



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; Sp9(2): 424-427

Received: 04-01-2020

Accepted: 07-02-2020

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Beetroot- A review paper

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Abstract

The Beetroot is the taproot portion of the plant. It is an excellent food which is important for development and growth of human body. It is a rich source of antioxidant and minerals. It also acts as fruits as well as vegetables. Fresh form of beetroot generally consumed as a salad. It contains betalain essential for cardiovascular health. It plays another role as a natural color in the textile industries and as a medicinal plant to cure the various illnesses.

Keywords: Beetroot, Uses, Antioxidant, Betalain, Health, Disease.

Introduction

Beetroot (*Beta vulgaris* L.) belongs to the Chenopodiaceae family. It has bright crimson colour. Beetroot is commonly known as beet, chard, spinach beet, sea beet, garden beet, white beet and Chukander (in Hindi). It has very medicinal properties which give some positive effect on the human body. Beetroot can be eaten raw, boiled, steamed and roasted. Red beetroot is a rich source of minerals (magnesium, manganese, sodium, potassium, iron, copper) (Mathangi, 2019)^[14]. The beetroot has different medicinal properties and help to protect against heart disease and certain cancers (colon cancer) (Kavalcova *et al.*, 2015). Beetroot are rich in other valuable compound such as glycine, betaine (De Zwart *et al.*, 2003)^[6], Saponins (Atamanova *et al.*, 2005)^[1], betacyanin (Patkai *et al.*, 1997)^[15], carotenoids (Dias *et al.*, 2009)^[7], folates, betamins, polyphenols and flavonoids (Vali *et al.*, 2007)^[20].

Beetroot contributes to consumer's health and wellbeing because it has antioxidant property due to the presence of nitrogen pigment betalain. Beetroot are also known for its antimicrobial and antiviral effects (Strack *et al.*, 2003)^[19] and it can also inhibit the cell proliferation of human tumor cells (Reddy *et al.*, 2005)^[18]. Beetroot is one of the natural food which boosts the energy as it has one of the highest nitrates and sugar contents plant (Yadav *et al.*, 2016)^[22]. Beetroot makes an excellent dietary supplement as it is not only rich in minerals, vitamins and nutrients but it also has unique Phytochemical compounds (carotenoids, phenolic acids, ascorbic acid) which have many medicinal uses.

Several parts of this plant are used as antioxidant, antidepressant, antimicrobial, antifungal, anti-inflammatory, diuretic and carminative. (Yadav *et al.*, 2016)^[22]. The beetroot is an alkaline food with a pH 7.5-8 and it contains significant amount of vitamin C, vitamin B1,B2, niacin, B6, B12 and its leaves are excellent source of vitamin A.

The beetroot juice can also be consumed as a natural remedy to expel kidney and bladder stones and also for sexual weakness.

Beetroot is easy to grow and is always ranked as one of the top 10 vegetables grown in India. Beetroot is grown for food uses (pickles, salad, juice) rather than for sugar production. In contrast to other fruits, the main sugar in beetroot sucrose with only small amount of glucose and fructose (Bavec *et al.*, 2010)^[2]. Because fructose lowers one's exercise capacity, low fructose and high sucrose content, for example, in sports drinks.

Beet powder is used as a colouring agent for many foods product. Some frozen pizzas use beet powder for colouring in tomato sauce. The most common garden beet is deep red ruby in colour, but yellow, white, and pepper arrows are available in specialty markets. Outside the United States, beets are often called beetroots. It is estimated that about two thirds of the beetles' crops remain chemical. The Greek Peripatetic Theophrastus later describes the same beetle as an herb, while Aristotle also mentions a plant (Hilland Langer, 1991)^[9].

Beets are used in molded vegetables, flowering roots, and beetles and in many product systems. Beetroots for processing and fresh market are harvested mainly in September and October. A yield of 20,000 kg per hectare (Beetroot, 1983). The roots and greens are great for women health and for those planning pregnancies. The fresh beetroot and sliced beetroot are shown in Figure-1

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Fig 1: (a) and (b) shows fresh and sliced beetroot respectively

Beetroot is a good tonic food for health. The market for beetroot is not a large market but it is significant and deliveries to wholesalers. In the long run the sales period can be extended to the roots (Boswell, 1967)^[5]. Beta vulgaris var. rubra revealed significant tumor inhibitory effects in skin and lung cancer (Kapadia *et al.*, 1996)^[11]. These findings suggest that beetroot ingestion can be a useful to prevent the cancer. But extracts of beetroot also showed some antimicrobial activity on *Staphylococcus aureus* and on *Escherichia coli* and also antiviral effect was observed (Rauha *et al.*, 2000; Prahoveanu *et al.*, 1986)^[17, 16].

Some of the most controversial examples are the official position of the South African health minister on AIDS treatment. Dr Manto Tshabalala-Msimang, health minister under Thabo Mbeki, was named "Dr. Beetroot" to supplement beets and other vegetables with antiretroviral medicines, which she considered harmful (Blandy, 2006)^[4]. Beetroot is one of the original 'super foods'.

There are nine other species in the beta genus and all also have the common name beet, although Beta vulgaris is the most well-known and commercially important (NRCS, 2006).

Other language name of beetroot

Bita gacha (Bengali), Bit (Malayalam), Bita (Marathi), Beet (Punjabi), Carkkarai vali kilanku ceti (Tamil), Dumpamokka (Telegu), Salada (Gujarati) and Gajarugadde (Kannada)

Table 1: Physical properties of beetroot

Physical parameters	Average value
Mass	180 gm
Length	16.25 cm
Colour	Dark red
Diameter	5.43 cm
Shape	Round
Viscosity	0.72 Pa s
Edible index	91.03%
Waste index	8.07%

*value is the average of 3 determinations

Table 2: Nutritional value of fresh beetroots: -

Composition	Values	Composition	Values
Carbohydrates	9.96 g	Vitamin B ₆	0.067 mg
Sugars	7.96 g	Folate (Vit. B ₉)	80 µg
Dietry fiber	2.0 g	Vitamin C	3.6 mg
Fat	0.18 g	Calcium	16 mg
Protein	1.68 g	Iron	0.79 mg
Vitamin A equiv.	2 µg	Magnesium	23 mg
Thiamine (Vit. B ₁)	0.031 mg	Phosphorus	38 mg
Riboflavin (Vit. B ₂)	0.027 mg	Potassium	305 mg
Niacin (Vit. B ₃)	0.331 mg	Zinc	0.35 mg
Pantothemic acid (B ₅)	0.145 mg	Sodium	77 mg

Historical background

Zohary and Hopf also suggested that beetroot cultivars were also cultivated at the time, and some Roman recipes support this.

Beets are native to the Mediterranean. Although the leaves have been eaten since before written history, the beetroot was generally used medicinally and did not become a popular food until French recognized their potential in the 1800's. Beet powder is used as a coloring agent for many foods. Some frozen pizzas use beet powder for coloring in tomato sauce. The most common garden beet is deep red ruby in color, but yellow, white, and candle arrows are available in specialty markets. Outside the United States, beets are generally referred to as beetroot. It is estimated that about two-thirds of commercial beet crops end up canned.

They state the earliest written mention of the beet comes from 8th century Mesopotamia (Hopf *et al.*, 2000)^[10]. The Greek Peripatetic Theophrastus later describes the beet as similar to the radish, while Aristotle also mentions the plant (Hill and Langer, 1991)^[9]. Later English and German sources show that beetroots were commonly cultivated in Medieval Europe (Hopf *et al.*, 2000; Hill and Langer, 1991)^[10, 9].

Harvesting and Handling

Harvesters used for other root crops are used for beets. Harvesters under dry weather and soil conditions. Ensure that soil debris is minimized in the bulk bins so that the beets have sufficient fresh air in storage.

In India beetroot is grown mainly in Haryana, Uttar Pradesh, Himachal Pradesh, West Bengal and Maharashtra. Beetroots for processing and fresh market are harvested mainly in September and October.

Beetroot product

The usually deep-red roots of beetroot are eaten boiled as a cooked vegetable, or cold as a salad after cooking and or raw and shredded, either alone or combined with any salad vegetable. A large proportion of the commercial production is processed into boiled and sterilized beets used as a pickles. Eastern Europe soup, like cold borscht, is a popular dish. Yellow-colour beetroots are grown on a very small scale for home consumption (Grubben *et. al.*, 2004)^[8].

Beets were selected as the traditional food of the American South. It is also common in Australia and New Zealand that beetroot pickle is eaten on a burger. Beet juice is a popular health food, found in roots, is actively used as red food colourants e.g. to enhance the color of tomato paste, sauces, desserts, jam and jellies, ice cream, sweets and spices. Red Beet also makes a rich red, Burgundy style wines. Wild sea beet is the first type of beetroot and should be the source of all the different types of beetroot found today. The roots can be

rounded, molded, cylindrical or tapered. Their color can be white, yellow or red depending on the color of the flesh. The leafy peaks can also be used as a sweet spot for spinach (Kumar *et al.*, 2015)^[13].

Dried beetroots used as chips as a substitute to traditional snacks, or after simple preparation as part of a fast food (Krejcova *et al.*, 2007).

Beetroot is use as (pickles, salad, juice, cakes, and appetizer) and also use for sugar production. Betanin is widely used as a natural colorant in many dairy product (e.g. milk, ice cream, and yogurt), beverages (juices and burakovy kvas) and Candie (e.g. cookies and desserts) (Azeredo *et al.*, 2008)^[11].

Nutritional and health benefits of beetroot-

The use of seasoned remedies severally or together with customary medicines has been utilized in varied medical treatises for the cure of various malady, ailment or disease. Beetroot is one amongst the well-known edible plants and has substantial healthful properties because of the presence of distinctive natural edible substances. It contains antioxidant, vitamins and minerals varied vital antidepressant, antimicrobial and anti-carcinogenic.

Beetroot pigment is used as a food dye. It changes colour when heated so can only be used in ice-cream and other confectionary, but it is both cheap and has no known allergic side effect. Beetroot juice is very potent, a beautiful rice ruby red colour it is known to help purify the blood (Kumar *et al.*, 2015)^[13].

Beetroot leaves are sometimes used for eating. The leaf blades are eaten as spinach beet while the midribs of chard are eaten boiled. In some rural parts of Africa, the whole leaf blades are usually prepared with the major as one dish (Grubben *et al.*, 2004)^[8].

Beetroot has long been known for its amazing health benefits for almost all body parts. Start adding beets to your juicing diet to enjoy all the heavenly goodness.

Beetroot has significant anti-cancer properties, and also normalize blood pressure. Beetroot juice (Kumar *et al.*, 2015)^[13].

The effects of beetroot juice on inflammation play a strong role in the development and progression of several clinical conditions including heart disease and cancer, a beneficial effect of beetroot release may be related to this anti-inflammatory capacity (Winkler *et al.*, 1990)^[21].

Beet and their naturally occurring nitrates lower blood pressure safety, boost stamina, and are rich in valuable nutrients like vitamins C, potassium, manganese, and high in fiber.

Conclusion

This review paper concludes all the benefits of beetroot and their utilization. It brings attention to the medicinal, nutritional importance of the beetroot for the consumption of human being.

Beetroot is a delicious vegetable that is rich in carbohydrate, proteins and antioxidants. Beetroot is also a rich source of minerals and dietary fiber. Beetroot has several health benefits. Beetroot is loaded with excellent antioxidant properties and can highly stops the extension or growth of liver cancer and colon cancer cells. Beetroot have the ability to be used as a value-added constituent in many food products. It also contains high amount of iron, calcium and phosphorus.

Beets are widely used in the treatment of liver and fatty liver diseases. They are also used to help lower levels of

triglycerides (fatty acids) in the blood, lower blood pressure, improve athletic performance, and reduce muscle stiffness. Beetroots have been associated with numerous health benefits; they are low calories but rich in magnesium, manganese, and iron essential for bones muscles, brain, and healthy hair.

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