

Unlocking the Health Potential of Sorghum: A Climate-Resilient Superfood

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Abstract

Sorghum is a nutrient-dense, gluten-free superfood rich in fibre, protein, antioxidants, and essential minerals. It supports digestion, regulates blood sugar, lowers cholesterol, and strengthens bones, making it ideal for managing diabetes, celiac disease, and weight control. Its antioxidants provide anti-inflammatory and anti-cancer benefits, reducing risks of colon cancers. Widely used in functional foods, sorghum flour enhances the nutritional value of bakery products. Environmentally, sorghum thrives in drought-prone and saline soils with minimal inputs, offering a sustainable solution for food security and bioethanol production, while promoting health and sustainability.

Introduction

Sorghum is a popular type of Millet in India to make Rotis and other bread. It is locally known as Jowar. Organic jowar is a rich source of iron, protein, and fibre and, due to the presence of policosanols which aids in lowering cholesterol levels. Sorghum has a low glycaemic index and also increases satiety.

Sorghum is the principal staple food of Maharashtra, and also an important food of Andhra Pradesh, Tamil Nadu, Madhya Pradesh and Karnataka. Maharashtra ranks first in sorghum production with 1.81 million tons in 2019-20 and contributes almost 38.23 per cent share to all of India’s production (DES-GOI, 2020).

Recently sorghum grain has been incorporated into other foods and it has been used to develop functional foods and beverages. Rather than this, the phenolic compounds, 3-deoxyanthocyanidins, and condensed tannins can be isolated and these isolated compounds can be used as encouraging natural multifunctional additives in broad food applications (Xiong et al., 2019).

Sorghum, referred as a climate-smart cereal due to its remarkable benefits such as its outstanding agronomic performance due to pest and disease resistance, adaptability to poor soils (saline and barren soil), drought and heat tolerance, thriving in adverse

environmental conditions with minimal inputs such as low water and fertilizer requirement.

Nutritional Profile

Scientific name: Sorghum bicolor
Family: Poaceae

Nutrients	Amount per 100 gm
Calories	1377 KJ
Carbohydrates	72.1
Moisture	12.4
Protein	10.6
Fibers	6.7
Lipids	3.5
	USDA, (2019)

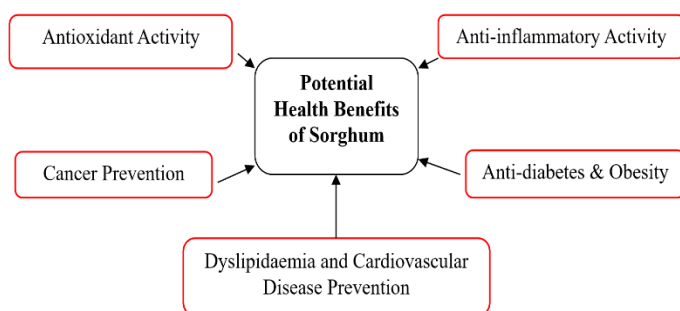
Sorghum flour demonstrates significant potential as a nutritional and functional ingredient in the bakery industry. Compared to whole wheat flour, sorghum has higher mineral content, including magnesium, potassium, and iron, along with greater amounts of dietary fiber and essential fatty acids. Its protein digestibility is slightly lower due to its fiber content, but its amino acid profile complements wheat flour. Incorporating sorghum flour into bread formulations improves the nutritional value, especially when combined with *Lactobacillus plantarum*, which enhances sensory properties. While bread with higher sorghum content shows reduced porosity and elasticity, optimizing the flour ratio can balance health benefits and sensory appeal, making sorghum a promising alternative for functional bakery products(Apostol et al., 2020).

Sorghum is a climate-resilient crop with remarkable adaptability to diverse environmental conditions, particularly in regions facing water scarcity and salinity. Its nutritional profile includes essential carbohydrates, proteins, minerals, and bioactive compounds that offer significant health benefits. Sorghum is an excellent alternative for sustainable food security due to its drought tolerance,

low input requirements, and dual use as food and feed. Its potential for bioethanol production, combined with its role in improving food security and reducing environmental impact, highlights its importance in addressing global agricultural and nutritional challenges (Hossain et al., 2022).

Health Benefits of Sorghum

Mentioned below are the best health benefits of Sorghum. You can consume High fibre and Rich source of protein sorghum in a different form, Sorghum flour, Sorghum seeds available in local markets.



1. Sorghum good source of vitamins and minerals

- ✓ Sorghum, like other cereals, is an excellent source of the fat-soluble and B-complex vitamins. Amongst all the B vitamins i.e. concentrations of thiamine, riboflavin and niacin in sorghum were comparable to those in maize.
- ✓ The detectable fat-soluble vitamins are vitamin B, E and K. It is also an important source of minerals and amongst them, phosphorus is the most abundant.
- ✓ Minerals and vitamins are located at the pericarp and germ; therefore, refined sorghum products lose part of these important nutrients. All these nutrients help in maintaining the vital activities within the body.

2. Sorghum contain high content of dietary fibres

- ✓ Sorghum is one of the best sources of dietary fibres. Sorghum does not have an inedible hull and so the whole grain can be eaten. This means it supplies even more fibre, in addition to many other crucial nutrients. The high-fibre content of sorghum is important for digestion, hormone production and cardiovascular health.

3. Sorghum rich source of antioxidants

- ✓ Sorghum contains polyphenol compounds in its pericarp which have good health-protective effect that is superior to many of the more popular consumed grains, fruits and vegetables. The antioxidant activity of sorghum is even 3-4 times higher than some of other whole grains.
- ✓ Black sorghum is especially rich in antioxidants because of its high content of anthocyanins. The antioxidants found in sorghum have anti-inflammatory, anti-cancer, anti-diabetic effects.

4. Sorghum helps in inhibiting tumour growth

- ✓ The 3-deoxyanthoxyanins (3-DXA) compounds which is mostly present in the darker-coloured sorghum, is shown to have a strong anti-proliferation activity against human colon cancer cells.
- ✓ The antioxidants inside the bran layer of sorghum grains scavenge harmful free radicals and reduce the chance of developing various types of cancer. Studies have shown that intake of sorghum is associated with a reduced risk of having oesophageal cancer globally.

5. Sorghum benefits for diabetes patients

- ✓ Diabetes is a condition which occurs due to a higher level of glucose and less sensitivity to insulin in the body. The starch in sorghum grain is more slowly digested as compared to the other cereals. It is because that the tannin compounds of sorghum bran have an inhibitory effect on amylase which slows down the hydrolysis of starch and the absorption of glucose into the blood stream.
- ✓ Sorghum good for diabetes as it acts as low glycaemic index food. Consuming sorghum is beneficial for better control of blood glucose level and increase insulin sensitivity for diabetic patients.

6. Sorghum flour safe celiac disease

- ✓ Celiac disease is a severe allergy to gluten which is primarily found in wheat-based products. Up to 1% of the population of United States is believed to have celiac disease.
- ✓ Sorghum flour is gluten-free and a good alternative to wheat flour for individuals

suffering from celiac diseases. Studies have shown that sorghum-based products did not show toxicity for celiac patients.

7. Use sorghum for lower cholesterol level

- ✓ Sorghum has the potential for managing blood cholesterol. The dietary fibre of Sorghum helps to reduce the 'bad' low-density lipoprotein cholesterol (LDL) because of its ability to reduce the amount of bile reabsorbed in the intestine.
- ✓ Moreover, studies have shown that the lipids of sorghum also have the ability to lower cholesterol levels. Lower level of cholesterol reduces the risk of stroke, chronic inflammation and type 2 diabetes.

8. Sorghum benefits for weight loss

- ✓ Sorghum is an excellent source of dietary fibre and this fibre helps to curb food intake by a sense of stomach fullness leading to increased satiety feeling thereby leading to decrease in food intakes. Sorghum itself is also a low glycaemic index food. Taking sorghum as part of daily diet can help in better control of body weight.

9. Sorghum improves bones strength

- ✓ Both calcium and magnesium are essential for strong bones. Magnesium stimulates calcium absorption in the body and adequate calcium is essential for bone health and present in sorghum. Deficiency of calcium leads to osteoporosis and arthritis. Sorghum is a good source of both calcium and magnesium. Every 100 g of sorghum satisfies 5% of the recommended daily intake of calcium and 40% of the daily recommended intake of magnesium.

10. Sorghum helps in improving mood

- ✓ The vitamin B6 present in Sorghum plays a major role in the production of a neurotransmitter gamma-aminobutyric acid (GABA). GABA is responsible for regulating the nerve impulses in the human body. Increased GABA production improves a person's mood, ability to focus, promoting

relaxation and helping to control stress and depression.

11. Sorghum boost energy levels

- ✓ Vitamin B-complex, especially vitamin B3 (Niacin), is important for body's metabolism and helps the cells produce useable energy. Sorghum contains 28% of the daily required niacin intake. Ingesting sorghum-based food helps to boost the energy level and remain focused on work.

12. Sorghum promote blood circulation

- ✓ Sorghum is very high in both copper and iron which are minerals that are crucial for blood circulation. Iron is important for red blood cell development. Copper helps to increase the uptake of iron in the body. Eating sorghum boosts the red blood cell synthesis and stimulates blood circulation.

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