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# Pharmacognostic Study & Nutritional Analysis of Dragon Fruit.

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**Abstract**: *This research will explore the nutritional benefits and health properties of dragon fruit, also known as Kamlam or Pitahiya in India. Originating from America, this fruit is extensively cultivated in countries such as Thailand, Vietnam, Israel, and Sri Lanka, and belongs to the cactus family. Not only does it significantly enhance farmers' incomes, but it is also packed with nutritional benefits. Its appealing appearance has led to a high market demand, and its cultivation in India has recently gained attention. The exterior of the fruit can be pink or yellow, while the interior features either white or pink pulp that is sweet and nutrient-rich, containing a wealth of vitamins and minerals*

**Keywords**: Dragon Fruit, Nutritional Properties, Health Benefit, Medicinal Property, Phytochemical Screening.

## I. INTRODUCTION

The Dragon Fruit (Hylocereus undatus), commonly referred to as pitaya, is a medicinal plant that belongs to the Cactaceae family and is prevalent in two primary genera: Hylocereus and Selenicereus. The most commonly cultivated varieties are from the Hylocereus genus. Pitaya is typically available in three principal varieties: Hylocereus undatus (characterized by red skin and white pulp), Hylocereus monacanthus, previously known as Hylocereus polyrhizus (with red skin and red pulp), and Hylocereus megalanthus, formerly referred to as Selenicereus megalanthus (featuring yellow skin and white pulp).That mature dragon fruit possesses a significant amount of total soluble solids, a wealth of organic acids, proteins, and a variety of minerals such as magnesium, calcium, and potassium. Dragon fruit is abundant in fibers, vitamins, and antioxidants, which aid in alleviating digestive issues and preventing conditions such as diabetes, cancer, and heart disease; it also helps lower cholesterol and high blood pressure while neutralizing harmful substances like heavy metals. The antioxidant properties of dragon fruit play a role in reducing the impact of several degenerative diseases, including arthritis, arteriosclerosis, inflammation, and cognitive decline. Research has revealed a remarkable presence of phytonutrients and antioxidants, including polyunsaturated fatty acids, Vitamin C, and Vitamin B, which are beneficial for the metabolism of carbohydrates, proteins, and carotenoids.

## MATERIAL & METHOD:-

**Botanical Classification Nomenclature of *Hylocereusundatus*:-**

| Rank | Specific Name |
|---|---|
| Kingdom | Plantae (Plants) |
| Sub Kingdom | Trachebionata (Vascular Plant) |
| Super division | Spermatophyta (Seed plants) |
| Division | Magnoliophyta (Flowering plant) |
| Class | Magnoliopsida (Dicotyledons) |

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|---|---|
| Order | Caryophyllales |
| Family | Cactaceae (Cactus Family) |
| Subfamily | Cactoideae |
| Species | *Hylocereusudantus* (Haw) Britton and Rose |


Varieties of Dragon Frui

**Sample collection:-**Fruits from three cultivars of dragon fruit (Hylocereus undatus, Hylocereus megalanthus, and Hylocereus costaricensis), all of the same age (30 days post-flowering), were collected. The samples were then transported to the Plant Physiology Laboratory for additional chemical analysis. For each species studied, three fruits were selected, with each fruit representing one of the three replicates.

**Preparation of Plant Materials and Extract:-**The authentication of Hylocereus spp. (Dragon fruit) plant materials was conducted by a specialist to confirm their identification and authenticity. Before extraction, the plant materials were rinsed under running tap water to remove any contaminants or unsuitable substances. The materials were then processed with a vegetable cutter to aid in the drying process. Following this, the plant materials were dried in an oven at a temperature of 60 degrees Celsius for 1-2 days. After achieving complete dryness, the materials were ground into a powder using a pulverizer. The resulting finely crushed or coarsely powdered plant materials were then subjected to the extraction process.

Table 1. Screening of bioactive compounds of dragon fruit stems using varied tests and positive result indicators.

| **Bioactive Compound Tested.** | **Test.** | **Positive result.** |
|---|---|---|
| Alkaloids. | **Mayer's Test** (A few drops of Mayer's reagent were added to 1 mL of extract). | Formation of yellowish Precipitate. |
| Anthocyanin. | **Alkaline reagent test** (Two to three drops of sodium hydroxide were added to the extract). | Appearance of deep yellow color and gradually became Colorless. |
| Flavonoids. | **Shinoda's test** (Ten drops of dilute HCL and a piece of magnesium were added to the extract). | Appearance of deep pink Color. |
| Phenols. | **Ferric chloride test** (Two milliliters of 5% neutral ferric chloride solution were added to the extract). | Appearance of dark blue Color. |
| Saponins. | **Froth test (**A drop of Na2CO3 solution was added to the extract in a test tube. After vigorous shaking, it was left to rest for five minutes). | Formation of foam. |
| Tannins. | **Lead acetate test** (A few drops of | Formation of reddishbrown |

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|---|---|---|
| | aqueous basic lead acetate solution were added to the extract using a test tube). | Precipitate. |
| Terpenoids. | **Salkowski test** (The test extract was shaken with chloroform, and concentrated H2SO4 was added along the walls of a test tube). | Appearance of red color. |

**NUTRITIONAL COMPOSITION ANALYSIS:-**

The nutritional composition (carbohydrate, crude fats, crude protein, moisture, ash, total sugar, crude fiber, and energy) of the peel, pulp, and whole fruit of the H. polyrhizus and H. undatus species were determined using the method of AOAC, 2005.

Ash:-Approximately 2 g of the sample was put into a preweighed crucible, and its weight was recorded and then placed in a muffle oven (Furnace Nabertherm, Germany) at 550°C for 2 h. Then, the ash sample crucible was transferred to a desiccator and cooled to room temperature, and the ash content was calculated by using the following formula: weight of reidue X 100/ weight of sample.

Fat:-The fat content was determined directly through extraction (peel, pulp, and whole fruit) with petroleum ether in an intermittent Soxhlet extractor (Soxhlet Extractor Darmstadt, Germany) for 4 h. The residue in the bottom of the round flask after solvent removal represented the fat content. The residue was weighed and checked via the Reflective Index (RI) using a reflectometer (Merck KGaA, 6 4271Darmstadt, Germany).

Crude protein:-Total protein was calculated from the nitrogen content measured by a modification of the AOAC, 2005 (Method No. 978.04). For the standard method, the sample was weighed to 1 g and mixed with a catalyst of 5 g of copper sulfate, 6.5 g of potassium sulfate, and 20 mL of concentrated sulfuric acid. Then, it was digested in a 250 mL digestion tube at 420°C for 45 minutes using a Kjeldahl digester (Tecator Kjeltec System, Germany). After that, 50 mL of distilled water was added using Kjeldahl distillation. Total nitrogen was determined by titration with standardized HCl (0.20 N) to a mixed indicator endpoint (1 mg mL−1 bromocresol green and 1 mg mL−1 methyl red in ethanol of volume concentration 950 mL L−1). Boric acid solution (4%) was employed for the catalyst reagent. The percentage of nitrogen (N) was calculated using the following equation. Nitrogen (%) = {(S-B) × N × 0.014 × D× 100}/weight of sample (W). where D = dilution factor, 0.014 = constant value, and S and B are the titer volumes of the sample and blank, respectively. Crude protein was obtained by multiplying the corresponding total nitrogen content by a convenience factor of 6.25. Thus, the percentage of crude protein was calculated as follows:

Crude protein (%) = % of N × 6.25.

Carbohydrate:-Total carbohydrate was determined by calculation with the following formula:

% (percentage) of total carbohydrate = [100 - % (crude protein + crude fat + ash + crude fiber)].

The various proximate parameters were all reported in percentages (AOAC, 2005). All the analyses (all three samples of the two species, i.e., peel, pulp, and whole fruit) were performed in triplicate.

Mineral analysis:-Na and K contents were determined by a flame photometer (Corning, Model 403, UK) (Abdualrahman et al., 2015). Ca, Mg, P, Fe, Zn, and Cu were determined using an atomic absorption spectrophotometer (Perkin-Elmer Model 403, USA) (Ekpete et al., 2013).

Estimation of vitamin C:-Vitamin C content in the different parts (peel and pulp) and whole fruit of the two species were separately determined using the official vitamin C estimation method (AOAC, 2005).

**Medicinal Properties and Health Benefits of Dragon Fruit:-**

Wound Healing Property:-The diabetic rat with injuries was administered an extract derived from dragon fruit leaves and flowers, resulting in a significant enhancement of the wound healing process. Bioactive compounds such as hydroxyproline, DNA collagen content, and total proteins present in dragon fruit pulp have historically been employed in traditional medicine for wound treatment, while also contributing to increased tensile strength through their healing

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properties. The young stems of the H. undatus plant, along with dragon fruit and fresh flower buds, are edible and can be consumed as vegetables. Dried flower buds are utilized in the preparation of homemade remedies. In culinary settings, dragon fruit is commonly featured in fruit salads and beverages. The high vitamin C concentration in dragon fruit supports the prevention of coughs and asthma, and it may also accelerate the healing of cuts and wounds.

Anti-ageing Property:-Dragon fruit is rich in Vitamin E and beta carotene, both of which act as inhibitors of cancer cell formation. Notably, the red variety of dragon fruit contributes to delaying the aging process. Additionally, the consumption of dragon fruit can reduce the number of fat cells in the body due to its reliable fiber content.

Anti-obesity Property:- The methanol extract from the flesh of H. costaricensis administered to the test rats demonstrated an anti-obesity effect. Additionally, the juice extract of H. undatus exhibited anti-inflammatory, antilipase, and anti-diabetic properties. The results from the dragon fruit indicated the presence of bioactive compounds such as saponins and triterpenoids, which have significant potential applications. Furthermore, the crude fibers, lipid profiles, and flavonoids found in the dragon fruit extract can inhibit the absorption of intestinal cholesterol.

Anticancer Property:- Natural compounds exhibiting anticancer properties are highly beneficial in cancer treatment. The human prostate cancer cell line PC3, the human breast cancer cell line Bcap-37, and the human gastric cancer cell line MGC-803 were analyzed for cytotoxic activity derived from dragon fruit. H. polyrhizus demonstrated superior cytotoxic effects on MGC-803 cells, a gastric cancer type, compared to H. undatus. The bioactive compounds present in the peel of dragon fruit, such as B16F10, AGS, and MCF-7, have the capability to inhibit the growth of cancer cells. The application of MGC-803, PC3, and Bcap-37 cell lines contributes to a reduction in cancer morbidity. Additionally, human liver cancer (HepG-2) cells treated with methanol extracts from H. undatus fruit pulp exhibited encouraging anticancer and anti-apoptotic properties, indicating its potential as an anti-cancer agent.

**Result:-**

**1. Pharmacognostic Study**

**a. Macroscopic Characteristics:**

Fruit shape: Oval to pear-shaped with prominent scales.

Color: Bright pink to red skin; flesh color varies (white, red, or purple depending on species).

Texture: Smooth flesh with tiny black seeds dispersed uniformly.

**b. Physicochemical Parameters:**

| Parameter | Result (%) |
|---|---|
| Total ash | 4.2 |
| Acid-insoluble ash | 0.6 |
| Water-soluble ash | 2.3 |
| Loss on drying | 6.8 |
| Alcohol soluble extractive | 8.5 |
| Water soluble extractive | 12.7 |

**c. Phytochemical Screening:**

Alkaloids: Absent, Flavonoids: Present

Tannins: Present, Saponins: Present

Glycosides: Present, Terpenoids: Present

**2. Nutritional Analysis**

| Nutrient | Per 100g (fresh pulp) |
|---|---|
| Energy | 50 kcal |
| Carbohydrates | 11.0 g |
| Protein | 1.1 g |
| Fat | 0.1 g |
| Dietary Fiber | 3.0 g |
| Vitamin C | 20.5 mg |

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|---|---|
| Calcium | 18 mg |
| Iron | 0.4 mg |
| Magnesium | 10 mg |
| Phosphorus | 22 mg |

## II. CONCLUSION

The findings of this review indicate that dragon fruit ranks among the most sought-after and nutrient-rich fruits globally. It is abundant in various minerals and nutrients, providing phytochemicals that possess antioxidant, antimicrobial, anticancer, antidiabetic, anti-cardiac, and anti-aging properties. Consequently, the significance of dragon fruit has increased in both economic and nutritional contexts. It serves as a reservoir of phytochemicals that foster health and contribute to economic development. This review aims to explore the cultivation of dragon fruit in a new region while considering its nutritional and commercial value. The fruit's nutritional abundance and health advantages have led to its worldwide recognition and adaptability. In tropical and subtropical climates, this crop thrives year-round in well-drained soils with a slightly heavy texture. Dragon fruit is rich in vitamins, dietary fiber, fructose, glucose, and minerals, all of which enhance the body's defenses against diseases. In summary, dragon fruit stands out as an exceptional fruit with significant therapeutic and nutritional benefits.

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