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Nutritional and Health benefits of the Millets

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Introduction

Population is growing at a very fast pace. Major portion of the population of theworld is dependent on the rice and wheat for meeting out their calories requirement. Researchers from various institutes under the Indian Council of Agricultural Research (ICAR) and Bidhan Chandra Krishi Viswavidyalaya found depleting trends in grain density of zinc and iron in rice and wheat cultivars in India. In the grains of rice cultivars introduced in the 1960s, zinc and iron contents were 27.1 mg/kg and 59.8 mg/kg, respectively. Within the 2000s, this decreased to 20.6 mg/kg and 43.1 mg/kg, respectively. Similarly, the concentration of Zn and Fe found in wheat were 33.3 mg/kg and 57.6 mg/kg during 1960s, dropped to 23.5 mg/kg and 46.4 mg/kg respectively in cultivars released during 2010s. (Debnath *et al.*, 2021)Millets can be the future foods for tackling effectively such issues.Dry land regions of the world traditionally eat millets as a primary diet. Millets are produced on roughly 17 million ha in India, producing 18 million tonnes annually and making about 10% of the nation's total grain production. (Dayakar Rao*et al.*, 2017)They are nutri-cereals, which are noted for their high nutrient content and high protein, essential fatty acid, dietary fibre, B-Vitamin, and mineral content, including calcium, iron, zinc, potassium, and magnesium. They help in reducing blood sugar levels (diabetes), and controlling blood pressure, thyroid, cardiovascular, and celiac disorders. Millets also represent our traditional food but the significant reduction in the consumption of the millets have been found in the last decade.

Nutritional content of different millets

Millets are a good source of protein, minerals, and phytochemicals and are nutritionally comparable to other types of cereal. The concentration and activity of antioxidants are impacted by processing techniques such soaking, malting, decortications, and frying (Saleh *et al.*, 2013). While finger millet has 12–16% protein and 2-5% lipids, sorghum and the majority of millets only have about 10% protein and 3.5% lipids. Sorghum

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and millets are excellent suppliers of vitamins and minerals, as well as other micronutrients. Prolamin (also known as kaffirin), which makes up a large amount of sorghum protein, has the unusual property of becoming less digestible when cooked, whereas millets have a better amino acid profile. Sorghum proteins are said to be much less digestible after heating than other cereal proteins, which may be advantageous for some dietary groups. Table 1 gives us approximate proximate composition of different millets.

Millet	**Protein (g)**	**Ash (g)**	**Total fat (g)**	**Total fiber (g)**	**Carbohydrates (g)**
Bajra (*Pennisetum glacum)*	10.96 ± 0.26	1.37 ± 0.17	5.43± 0.64	11.49 ± 0.62	61.78 ± 0.85
Sorghum (*Sorghum bicolor)*	09.97±0.43	1.39± 0.34	1.73±0.31	10.22± 0.49	67.68 ± 1.03
Ragi (*Eleusine corocona)*	07.16± 0.63	2.04± 0.34	1.92± 0.14	11.18± 1.14	66.82 ± 0.73
Little millet (*Panicum miliare*)	08.92 ± 1.09	1.72± 0.27	2.55± 0.13	06.39± 0.60	65.55 ± 1.29
Quinoa (*Chenopodiumquinoa)*	13.11	02.65	5.50	14.66	53.66
Amarant seed (Black)	14.59	02.78	5.74	07.02	59.98

(Dayakar Rao*et al.*, 2017)

Health benefits of the millets

Consumption of the millets prevents from the risk of heart diseases, improves the digestive system, protects from the diabetes, detoxifies the body, increases energy levels, enhances the immunity, reduces the risk of the cancer and improves the muscular and neural system and protect us against several deadly disease like Parkinson's disease (Manach*et al.*,2005; Chandrasekara and Sahidi, 2012). Important nutrient present in millets include antioxidants like lignans, phytosterols which are having number of health benefits.

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Reduces the risk of cardiovascular disease

Millets contain large amount of magnesium which reduce the blood pressure and risk of heart strokes due to the atherosclerosis. Potassium helps us to reduce the blood pressure low by acting as a vasodialator to reduce the cardiovascular disease. High fiber content in millets helps in reducing the chloestrol lowering the risky LDL and increasing the effects of the HDL. Lee *et al.* (2010) noted that the finger and proso millet lower the concentration of the plasma triglycerids in hyperlipidemic rats and thus prevent cardiovascular disease.

A boon for the diabetic patients

Millets are rich source of the magnesium which increases the efficiency of insulin and glucose receptors in the body and help in preventing diabetes. Higher fiber content in the finger millet based diets lowers the glycemic response and helps for the diabetic patients. Slow digestible starch (SDS) present in the sorghum prolongs digestion and absorption of carbohydrates and helpful for the diabetic patients (Wursch, 1997). Pearl millet due to its high fiber content digests slowly and release glucose in blood at lower rate and helps in maintaining blood sugar level constant in diabetic patients for a longer time.

Regulate digestive process.

Higher fiber content in millets helps to overcome problems like constipation, bloating, excess gas and cramping. Helps to overcome the celiac disease in gluten sensitive people as the millets are devoid of the gluten. (Catassi and Fasano, 2008).

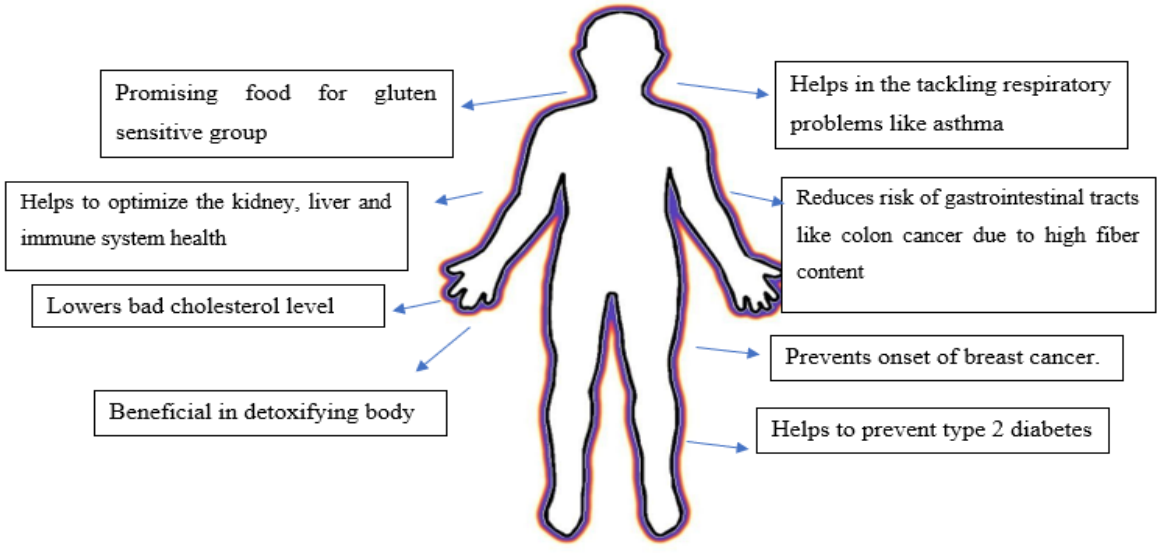

Figure 1 Health benefits of Millets

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Antioxidantal Properties.

Millets are rich in antioxidants which have beneficial impact on neutralizing the free radicles. These antioxidants help us to clear up the toxins from the body such as liver and kidney.Quercetin, curcumin and various other beneficial catechins helps to clear the system on any foreign agents and toxins by neutralizing and promoting proper excretion. Other benefits of the millets are shown in the diagram below:

Conclusion

Millets are the food of the future. Realizing the importance of the millets the UN General assembly and the Food and Agriculture organization have declared 2023 as the international year of millets. Millets are the nutrient dense foods with the added advantage of less environmental impact than the traditional cereal crops like rice. These require less inputs and can be successfully grown on the diverse agroclimatic conditions. These crops require less water thus will reduce the load on the water resources. Despite of having less input requirement in the form of water and the fertilizer the nutrients profile provided are much better than the traditional crops.

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