

Nutritional Profile of Dragon Fruit Products

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Dragon fruit (*Hylocereus* spp.) also known as pitaya or strawberry pear (Badma *et al.*, 2018), is a perennial, epiphytic tropical climbing cactus with a triangular fleshy jointed stems which belongs to family Cactaceae and of genus *Hylocereus* (Gunasen *et al.*, 2006; Tripathi *et al.*, 2014 and Cheah *et al.*, 2016). There are three species of dragon fruit which include *selenicereus megalathus* (white flesh with yellow peel dragon fruit), *Hylocereus undatus* (white flesh with red peel dragon fruit) and *Hylocereus polyrhizus* (red flesh with red peel dragon fruit). *Hylocereus undatus* is the most cultivated and consumed species of dragon fruit. The fruits of this species present market demand, due to its very attractive sensory characteristics (Homemde-Mello, 2014). Until recently, this fruit was unknown and has come to represent a growing niche in the exotic fruit market due to appreciation of the organoleptic characteristics when eaten raw or inserted in gastronomy (Granulado *et al.*, 2012). The dragon fruit was introduced in India late 90s. But the area under dragon fruit is still very limited.



Fig. 1: Dragon Fruits

In India, it is cultivated on very limited scale. A very few farmers of Karnataka, Kerala, Tamil Nadu, Maharashtra, Gujarat and Andhra Pradesh have taken up dragon fruit cultivation. The total area under dragon fruit cultivation is less than 100 acres (Tripathi *et al.*, 2014). World status of dragon fruit Vietnam is the world's largest producer of dragon fruit. The total area of dragon fruit cultivation in Vietnam is

approximately 50,000 ha in 2020 and production in 2020 is 12,50,000 MT and is expected to cross 17,00,000 MT by 2025. China has recently embarked on large-scale planting, adding up to over 60,000 hectares of dragon fruit. Vietnam exports up to 80 percent of its harvest, primarily to China, and the largest consumer of this fruit is still China.

Nutritional Value and Health Benefits of Dragon Fruits

This fruit is known because of its unique appearance, health benefits and other nutritional content. Dragon fruit is rich in nutrients like vitamin B1, B2, B3, C, high fiber content, minerals like Ca, Fe, P, with low amount of carbohydrates and no fats. Whereas, seeds contain 50% of essential fatty acids namely, linoleic acid and linolenic acid (Sonawane, 2017).

Different studies conducted with the dragon fruit emphasized its functional properties helping to reduce the risk of chronic diseases in the human body and also helpful in reducing blood sugar levels in people suffering from type 2 diabetics. Another benefits of dragon fruits is reduces cancer risks, increases boost immunity, help in digestion system, good for heart, skin, bones, eyes and hairs (Stintzing *et al.*, 2003; Yong *et al.*, 2009 and Wichienchot *et al.*, 2010).

Products Prepared from Dragon Fruits

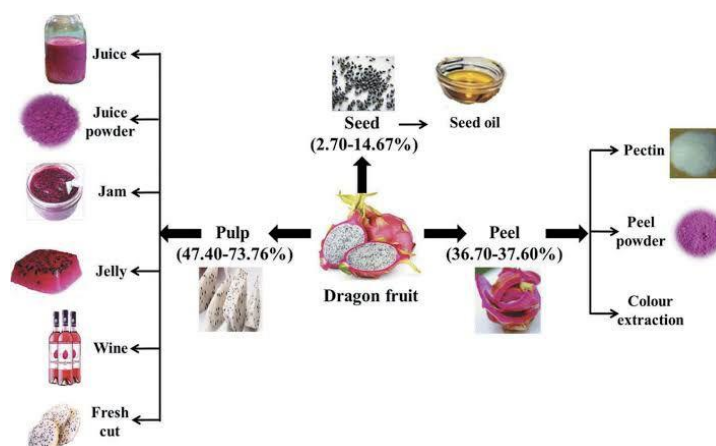


Fig. 2 Value-added products from dragon fruit

In India the dragon fruits are processed into a number of value-added products (Fig. 2.) like jam,

juice, pulp, jelly, yogurt, shrikhand, cheese, preserves, chocolates, ice-cream, energy and fruit bars, marmalade and preserves, pastries and wine etc. The details of value-added product prepared from dragon fruit are describe as per follows:

- 1) **Jelly:** The study was to analyze the proximate composition of Dragon fruit (*Hylocereus undatus*) and develop jelly from dragon fruit to assess its prospect in marketability. The proximate analysis showed moisture 87.90 ± 0.03 %, ash 87.90 ± 0.03 %, reducing sugar 4.50 ± 0.04 %, non-reducing sugar 3.50 ± 0.01 %, total sugar 8.00 ± 0.01 %, total soluble solid 11 ± 0.13 %, pH 4.20 ± 0.02 %, acidity 0.45 ± 0.01 % and vitamin-C 9.90 ± 0.04 %. Then the dragon fruit jelly was prepared with standard formulation (0.05 %, 0.1 % and 1.5 % of pectin) was analyzed for its nutritional composition with standard method. The three samples contained more or less similar nutritional compositions. The products were stored at ambient temperature (27°C to 34°C) for a period of 6 months and quality parameters were assessed. During storage the changes in color, flavor, odor, TSS and pH was observed. No special change of ingredients was found during first 4 months of storage and a little change of pH was observed after 4th months. A taste panel consisting of 10 panelists adjudged the acceptability of the samples. The consumer preferences were measured by statistical analysis. Among the samples jelly containing 1.5 % pectin secured the highest score for color, flavor, turbidity and overall acceptability.
- 2) **Dragon fruit powder:** Dragon fruit powder (DFP) is a rich source of fiber (15.7 %) and phytochemicals (Gallic acid). Commercial dragon fruit use is limited to ready to serve and other fruit products.
- 3) **Dragon fruit biscuits:** The study was made to develop biscuit from dragon fruit powder (DFP). Four formulations of biscuits were prepared by mixing DFP in the ratio 30 %, 40 %, 50 %, and 60 % (w/w) with wheat flour, and they were considered as DFB30 (Dragon Fruit Biscuit 30 %), DFB40 (Dragon Fruit Biscuit 40 %), DFB50 (Dragon Fruit Biscuits 50 %), and DFB60 (Dragon Fruit Biscuits 60 %), respectively. Biscuits were

prepared by using the traditional creaming method. Prepared biscuits were compared with sole wheat flour biscuit (B0) as a plain/control sample. As per sensory evaluation, DFB50 is acceptable formulation of wheat flour to DFP. Biscuit (DFB50) showed increased fiber content by about fivefold (7.81 g %), minerals (0.91 g %), and improved spread ratio (8.76) when compared with wheat flour biscuit (B0). Biscuit also reported being enriched with 0.0092 mg % Gallic acid with no significant change noticed in protein, fat, calcium, and iron content as from wheat biscuit (B0). It may be mentioned that 100 g daily consumption of fortified biscuit may alone fulfill 20 % recommended daily intake requirement for dietary fiber.

- 4) **Jam:** The study was to determine the shelf life of red dragon fruit jam using the Arrhenius model based on Accelerated Shelf-Life Test (ASLT). The fruit jam was prepared using pectin as stabilizer and 10 minutes of cooking times. Two parameters, that were the Total Plate Count (TPC) values and the antioxidant activity, were utilized to estimate the shelf life of red dragon fruit jam using the Arrhenius equation. The zero-order kinetic model has been proved to be the most appropriate model to represent the change of TPC values whereas the first order model is best fitted for the change of antioxidant activity. Accord the chosen models, the shelf life of red dragon fruit jam during storage at 28°C is estimated to be 99 days
- 5) **Wine:** A new type of fruit wine made from red dragon fruit juice was produced through alcoholic fermentation (AF) with different yeasts: *Saccharomyces cerevisiae* EC-1118, *Torulaspora delbrueckii* Biodiva and *Lachancea thermotolerans* Concerto. Complete AF with similar fermentation rates in terms of sugar utilisation and ethanol production (8–9 %, v/v) was achieved by three yeast strains. *T. delbrueckii* produced a significantly lower amount of glycerol and acetic acid, while *L. thermotolerans* produced more lactic and succinic acids. In addition, the two non-*Saccharomyces* strains were more efficient in proline utilisation. For volatile compounds, *S. cerevisiae* produced the highest amounts of esters,

while *T. delbrueckii* produced higher alcohols, isoamyl acetate and terpenes. On the other hand, AF caused significant degradation of betacyanin pigments and total phenolic compounds. Nevertheless, better retention of antioxidant activity and colour stability was found in *L. thermotolerans* and *T. delbrueckii* fermented wines than that of *S. cerevisiae*. This study suggested that it is feasible to use pure non-Saccharomyces yeast to produce red dragon fruit wine for commercialization.

Conclusions

Dragon fruit is high in vitamin C and other antioxidants, which are good for your immune system. It can boost your iron levels. Iron is important for moving oxygen through your body and giving you energy, and dragon fruit has iron. And the vitamin C in dragon fruit helps your body take in and use the iron. It is highly nutritious as well as great in taste and health preservation functions.

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