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Sweeter Side of Sugarcane

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ABSTRACT

India is the largest producer and consumer of sugar in the World. About 45 million sugarcane farmers, their dependents and a large agricultural force, constituting 7.5 percent of the rural population, are involved in sugarcane cultivation, harvesting and ancillary activities. This enabled India to become the largest producer of sugarcane and sugar in the world leaving the other major producers Brazil and Cuba. The major sugarcane crop growing states in India are Uttar Pradesh, Bihar, Assam, Haryana, Gujarat, Maharashtra, Karnataka and Tamil Nadu. The sugarcane cultivation and sugar industry in India plays a vital role towards socio-economic development in the rural areas by mobilizing rural resources and generating higher income and employment opportunities. Refined sugar is the primary product of sugarcane juice, but during its processing, various other valuable products are also obtained in an unrefined form, such as, brown sugar, molasses, and jaggery. Sugarcane juice is widely used in India in the treatment of jaundice, hemorrhage and other urinary diseases.

INTRODUCTION

India is the world's largest producer of sugarcane, after Brazil and is easily available all throughout the country at a very low price. Sugarcane juice is obtained from the sugarcane plant (*Saccharum officinarum*). *Saccharum* signifies sweet flavor due to its high sugar content. It is served as a cooling drink with ice, flavored with a dash of lemon or sizzled with mint, ginger and salt. Sugarcane juice is the key ingredients for at least a dozen of other byproducts like jaggery, molasses, rum, biofuel and ethanol. Sugarcane is a perennial grass belonging to Poaceae family and it has been cultivated worldwide more than 90 countries because of its economical and medicinal value of high-yielding products. Refined sugar is obtained as a primary product from sugarcane juice, an eminent raw material of sugarcane. Drinking a glass of sugarcane juice has amazing health benefits and is packed with vital nutrients that our body needs. It can strengthen the bone, boost the immune system, enhance digestion and relieves stress.

Nutritional Facts of Sugarcane:

Sugarcane is loaded with water and heaped with saccharine sugar that accounts for its sweetness. It is a rich source of carbohydrates, essential amino acids, vitamins C, B1, B2, B6 and minerals including calcium, phosphorus, iron, succinic, fumaric, malic and citric acids, all of which are crucial nutrients that are vital for good health.

Ayurveda Benefits of Sugarcane:

1. Sugarcane juice is one of the most famous natural energy drink laden with health benefitting properties. It is a wholesome natural diuretic that is cold in nature. Sugarcane juice readily increases kapha dosha, while it pacifies pitta and vata dosha. The holistic science of Ayurveda recommends having sugarcane juice, as it supports normal liver functions. It works amazingly well as a natural remedy for jaundice, by replenishing lost electrolytes and nutrients and helps in faster recovery.

2. According to Ayurveda, sugarcane juice helps strengthen liver and is thus suggested as a remedy for jaundice. Jaundice is a condition where yellow pigmentation of the skin and membrane due to elevated levels of a substance known as bilirubin in the bodily fluids and is triggered by poor functioning of liver.



Figure 1 Sugarcane Crop

3. Another important health benefit of sugarcane juice is due to it being rich in the good kind of carbohydrates, protein, iron, potassium and other essential nutrients that makes it the ideal energy drink. Especially in the summer months, a glass of cold sugarcane juice improves health and depleting levels of energy. It builds up plasma and body fluids and helps counter dryness and fatigue.

4. Ayurveda also suggests that 'sugarcane juice exhibits laxative properties thereby improves bowel movement and relieves constipation'. Sugarcane juice also has alkaline properties which mean it is good for treating acidity and stomach burns.

Health Benefits of Sugarcane

1. Instant Energy Booster

The natural supply of sucrose in sugarcane gives right amount of energy that can kick-start day and normalize the release of glucose in the body to regain lost sugar levels. It is also the best choice to dehydrate the body and shake off fatigue.

2. Diuretic in Nature

The diuretic property of sugarcane juice makes it an essential ingredient for driving away infection. Drinking sugarcane juice will help in preventing urinary tract infection, especially when experience burning sensation while passing urine and it also averts kidney stones.

3. Fuels Immune System

The goodness of essential nutrients, chlorophyll, and antioxidants in sugar cane are beneficial in boosting the immune system. It shields the body against infection and prevents the formation of cancer cells. In addition, sugarcane helps to detoxify the body and revamps all organs in the body including eyes and brain.

4. Prevents Tooth Decay

Sugarcane is a wonderful food loaded with minerals that can combat tooth decay and ward off the bad breath. The richness of minerals and other essential acids in sugarcane is beneficial in strengthening the gums. Having a piece of sugarcane after a meal serves as a delicious dessert.

5. Fights Inflammation

Sugarcane is heaped with a myriad of antioxidants, flavonoids and phenolic substances. It possesses strong anti-allergic, anti-inflammatory, and antiviral properties that shields from catching a cold, flu, and sore throat. Furthermore, drinking a glass of sugar cane juice serves as an effective remedy for jaundice and energized throughout the day.

6. Flushes Kidney Stones

Sugarcane is an amazing hydrating food that is loaded with water, hydrates body and helps in eliminating kidney stones. As dehydration is the major cause of kidney stone formation, drinking sugarcane juice for longer duration can prevent kidney stones and remove smaller ones.

7. Healthy Skin

The goodness of Alpha Hydroxyl Acid (AHA) in sugarcane is beneficial in keeping the skin look supple and healthy. Sugarcane functions as an effective anti aging mask that moisturizes the skin and prevents acne. Applying sugarcane juice regularly makes skin look radiant and glowing.

8. Augments Bone Health

Sugarcane being intrinsically rich in calcium supports the normal development of the skeletal system and maintains bones and teeth health.

9. Fights Bad Breath

Sugarcane can act as savior to combat bad breath. Bestowed with essential minerals like calcium and phosphorus that helps build tooth enamel and averts tooth decay. In addition, it also overcomes bad breath.

10. Treats Acne

Applying sugarcane juice topically on the face can help ease acne and also treat several other skin woes. The goodness of Alpha Hydroxyl Acids (AHA) promotes cell regeneration, exfoliates dead skin cells, clears clogged pores and lowers the risk of acne.



Figure 2 Sugarcane for weight loss

11. Improves Digestion

Drinking sugarcane juice helps to maintain a good digestive system. With the presence of potassium, it helps in keeping the system in good shape, prevents stomach infection and is very helpful in treating the problem of constipation.

12. Cures Febrile Disorder

Sugarcane juice has been found to have immense benefits for people who are struggling with febrile disorders. In the event of febrile disorder, the individual suffers from fever that leads to seizures and loss of protein in the body. It is common in infants and children. Sugarcane juice helps in replenishing the lost protein and aids in recovery.

13. Skin Care

One of the surprising benefits of sugarcane juice is that it fights acne, reduces blemishes, delays ageing and keeps the skin supple. Alpha Hydroxyl Acid (AHA) is glycolic acid in sugarcane that helps to maintain the radiance of the skin.

14. Heals Wound

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Sugarcane juice is a wonder ingredient that assists in speeding wound healing the presence of a rich amount of natural sucrose is potential in healing any kind of wound in a short span of time. In addition, sugarcane juice over the wounded area to speed up the repair of wounds.

15. Stronger Bones:

The wealth of minerals in sugarcane juice includes calcium, magnesium, phosphorus, iron, and potassium which play a vital part in strengthening the bones. Thus, lowering the risk of osteoporosis, drinking a glass of sugarcane juice daily can keep bones stronger as per age.



Figure 3 Sugarcane for skin care

SUGARCANE AND ITS BYPRODUCTS

Today Sugarcane is considered as one of the best converters of solar energy into biomass and sugar. It is a rich source of food (sucrose, jaggery and syrup), fiber (cellulose), fodder (green leaves and tops of cane plant, bagasse, and molasses and to some extent press mud), fuel and chemical. The main by-products are bagasse, molasses and press mud. The other products and their by-products of less commercial value are green leaves and tops, trash, boiler ash and effluent generated by sugar industry and distillery. Though many products can be made, production of few is financially viable.

1. Bagasse :

Bagasse is a fibrous residue left over after the sugarcane is crushed. The fiber content of bagasse (cellulose) is used in cellulose industries like the pulp, paper, particle boards, cattle-feed etc. This is valued as an important by-product and efforts are under way to save as much as possible to produce the value-added products.

2. Confectionary

Sugar cane is a very important part of the primitive diet. Chewing the peeled, raw cane is one way that primitive people obtained the goodness from Sugar Cane. Today, sugar confectionery includes a

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large range of food items, commonly known as sweets. Some examples are; Boiled sweets, Toffees, and Marshmallows.



Figure 4 Sugarcane byproduct



Figure 5 Sugarcane Sweets

3. Rum

Some distilleries use fresh juice of sugar cane as the raw material for the Rum spirit, and other distilleries use a byproduct of the sugar refining process known as molasses as the raw material for the fermentation process. The fermentation process requires the addition of yeast to the raw material which converts the available sucrose to alcohol. Some prefer fresh rum, but most consumers prefer the more elegant taste of an aged spirit. Almost all rum is aged in used oak barrels that once held whiskey or bourbon. Aging can last from one to thirty years or more, making rum one of the most varied of the distilled spirits. During the aging process the rum acquires a golden color that changes to a dark brown with time.

4. Paper

Bagasse is among the world's most widely used and available non wood fibers. Bagasse is the most eco-friendly renewable resource for paper making. Tamil Nadu Newsprint and Papers Limited use about 800,000 tons of Bagasse a year replacing wood in the manufacture of paper. Paper mills located close to sugar cane farming regions can take advantage of a year-round supply of fiber, as bagasse can be stored in warehouses and used on demand. Kimberly Clark is a major producer of bagasse paper, primarily for paper towels and tissues. Their Orizaba, Mexico mill produces some 300,000 tons of paper products per year.

5. Ethanol

Sugarcane can also be used to make ethanol, a liquid that can be used as an automotive fuel or a gasoline additive. Gasohol, a mixture of 10 to 25 percent ethanol with gasoline, is commonly sold in place of gasoline in many nations. Gasohol, which can be used in any gasoline burning engine, has many environmental advantages. Ethanol can also be used directly as an automotive fuel in specially designed engines.

6. Stock Feeds

Cellulose is the world's most widely available renewable resource, amounting to about fifty per cent of the cell-wall material of woody and herbaceous plants. Due to this abundance and renew ability, there has been a great deal of interest in utilizing cellulose as a feedstock. One potential use of bagasse is as a feedstuff for cattle, because the components of bagasse are in their natural, resistant conformation, susceptibility to enzymes hydrolysis is extremely limited.

7. Fuel and Power

Bagasse is used as fuel to run the mills and often to make electricity. Another general use made of sugarcane throughout the world is as a source of heat. In some areas, the cost of bagasse fiber

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fluctuates with the price of oil. When oil is expensive, there is a greater demand to use bagasse as a cheap fuel to burn. There has been impressive progress in biomass based power generation, both in sugar mills and for Independent Power Producers. Biomass, at one time, considered to be the fuel of the poor in the developing countries, has now become an important source of energy for developed countries as well. Biomass' role in building the economy while preserving the environment has attracted large allocations for technology adaptation and development leading to more efficient methods of biomass conversion into useful energy

8. Press-Mud

Press mud is the residue of the filtration of sugarcane juice. The clarification process separates the juice into a clear juice that rises to the top and goes for manufacture, and mud that collects at the bottom. Press mud is a solid residue, obtained from sugarcane juice before crystallization of sugar. Generally press mud is used as manure in India. It is a soft, spongy, lightweight, amorphous, dark brown to black colored material. It generally contains 60-85% moisture; the chemical composition depends on cane variety, soil condition, nutrients applied in the field, process of clarification adopted and other environmental factors.

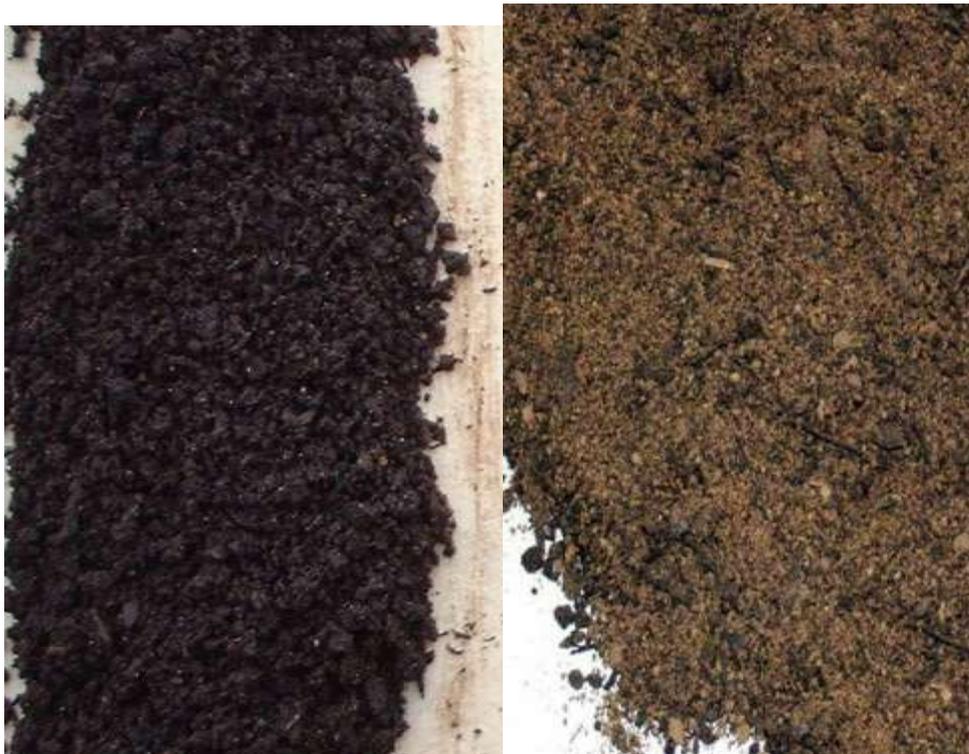


Figure 6 Press mud compost by Sugarcane

CONCLUSION

Sugarcane extract is utilized as a regular nutritional drink in several Asian countries since it comprises significant amount of minerals, vitamins, and hydrophilic compounds with essential biological activities. The presence of pharmacological activities is proven in sugarcane juice and its unrefined products such as brown sugar, molasses, and jaggery are considered as richest sources of phenolic compounds, Further there is a scope for investigation to identify the presence of new compounds with more activities and its products. Further, studies has to be made in future in sugarcane and its products since there is a lack of comprehensive investigation on the large number of identified compounds and their pharmacological activities. Although the chemical composition is known for several compounds of sugarcane, future research has to be made to understand the metabolic pathways of these com-pounds, need to understand the phyto chemistry of sugarcane products such as jaggery and thermostable chemical components.

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