



DRAGON FRUIT (*Hylocereus spp.*): NUTRITIONAL, MEDICINAL AND THERAPEUTIC VALUES

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Abstract

Hylocereus spp., commonly known as dragon fruit (pitahaya) originated principally from the tropical and subtropical forest regions of Latin Americas. Studies revealed that it lower cholesterol concentration, balance blood sugar concentration, prevent colon cancer, strengthen kidney function and strengthen the brain workings, increasing the sharpness of the eyes. Dragon fruit is reported to have health benefits including prevention of memory losses, prevention of cancer, control of blood glucose level in diabetic patients, prevention of oxidation, aiding in healing of wounds etc. In addition, it has the ability to promote the growth of probiotics in the intestinal tract. The dragon fruit helps in the digestive process, neutralize toxic substances such as heavy metal, and when it will consumed regularly the dragon fruit can help against asthma and cough. Flavonoids have a wide range of biological activities, such as cell proliferation-inhibiting, apoptosis-inducing, enzyme-inhibiting, antibacterial, and antioxidant effects. Moreover, some findings indicate that flavonoids has various clinical properties, such as anti atherosclerotic, anti inflammatory, anti tumour, anti thrombogenic, anti osteoporotic, and antiviral effects.

Introduction

A pitaya or pitahaya is the fruit of several cactus species, most importantly of the genus *Hylocereus* (sweet pitayas). Pitaya (*Hylocereus spp.*) originated principally from the tropical and subtropical forest regions of Latin Americas, including North, Central and South America (Crane and Balerdi 2005; Luders and McMahon, 2006). It is known as dragon fruit in Asia as its skin is covered with bracts (scales) like dragon (Mizrahi *et al.*, 2002). Dragon Fruit belongs to family of *Cactaceae* and grows best in dry, tropical or subtropical climates where annual rainfall ranges from 20-50 inch per year. It is an epiphyte plant that requires a peat land and a warm and humid environment. Joints can measure up to 1.20 m and the stems can reach 10 m or more in length being 10-12 cm thick. Currently, it is being cultivated in at least 22 countries in the tropics including Australia, Cambodia, China, Malaysia, Thailand, Srilanka (Nobel and Barerra, 2002).

In India these fruits are mainly available in metro-politican cities like Mumbai, Chennai, Kolkata, Delhi, Ahmedabad, etc. imported from Vietnam, Singapore, Srilanka and from many south East Asian countries. Nowadays, these fruits are cultivated in many regions like Pune, Ahmednagar, Aurangabad, Sholapur, Sangali in Maharashtra. It is cultivated in low country wet zone, intermediate zone and dry zone with irrigation facilities. The fruit weighs 150-1200 g and their differences lie on the size and shape of the fruit, as well as the

colour of their pulps i.e. red (*H. polyrhizus*) or white (*H. undatus*). The average weight of a dragon fruit is around 350 g. The best climate condition for dragon fruit plantation is dry, tropical or subtropical. As for the fruit production, one plant can produce up to four to six cycles of fruits per year and fruits are harvested when they are fully expanded and the skins become 85% red in colour. Dragon fruit has a pH ranging between 4.7 and 5.1 and a Brix value ranging between 11 and 19°Brix (Gunaseena *et al.*, 2007).

Nutritional Profile

Nutrition	Amount
Water	82.5- 83 g
Protein	0.159- 0.229 g
Fat	0.21- 0.61 g
Fiber	0.7- 0.9 g
Carotene	0.005- 0.012 mg
Calcium	6.3- 8.8 mg
Phosphorus	30.2- 36.1 mg
Iron	0.55- 0.65 mg
Vitamin B	1 0.28- 0.043 mg
Vitamin B	2 0.043- 0.045 mg
Vitamin B	3 0.297- 0.43 mg
Vitamin C	8.0- 9.0 mg
Thiamin	0.28- 0.30 mg
Riboflavin	0.043- 0.044 mg
Niacin	1.297- 1.30 mg
Ash	0.28 g
Other	0.54- 0.68 g

The fruit contains relatively high amount of fiber (2–4%, w/w), potassium (3.2–4 g/L) and antioxidants (42.4±0.04 mg of gallic acid equivalents/100 g of flesh) (Wu *et al.*, 2006). In addition, red pitaya is a good source of proline (1.1–1.6 g/L) and the seed of red pitaya also contains considerable amount of essential fatty acid (linoleic acid, 51%) (Ariffin *et al.*, 2009). In terms of proximate analysis of red pitaya, each 100 g of red pitaya has total titratable acidity of 2.4–2.5 g/L. The sugar content of red pitaya is mainly contributed by glucose (55 g/L) and fructose (19 g/L) while citric acid and lactic acid are the two organic acids found in the fruit. Dragon fruit for Diabetes
Dragon fruit contains phytoalbumins and flavonoids that helps in the prevention of diabetes. Dragon fruit for Weight-Loss Dragon fruit is rich in fibers that helps in the digestion of food and in detoxifying harmful chemicals in the colon. A 100-gram serving of white-

fleshed pitahaya provides an estimated 21 milligrams of vitamin C, which corresponds to 34% of the daily value (DV) set for vitamin C. By way of comparison, this is less than half the amount of vitamin C found in an equal serving of oranges but more than three times the amount of vitamin C found in carrots. Vitamin C is perhaps best known for its ability to strengthen the immune system, but it also offers many other health benefits. When you eat dragon fruit or other foods that contain vitamin C, you boost your body's natural ability to get rid of heavy metals and other toxins, promote the healing of your body's cells, and improve your ability to cope with stress. Vitamin C is also an important antioxidant that is vital for overall good health and beautiful skin.

Due its nutritional profile, dragon fruit can be used as a natural remedy for constipation. Dragon fruit seeds, in particular, appear to have strong laxative properties and can therefore be highly effective at stimulating bowel movement. One of the nutrients that contributes to the laxative properties of the dragon fruit is fiber. A 100-gram portion of dragon fruit delivers 3 grams of fiber, which is equivalent to 12% of the daily reference value for dietary fiber. Furthermore, dragon fruit seeds contain polyunsaturated fatty acids which have been shown to exert laxative effects.

Medicinal and Therapeutic values:- Mayas used *H. undatus* fruits as hypoglycemic, diuretic, against heart disease (Argueta, 1994; Ankli *et al.*, 1999), wound disinfectant, tumor

dissolution with stem sap (Mendieta & Del Amo, 1981), and dysentery cure (Hopkins & Stepp, 2012).

In the last decade, it has been shown that *H. monacanthus* fruits have antioxidant and anti-proliferation properties (Kim *et al.*, 2011). Wu *et al.* (2006) have verified that *H. monacanthus* peel and pulp are rich in polyphenols, and peel could inhibit cancer cell growth (melanoma B16F10 and other types) (Kim *et al.*, 2011). Tenore *et al.* (2012) have shown that polyphenol extracts from the fruit have antioxidant properties and nutraceutical potential, and that the pulp is source for phytochemically bioactive compounds (antioxidants). Oligosaccharides from *H. undatus* and *H. monacanthus* have pre-biotic characteristics, resistance to acid conditions in the stomach, and partial resistance to human α -amylase, and they also promote lactobacillus and bifidobacterias. Pitahaya seed oil is a potential source of natural antioxidants and contains phenolics, tocopherols, and sterols (Lim *et al.*, 2010). *H. undatus* and *H. monacanthus* contain 50 % of essential fatty acids; linoleic acid is in greater proportion than linoleic (C18:2, 48% and C18:3, 1.5%). In *Hylocereus* seeds, the linoleic acid concentration is greater than in flax seed, canola, sesame or grapevine. However, seed mass relative to the fruit is very low (1:99) (Ariffin *et al.*, 2009). Nonetheless, Chemah *et al.* (2010) mention that pitahaya seeds have high potential as source of antioxidant and essential fatty acids, with an exceptional level of linoleic acid: 660 g Kg⁻¹ in *H. megalantus*, 540 g Kg⁻¹ in *H. undatus* and 480 g Kg⁻¹ in *H. monacanthus*. Acetone extracts (70 % concentration) of *Hylocereus* peel have high antimicrobial activity, particularly against *Salmonella typhi*. Likewise, the phenolic fractions of *H. monacanthus* fruit have great antimicrobial spectrum than non-fractionated extracts (Tenore *et al.*, 2012). Chloroform extracts of *H. polyrhizus* and *H. undatus* have antimicrobial activity against gram-positive and gram-negative bacteria, but *H. polyrhizus* extracts have greater effect. In rats, an antihepatotoxic effect has been shown after paracetamol induced hepatotoxicity. A pitahaya based diet decreases, in rats, dyslipidemia (increased and modifiable risk factor for cardiovascular disease, particularly coronary disease due to lipid alteration in the blood). Betanidine extracted from *H. ocamponis* and administered to atherogenic BALB mice in 9.6 mg dosages for 40 days reduced, through an unidentified mechanism, glucose levels by 50.9 %.

In terms of fertility, Ankli *et al.* (1999) consider *H. undatus* used for abortion prevention. *H. costaricensis* fruit promotes rat fertility; 500 mg Kg⁻¹ of ethanol extracts from pitahaya fruits increased sperm count, and 1000 mg Kg⁻¹ incremented sperm viability and production rate; additionally, under histological observations high sperm density in the seminal tubes was found. Methanol extracts from *H. polyrhizus* in 5000 mg Kg⁻¹ day⁻¹ for 28 days showed no signs of acute or subchronic toxicity or mortality (Hor *et al.*, 2012).

Conclusion

Dragon fruit is a very wonderful fruit not only providing nutrition but also offering several components which shows medicinal and therapeutic properties against a wide number of ailments. Most of its chemical constituents have explored for treating conditions like diabetes, constipation, weight loose (obesity), kidney disorder, life threatening disease like cancer and many more serious diseases.

References

- Ankli A., Sticher, O., Rich, M. H. 1999. Yucatecmaya medicinal plants versus non medicinal plants: indigenous characterization and selection. *Human Ecology*, **27**(4): 557-580.
- Argueta, A. V., Cano, L. M. A., Rodarte, M. E. 1994. Atlas de las plantas de la medicina tradicional Mexicana. *Instituto Nacional Indigenista II*: 1170– 1171.
- Ariffin, A. A., Bakar, J., Tan, Ch. P., Rahman, R. A., Karim, R. and Loi, Ch. Ch., 2009. Essential fatty acids of Pitaya (dragon fruit) seed oil. *Food Chemistry*, **114**(2):561-564.
- Chemah, T. C., Aminah, A., Noriham, A., Wan- Aida, W. M. 2010. Determination of pitaya seeds as a natural antioxidant and source of essential fatty acids. *International Food Research Journal*, **17**(4): 1003-1010.
- Crane, J. H. and Balerdi, C. F. 2005. Pitaya growing in the Florida home landscape. *IFAS Extension*, HS1068: 1–9.
- Gunasena, H. P. M., Pushpakumara, D. K. N. G. and Kariyawasam, M., 2007. Chapter 4: dragon fruit —*Hylocereus undatus* (Haw.) Britton and Rose. In: Pushpakumara, D.K.N.G., Gunasena, H.P.M., Singh, V.P. (Eds.), *Underutilized Fruit Trees in Sri Lanka*. World Agroforestry Centre, South Asia Office, New Delhi, India, Pp. 110–142.
- Hopkins, A. L. and Stepp, J. R. 2012. Distribution of herbal remedy knowledge in Tabi, Yucatan, Mexico. *Economic Botany* **66**(3): 249-254.
- Hor, S. Y., Ahmad, M., Farsi, E., Yam, M. F, Hashim, M. A., Lim, C. P., Sadikun, A. and Asmawi, M. Z. 2012. Safety assessment of methanol extract of red dragon fruit (*Hylocereus polyrhizus*): Acute and subchronic toxicity studies. *Regulatory Toxicology and Pharmacology*, **63**: 106-114.
- Kim, H., Choi, H. K., Moon, J. Y., Kim, Y. S., Mosaddik, A. and Cho, S. K. 2011. Comparative antioxidant and antiproliferative activities of red and white pitayas and their correlation with flavonoid and polyphenol content. *Journal of Food Science*, **76**(1): 38-45.
- Luders, L. and G. McMahon. 2006. The pitaya or dragon fruit (*Hylocereus undatus*). *Agnote*, **778**: 1–4.
- Mendieta, R. M., Del Amo, R. S. 1981. *Catálogo de las plantas medicinal es del estado de Yucatán*. Instituto Nacional de Investigaciones sobre Recursos Bióticos Xalapa, Veracruz, Mexico. 428p.
- Mizrahi, Y. and Nerd, A. 2002 Climbing and columnar cacti: New arid land fruit crops. *Progress in new crops*. ASHS Press Alexandria, VA. Pp: 56-64.
- Nobel, P. S. and de la Berrera, E. 2002 Stem water relations and wet CO₂ uptake for hemiepiphytic cactus during short term drought. *Environment and Experimental Botany*, **48**: 129-137.
- Tenore, G.C., Novellino, E., Basile, A. 2012. Nutraceutical potential and antioxidant benefits of red pitaya (*Hylocereus polyrhizus*). *Journal of Functional Foods* **4**(1): 129-136.
- Wu, L. C., Hsu, H. W., Chen, Y. C., Chiu, C. C., Lin, Y. I., Annie and Ho J. 2006. Antioxidant and anti proliferative activities of red pitaya. *Food Chemistry*, **95**(2): 319-327.