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Nutritive and medicinal value of dragon fruit

■ MADHURI SHRIKANT SONAWANE

ABSTRACT : Dragon fruit or pitahaya (*Hylocereus* spp.) is considered as a heavenly fruit on the earth. It is eaten as fresh or dried fruit, as a vegetable, as a fodder, as a natural colouring agent in various drinks and beverages, as a pectin source. Most importantly, being rich in various nutrients, vitamins and minerals and accordingly owing 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. In a present investigation attempt has been made to explore the available research studies to prove or disprove the claims of its high nutritive and medicinal values.

KEY WORDS : Dragon fruit, Pitahaya, Nutritive value, Medicinal value, Food dye, Pectin

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Author for correspondence :

MADHURI SHRIKANT
SONAWANE

School of Agricultural Sciences,
Yashwantrao Chavan
Maharashtra Open University,
NASHIK (M.S.) INDIA

There are various cacti producing edible fruits. Pitahaya are the fruits of the cacti belonging to the genus *Stenocereus* and are indigenous to Central America. These are commonly eaten in the arid regions of the America and are sour in taste. The species include *S. gummosus*, *S. queretaroensis*, *S. griseus*, etc. The fruits of another genus *Hylocereus* are called as pitahaya or dragon fruit. Pitahaya producing cacti of the genus *Hylocereus* are originally native to Mexico. They were transplanted to Central America, probably by Europeans. (Morton, 1987). These cacti are cultivated in Southeast Asia mainly Thailand and Vietnam, the United States, Israel, Australia, Cyprus and the Canary Islands. Various Pitahaya producing *Hylocereus* species include *Hylocereus undatus*, *Hylocereus costaricensis*, *Hylocereus megalanthus*, etc. Fruits of *Hylocereus* are sweet with leathery skin.

Hylocereus are the tall cacti species with flowering fruit. It is a vining, terrestrial or epiphytic cactus with fleshy stem. The plant grows climbing the support pole or other tree using aerial roots. Dragon fruit stems are scandent (climbing habit), creeping, sprawling or

clambering and branch profusely with generally three ribs and undulating horn-like margins with areoles, bearing spines. Scented, nocturnal, greenish-yellow or whitish and rarely rose-tinged flowers are produced on the succulent stem.

The dragon fruit is oblong to oval, to 6–12 cm long, 4–9 cm thick, mostly red with large bracteoles. It has thin, leathery rind with sweet flavoured white or red pulp inside. Very small, black coloured edible seeds are embedded in the pulp (*Hylocereus undatus*, n.d.). The fruit normally weighs from 150 to 600 g.

Dragon fruit grows best in dry, tropical and subtropical climates enduring temperatures upto 40 °C. In wet tropical zones plants grow well but sometimes have problem setting fruits reliably. The dragon fruit sets on the cactus-like trees 30–50 days after flowering and can sometimes have 5–6 cycles of harvests per year.

Dragon fruit tree is used as ornamental vine in gardens and landscapes. The fruit is eaten as fresh fruit chilled by peeling away the skin or as dried fruit. It is also used as flavouring agent in drinks, juices and alcoholic beverages sorbet, smoothie and pastries.

Unopened flower buds are cooked and eaten as vegetables. Fruit peel is used for extracting natural colouring agent, as well as natural source of pectin.

Objectives:

Now-a-days, dragon fruit is gaining popularity in India as a nutritious and medicinal fruit. It is being eaten with a say of high nutritional value and remedial over various health problems. The major aim of this study is to explore the research evidences for the assumptions that dragon fruit has high nutritive and medicinal values.

RESEARCH METHODS

This is descriptive study based on secondary data. Various research journals, books, websites and various reports related to nutritive and medicinal value of dragon fruit were studied to draw the conclusions.

RESEARCH FINDINGS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Medicinal and nutritive value of fruit :

Dragon fruit is considered as a heavenly fruit on the earth with high nutritive and medicinal values. It is considered to lower blood sugars in type 2 diabetes. Therefore, the dried dragon fruit is included in diabetic diet plan. Eating fruit is considered beneficial for carbohydrate metabolism, strengthening bones and teethes, heart tissues, healthy blood and tissue formation,

strengthening immune system, faster healing of bruises and wounds, respiratory tract infections and even as a mild laxative due to substantial fibre content. Dragon fruit is believed to 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 as well as cosmetic ingredients (Suryono, 2006).

The fruit pulp is rich in antioxidants and vitamin C, polyunsaturated (good) fatty acids, B vitamins, carotene, protein and minerals like calcium, iron, potashium, sodium, etc. Rahmawati and Mahajoeno (2009) have reported vitamin C content as high as 6000mg/100 g of fruit pulp.

The seeds of dragon fruits are high in polyunsaturated fats (omega-3 and omega-6 fatty acids) that reduce triglycerides and lower the risk of cardiovascular disorders. Eating dragon fruit can help the body to maintain such normal function as ridding the body of toxic heavy metals and improved eyesight. Lycopene, responsible for the red color in dragon fruit, has been shown to be linked with a lower prostate cancer risk (What Is Dragon Fruit Good For?, n. d.)

Dragon fruit also have some toxic effects on health if consumed excess amounts.

Fruit pulp:

A 100 g of dragon fruit pulp contains nutrients as per the following Table 1.

Earlier studies (Mahattanatawee *et al.*, 2006) focus

Table 1 : Dragon fruit pulp contains nutrients			
Nutrients	Amount per 100 g	% daily value	Remarks
Water	87g	NA	Very high water content
Protein	1.1g	2.1%	
Fat	0.4g	NA	Contains practically no fat
Carbohydrates	11.0g	3.4%	
Fibre	3g	12%	Very good source of dietary fibre
Vitamin B1 (Thiamine)	0.04mg	2.7%	
Vitamin B2 (Riboflavin)	0.05 mg	2.9%	
Vitamin B3 (Niacin)	0.16	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)	1.9mg	10.6%	A good source of iron
Phosphorus (P)	22.5 mg	2.3 %	
Zinc (Zn)	NA	NA	

Source: <http://www.healwithfood.org/nutrition-facts/dragon-fruit-nutritional-health-benefits.php#ixzz4wk4LZcyC>

on the nutritional composition of dragon fruit including its antioxidant activities, total soluble phenolics (TSP), total ascorbic acid (TAA), total dietary fibre (TDF) and pectin as all were influenced by cultivar. Red dragon fruit is assumed having much iron to increase hemoglobin and erythrocyte level. Widyarningsih *et al.* (2017) have proved statistically significant effect of red dragon fruit juice on hemoglobin and erythrocyte levels in pregnant women and thereby suggesting an alternative treatment to deal with anemia among pregnant women.

Though not on human experiments on rats (Swarup *et al.*, 2010) have proved dragon fruit extract treatment was effective in controlling oxidative damage and decreasing the aortic stiffness measured by pulse wave velocity in streptozotocin-induced diabetes in rats.

Seeds :

Dragon fruit contains black, small seeds embedded in white or pink flesh. Attempts have been made to determine the composition of the oil extracted from these seeds of dragon fruit (Ariffin *et al.*, 2009). Interestingly, the oil extract of these seeds was found rich with 50 per cent of essential fatty acids namely, linoleic acid and linolenic acid – a necessity in human metabolism and cannot be synthesized from other food components by human body. Certain studies even revealed that dragon fruit flesh is rich in polysaccharides (Xu *et al.*, 2016) and mixed oligosaccharides (Wichienchot *et al.*, 2010) that were found capable of stimulating the growth of Lactobacilli and Bifidobacteria. Bifidobacteria and Lactobacilli are Gram-positive lactic acid-producing bacteria constituting a major part of the intestinal microflora in humans. This gastrointestinal microflora are called probiotics and help suppress the growth of gastrointestinal pathogens. Fantastically, dragon fruit is proving to be a natural probiotic.

The fatty acid compositions of two pitahaya seed oils were determined as follows (Ariffin *et al.*, 2009).

Fruit peel:

Pectin :

Dragon fruit, is also considered to be rich in pectins. Nur Izalin *et al.* (2012) has reported yield of pectin extracted from dragon fruit about 14.96 to 20.14 per cent of the dried peels. This can be used for commercial purpose. 7.5 per cent of pectin extracted by microwave assisted extraction method (Thirugnanasambandham *et al.*, 2014). Tang *et al.* (2011) revealed that dragon fruit could be a substantial source of pectin in fruit production. Nur Izalin *et al.* (2016) recommended using dragon fruit peel pectin as a thickener in food products such as low viscous food and beverages.

Betalains:

Dragon fruit is also considered good source of food dye or food colouring agent. Food colouring agents are required to compensate the colour losses during processing. The health-conscious consumers are preferring natural food dyes over the synthetic one. Dragon fruit is rich in pigment betalains comprising betacyanins and betaxanthins. Rebecca *et al.* (2008) not only extracted these pigments but reported great tolerance of these pigments towards the factors causing colour loss during processing (Stintzing *et al.*, 2002; Harivaindaran *et al.*, 2008; Esquivel *et al.*, 2007; Harbach *et al.*, 2004; Harbach *et al.*, 2007 and Ruzainah *et al.*, 2009). Woo *et al.* (2011) recommended refrigeration at 4°C without light for preserving the dragon fruit peel dye colour upto 3 weeks. Rodriguez *et al.* (2016) revealed that the antioxidant, anti-inflammatory, antiangiogenic and GST-inducing activities of betalains from red dragon fruit peels were enhanced through carbohydrate encapsulation.

Table 2 : Fatty acid composition of two pitahaya oil seeds

Fatty acid	<i>Hylocereus costaricensis</i> (Red-fleshed pitahaya)	<i>Hylocereus undatus</i> (White-fleshed pitahaya)
Myristic acid	0.2%	0.3%
Palmitic acid	17.9%	17.1%
Stearic acid	5.49%	4.37%
Palmitoleic acid	0.91%	0.61%
Oleic acid	21.6%	23.8%
Cis-vaccenic acid	3.14%	2.81%
Linoleic acid	49.6%	50.1%
Linolenic acid	1.21%	0.98%

Medicinal and nutritive value of stem:

Even the stem of dragon fruit tree is found possessing medicinal values. Certain studies (Ruzainah *et al.*, 2009) have suggested that premature stem of dragon fruit being higher in ascorbic acid content compared to dragon fruit flesh, may have been helpful in preventing the risk factors of certain diseases.

Conclusion:

Dragon fruit is gaining popularity in India as a nutritious and medicinal fruit. It is being eaten with a say of high nutritional value and remedial over various health problems. After exploring the available research evidences related to high nutritive and medicinal values of dragon fruit, it can be concluded that dragon fruit is rich in nutrients like vitamin C, B1, B2, B3, high fibre content, minerals like Ca, Fe, P, less carbohydrates and no fats, seeds rich with 50 per cent of essential fatty acids namely, linoleic acid and linolenic acid – a necessity in human metabolism and cannot be synthesized from other food components by human body. All these factors are rendering it beneficial for various diseases. Even the stem of dragon fruit tree is found possessing medicinal values. As premature stem of dragon fruit contains higher ascorbic acid, it may have been helpful in preventing the risk factors of certain diseases. Fresh and dried dragon fruit skin both are rich in pectins and betalains making it natural food thickener and natural colouring agent.

Of course, a very scanty research references available on the nutritional composition of dragon fruit have hampered the concrete conclusions over some aspects.

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