

Beetroot: A Super Food

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ABSTRACT:

The Beetroot is the taproot portion of the beet plant. It is an excellent food which impart very important role for the development and growth of human body. It also act as fruits as well as vegetables. Fresh form of beetroot consumed generally as a salad. Other than as a food, it play another role as a natural colorant in textile industries and as a medicinal plant to cure the various illness.

Key-words: *Beetroot, Beta vulgaris, Super food, Medicinal plant, and Chukander.*

INTRODUCTION

Beetroot (*Beta vulgaris L.*) is crop belonging to the Chenopodiaceae family having, bright crimson colour. It is famous for its juice value and medicinal properties; and known by several common names like beet, chard, spinach beet. sea beet. garden beet, white beet and *Chukander* (in Hindi). Beetroot gives the best value from June to November, and for storing, the beetroot leaves should be cut 50 mm above the root. They will keep for 4-5 days when refrigerated in the vegetable crisper.

Beetroot 'Boltardy' is one of the best varieties which produce large round shaped tender roots of deep red colour and fresh sweet flavour. Beetroot 'Burpees Golden' is globe shaped and golden orange in color. It is biennials if roots are grown for seed. It was not cultivated until the 3rd century and not developed until the 19th century by German and French breeders. Beetroot is the name used by the British and some other English speaking countries including Australia and the New Zealand for the vegetable that Americans in the USA call beets a type of food.

Beetroots main benefits are that it contains no fat, very few calories and is a great source of fiber. The best quality and root color are obtained when the air temperature ranges between 10 and 18 °C. Abundant rainfall, nitrogen fertilizer and high temperatures provide for rapid development which leads to white rings in the interior of the beetroot. The minimum soil temperature for beet germination is 5 °C, with an optimum range of 10 to 30 °C, an optimum temperature of 30 °C and a maximum temperature of 35 °C. Beets require a cold period of 2 weeks at 4 to 10 °C or longer to initiate flowers. Beets will tolerate frosts and mild freezes. Beets prefer deep, friable, well drained, sandy loams to silt loams. High organic matter in the soil is desirable and will help ensure an adequate moisture supply. The beet has a fairly large root system extending downward in the soil 1 m or more unless restricted (Compendium of Beet Diseases and Insects, 1986).

Beets are used for bunched greens, bunched roots, and beetroots and by processors for many products. Beetroots for processing and fresh markets are harvested mainly in september and

October. A yield of 20,000 kg per hectare is possible (Beetroot, 1983). The roots and greens therefore are great for women in general and for those planning pregnancy. The fresh beetroot and sliced beetroot is shown in figure 1.



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

Beetroot is a good tonic food for health. The main markets for beet greens and bunched beets are roadside, farmers markets and deliveries to wholesalers. The market for beetroot is not a large market but it is significant. With storage the marketing season may be extended for roots (Boswell, 1967). *Beta vulgaris* var. *rubra* revealed significant tumor inhibitory effects in skin and lung cancer (Kapadia *et al.*, 1996). These findings suggest that beetroot ingestion can be a useful means to prevent development and progression of 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).

Today the beetroot is still championed as a universal panacea. One of the most controversial examples is the official position of the South African health minister on the treatment of AIDS. Dr Manto Tshabalala-Msimang, health minister under Thabo Mbeki, had been nicknamed "Dr Beetroot" for promoting beets and other vegetables over antiretroviral AIDS medicines, which she considers toxic (Blandy, 2006). Beetroot is one of the original 'super foods'. Beetroot is a naturally environmentally-friendly crop, rarely needing treatment with pesticides. Up to 10 per cent of beetroot is sugar, but it is released slowly into the body rather than the sudden rush that results from eating chocolate.

The usually deep-red roots of beetroot are eaten boiled either as a cooked vegetable, or cold as a salad after cooking and adding oil and vinegar, 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 or into pickles. In Eastern Europe beet soup, such as cold borscht, is a popular dish. Yellow-coloured beetroots are grown on a very small scale for home consumption (Grubben *et al.*, 2004).

Effects of a commercially available beetroot juice on inflammation is strongly involved in the development and progression of several clinical conditions including coronary heart disease and cancer, beneficial effect of beetroot extract may relate to this anti-inflammatory capacity (Winkler *et al.*, 1990).

Hughes and Mitchell (2006) reported that both shallow and deep beds of diced beetroot have been studied, variables investigated being D.B.T. 120-200 °F (49–93 °C); air flow (6-12 lb of air/sq. ft /min); W.B.D. 10-70 °F (-12 to 21 °C). Drying rates in shallow beds were found to depend largely on the D.B.T., the W.B.D. and air-flow rate having a less marked effect. A prediction method used to determine the drying times of deep beds of diced beetroot in the moisture content range 8 to 0.1 was applied and found to be accurate to $\pm M 9.0$ %. Moisture distribution in a single slice of beetroot during drying has also been studied.

Pickled beets are a traditional food of the American South. It is also common in Australia and New Zealand for pickled beetroot to be consumed on a burger. Garden beet juice is a popular health food betanins, obtained from the roots, are used industrially as red food colourants e.g. to improve the colour of tomato paste, sauces, desserts, jams and jellies, ice cream, sweets and cereals. Red beet also makes a rich, red, Burgundy style wine. The wild sea beet is the earliest form of beetroot and is supposed to be the source for all the different beetroot varieties available today. The vegetable was native to the Indian and British coastlines. The beetroot, as we know it today, was only developed in the sixteenth century. Roots can be round shaped, cylindrical or tapered. Their colour can be white, yellow or red according to the colour of the flesh. The leafy tops can also be used as a tasty spinach substitute.

HISTORICAL BACKGROUND

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 to color the tomato sauce. The most common garden beet is a deep ruby red in color, but yellow, white, and even candy-striped 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). The Greek Peripatetic Theophrastus later describes the beet as similar to the radish, while Aristotle also mentions the plant (Hill and Langer, 1991). Zohary and Hopf also argue that it is very probable that beetroot cultivars were also grown at the time, and some Roman recipes support this. Later English and German sources show that beetroots were commonly cultivated in Medieval Europe (Hopf *et al.*, 2000; Hill and Langer, 1991).

Origin of beetroot

The ancient Babylonians were the first to use it for various applications. Early Greeks and Romans used the root for its medicinal properties and the leaves as vegetables. Moving ahead with time, beetroot held an important place in medicine. In England, beetroot juice or broth was recommended as an easily digested food for the aged, weak, or infirm. Even in mythology, Aphrodite is said to have eaten beets to retain her beauty. In folk magic, if a woman and man eat from the same beet, they will fall in love. In Africa, beets are used as an antidote to cyanide poisoning. Nutritional value of fresh beetroots per 100 g are given below -

Table 1 : Nutritional value of fresh beetroots per 100 g

Constituents	Amount	Constituents	Amount
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
Pantothenic acid (B ₅)	0.145 mg	Sodium	77 mg

Source: USDA Nutrient database

In the present times, beetroot is extensively cultivated on the coasts of Europe, North Africa and Asia, as far as India, and is found in muddy maritime marshes in many parts of England.

Harvesting and Handling

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

Uses of beetroot

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

The leaves and stems of young plants are steamed briefly and eaten as a vegetable, older leaves and stems are stir-fried. The usually deep-red roots of garden beet are eaten boiled either as a cooked vegetable or cold as a salad after cooking and adding oil and vinegar. A large proportion of the commercial production is processed into boiled and sterilized beets or into pickles. In Eastern Europe beet soup, such as cold soup, is a popular dish. Yellow-coloured garden beets are grown on a very small scale for home consumption. Beetroot can be peeled, steamed, and then eaten warm with butter as a delicacy; cooked, pickled, and then eaten cold as a condiment; or peeled, shredded raw, and then eaten as a salad. Pickled beets are a traditional food of the American South.

Beetroot pigment is used commercially as a food dye. It changes colour when heated so can only be used in ice-cream, sweets and other confectionary, but it is both cheap and has no

known allergic side-effects. Beetroot itself, of course, is a common salad ingredient – when cooked, vinegar is added to the water to lower the pH. Beetroot juice is very potent, and it's recommended that you drink the raw juice diluted at least 4 times with other milder juices such as carrot, cucumber. Plus it tastes better, a beautiful rich ruby red colour it is known to help purify the blood.

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 and is known as the common beet (NRCS, 2006). Beets, with large leaves, are also grown as ornamental plants. Ecologically, they provide food for many animals, including the larvae of a number of pest species. Beets are delightful for their color and flavor as well as for their beet nutrition. Their juice is wonderful mixed with carrot juice and can also be used as a dye. In some countries the beet juice, betanin, is processed commercially for coloration in various products.

JUICE INGREDIENTS

Beetroot juice is not only blessed with a beautiful color but also packed with nutrients. A detailed view of this parcel comes out to be like :

- **Vitamins:** Beetroots are a good source of folic acid and vitamin C. It also contains small amounts of vitamins B₁, B₂, B₃, and vitamin A in the form of beta-carotene.
- **Minerals:** Rich in calcium, magnesium, phosphorus, potassium, and sodium. Also, smaller amounts of iron, zinc, copper, manganese, and selenium.
- **Amino acids:** While raw beets are mostly water and carbohydrate, they also contain small amounts of all the amino acids (protein).
- **Calories:** One 2" (5 cm) beetroot contains 35 calories.
- **Antioxidants:** Its carotenoids and flavanoids can help reduce the oxidation of LDL cholesterol which could lead to damaged artery walls and ultimately heart attacks and strokes.
- **Anti-carcinogenic color:** The deep red color of beetroot comes from betacyanin. This prevents from colon cancer.
- **Silica:** The rich stock of silica in it does perfect utilization of calcium in the body and is also required for healthy skin, hair, nails and bones.

SPECIFICATIONS OF BEETROOT POWDER

1. Chemical/Physical Properties (as manufactured):
 - Colour: Red to purple;
 - Specific Gravity: 0.7~0.8;
 - Color Intensity (O.D. @ 537 nm): 0.3~0.4;
 - Dilution: 1:1000 in 0.1 mole;
 - Citric acid colour pigment: 0.3~0.4 %;
 - Consistency: Free Flowing Powder;
 - Solubility: Soluble all parts in water.
2. Chemical analysis copper content, mg/kg, Max: 20; Arsenic content, mg/kg, Max: 3; Lead content, mg/kg, Max: 5; Heavy metal, mg/kg, Max: 30.
3. Microbiological Properties Standard Plate Count/g, Max: 200 Yeast/g, Max: 5 Mold/g, Max: 5 E. coli/g; Nil Salmonella/25 g.

4. Packaging: 20 kg in HDPE drums or 15 kg in corrugated boxes.
5. Storage conditions: Protect from any exposure to air, light & heat. Do not freeze.
6. Shelf-life: Min 6 months.

HEALTH BENEFITS

Beets have long been known for its amazing health benefits for almost every part of the body. Start adding beets to your juicing diet to enjoy all its heavenly goodness:

- **Anemia:** The high content of iron in beets regenerates and reactivates the red blood cells and supplies fresh oxygen to the body. The copper content in beets helps make the iron more available to the body. A great blood builder.
- **Blood pressure:** All its healing and medicinal values effectively normalize blood pressure, lowering high blood pressure or elevating low blood pressure.
- **Cancer:** Betaine, an amino acid in beetroots, has significant anti-cancer properties.
- **Constipation:** Drinking beets juice regularly will help relieve chronic constipation.
- **Dandruff:** Mix a little vinegar to a small cup of beets juice. Massage it into the scalp with your fingertips and leave on for about an hour, then rinse. Do this daily till dandruff clears up [Warning: you will smell awful (extremely unpleasant) during this hour].
- **Detoxification:** The choline from this wonderful juice detoxifies (which remove toxic substance) (Platina, 1475).
- **Gastric ulcer:** Mix honey with your beets juice and drink two or three times a week on an empty stomach for removing ulcer.
- **Kidney ailments:** Coupled with carrot juice, the excellent cleansing virtues are exceptional for curing ailments (Cure Chronic) (Grubben *et al.*, 2004).
- **Liver toxicity or bile:** The cleansing virtues in beets juice is very healing for liver toxicity or bile ailments, like jaundice, hepatitis, food poisoning, diarrhoea or vomiting.
- **Skin disorders:** The water in which beetroots and tops have been boiled is an excellent application for boils, skin inflammation and out breaks of pimples and pustules.
- **Tonic effects** - Beetroot is a nutritious and suitable tonic for the entire digestive tract.
- **Increases sex drive:** It contains high amounts of boron, which is directly related to the production of human sex hormones (Carmen Socaciu, 2008).
- **Lowers cholesterol:** Beetroot contains soluble fibre, which has also been shown to have cholesterol lowering capabilities.

CONCLUSION

This review paper concludes the all scope of beetroot and their utilization. It emphasis the medicinal, nutritional importance of the beetroot for the consumption of human being. Individuals with a history of oxalate-containing kidney stones should limit their consumption of beets. As beetroot juice is very potent, do not consume too much, especially if your body is not yet accustomed to it. For a beginner, start with the juice of half a medium-sized beetroot once a week, slowly increasing to one whole beetroot a week. A harmless side effect of drinking beetroot juice is that your urine may turn pink or red.

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