



Finger Millet: A Potential Solution to Malnutrition

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A number of issues are brought about by rapid population increase, including food shortages, malnutrition, a lack of water and other resources for agriculture, and poor environmental conditions. In addition, changing climatic conditions have further hastened the vulnerability of farmers towards declining crop production. Approximately one-third of the world's population lives in dry lands, which make up 40% of the planet's land area. In 2100 AD, it is estimated that these low productive soils would increase by 50–56%, and 78% of dry land expansion will take place in developing nations. According to a World Bank estimate, 828 million people globally struggle with hunger. To alleviate world hunger (the demand for grain), sustainable crop alternatives are required, as well as ways to increase farmer income. Millets have a crucial role in developing long-term strategies for achieving nutritional security. In order to boost millet productivity, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has made finger millet (*Eleusine coracana*) the sixth required crop.

In comparison to the grains of wheat (*Triticum aestivum*), rice (*Oryza sativa*), maize (*Zea mays*), and sorghum (*Sorghum bicolor*), millets are said to provide essential nutrients and have a higher protein content. It is commonly known that millets had a key part in the development of modern meals like multigrain and gluten-free cereals. Millets are regarded to play a role in slowing the rate of fat absorption, slow release of sugars (low glycaemic index), and so reducing risk of heart disease, diabetes, and high blood pressure due to their richness in polyphenols and other biological active chemicals. Millets are becoming more popular since people are becoming more aware of their ability to promote health. Finger millet, *E. coracana* L. is also known as ragi and mandua (India); kaddo (Nepal); fingerhirse (Germany); petit mil, eleusine cultivee, coracan, koracan (France); bulo (Uganda); kambale, lupoko, mawele, amale, bule (Zambia); poho, rapoko, zviyo, njera, mazhovole (Zimbabwe); finger millet, African millet, koracan (England); dagussa, tokuso, barankiya (Ethopia); wimbi, mugimbi (Kenya).

In portions of India and eastern and central Africa, it is an important staple food. Finger millet makes up 10% of the 30 million tons of millet that are produced globally. Finger millet is a key staple grain and source of livelihood in many Asian locations. It can improve dietary intake, boost food security, support rural development, and help maintain ecologically friendly land practices. One ingredient that can be consumed is millet seed, which has a high calcium content as well as phytochemicals, dietary fiber, and polyphenols.

Accessibility and Affordability

In addition to hunger and malnutrition, the world's population is expanding at an exponential rate, and there are fewer natural resources available due to a changing climate. Enhancing resilient value chains, inexpensive and diversified diet options for consumers, and sustainable crop production are some solutions. Finger Millets, which come in a variety, can help with

this problem by serving as reasonably priced sources of nutrients for balanced diets that can be grown in dry and other challenging environments with little help from outside.

The International Year of Millets 2023 is a chance to spread knowledge of the millets' many advantages, from economic growth and environmental sustainability to nutrition and health. The Year will improve the relationship between science and policy, promote partnerships, motivate stakeholders to take action on promoting and producing millets, and promote consumption of millets by the general public.

The Nutritional Powerhouse: Understanding Finger Millet's Composition

In order to combat malnutrition, finger millet is a potent source of critical nutrients. In terms of nutrition, finger millet is a good source of fiber, calcium, and many vitamins and minerals. According to estimates, the carbohydrate content of finger millet ranges from 72 to 79.5 percent. Starch accounts for between 59.4 and 70.2 percent of all carbohydrates. The endosperm, embryo, and seed coat make up the Finger millet's kernel. It has a five-layer seed coat that is high in antioxidants and dietary fiber (Fig.1). Its considerable nutritional content, which is on par with or higher than that of rice and wheat, makes it a crucial cereal crop. The health benefits of finger millets, including their anti-diabetic, anti-tumorigenic, anti-diarrheal, anti-ulcer, anti-inflammatory, atherosclerogenic, antioxidant, and antibacterial activities, are also due to their trypsin inhibitory components. The percentage of essential amino acids in finger millet is greater than the average (33.9%), at 44.7% of the total amino acids. The protein content of the finger millet grain is inversely associated with its lysine and methionine contents. The necessary amino acids are well-combined in the albumin and globulin fractions, and the prolamin fraction has a larger proportion of glutamic acid, proline, valine, isoleucine, leucine and phenylalanine but low, arginine and glycine.

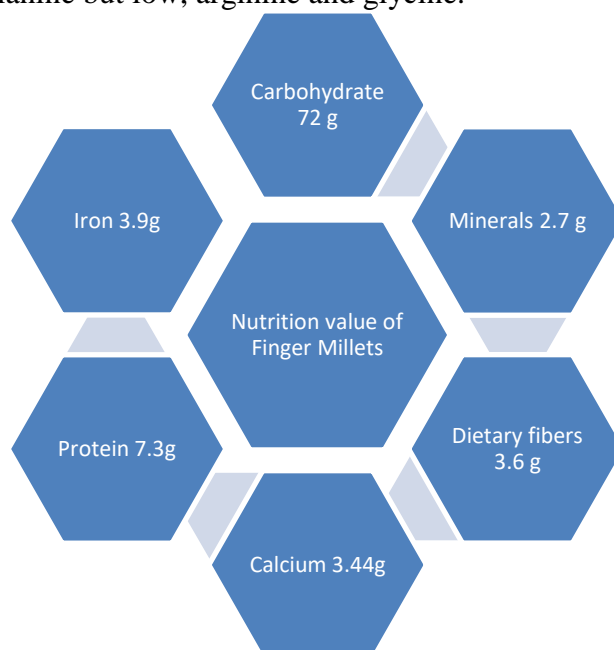


Fig. 1 Nutritive value of Finger Millet's

Table 1 composition of Finger Millet

Amino Acid (g/100)	Finger Millet
Essential amino acid	
Isoleucine	4.3
Leucine	10.8
Lysine	2.2

Methionine	2.9
Phenylalanine	6.0
Threonine	4.3
Valine	6.3
Histidine	2.3
Tryptophan	
Non-essential amino acid	
Alanine	6.0
Arginine	3.4
Aspartic Acid	5.7
Cystine	NA
Glutamine Acid	23.2
Glycine	3.3
Serine	5.3
Tyrosine	3.6
Proline	9.9

Table 2 Nutrient Comparison: Finger Millet vs. Other Cereal Grains

Crop	Amount of Nutrients per 100-gram				
	Carbohydrates	Protein	Fiber	Iron	Calcium
Finger millets	72	7.3	3.6	3.9	3.44
Buckwheat	72	13.3	1.7	2.3	18
Barley	74	9.4	2.4	1.7	26
Rice	78	6.8	0.2	0.7	10
Maize	72	9.2		1.2	1.2
Wheat	71	11.8	1.2	5.3	4.1

Nutrient Comparison: Finger Millet vs. Other Cereal Grains

The specific nutritional benefits of finger millet (ragi) are revealed by nutritional comparisons between finger millet and other common cereal grains like rice, wheat, and maize. When compared to rice, wheat, and maize, finger millet stands out as a cereal grain with greater levels of protein, Fiber, calcium, and iron. Due to its low glycemic index, it is a fantastic option for preserving stable blood sugar levels. In areas where vitamin deficits are common, including finger millet in diets can help combat malnutrition and provide a more varied and nutritious food source.

Finger Millet for Child Nutrition and Growth

Finger millets are good for children who are allergic to or intolerant to wheat since they are high in vitamin B complex, calcium, iron, potassium, magnesium, and zinc. They are also gluten-free and have a low GI (glycemic index). When quinoa is cooked, the protein is not destroyed. Millets are therefore beneficial for developing and growing muscles. It has been demonstrated that millet lowers blood sugar levels than wheat or rice because it contains smart carbs with lots of Fiber and little simple sugars. As a result, millet has a comparatively low glycaemic index. By doing this, children's obesity risk is reduced. Millets are high in Fiber and hydrate the colon, preventing children's constipation. Prebiotics found in millet are abundant and contribute to gut health. Additionally, millets are a good source of magnesium, which is important for healthy neuromuscular function. Additionally, it aids in regular muscle contraction. It is necessary for the development of teeth and bones. Niacin, a co-enzyme for

oxidative reaction, helps to lower cholesterol in millet, which lowers the chance of heart disease in the future. Since millet is free of gluten and allergens, it can be consumed by people with celiac disease or gluten sensitivity. Finger millet and other cereal grains are compared in terms of nutrients.

Combating Anaemia and Iron Deficiency

Because of its high iron content, high absorption, and beneficial interactions with vitamin C, finger millet is emerging as a powerful weapon in the fight against anaemia and iron deficiency. Pregnant women, nursing moms, kids, and those with celiac disease may benefit the most from including it in their diets. Healthcare professionals and nutritionists can significantly contribute to improving the overall iron status and lowering the prevalence of anaemia in populations at risk by promoting the intake of finger millet and increasing public awareness of its nutritional advantages.

Finger Millet and Diabetes Management

Finger millet is a great option for managing diabetes because of its low glycemic index, slow-release carbohydrates, high Fiber content, and vital minerals. For those with diabetes, including finger millet in the diet can help with better glycemic control, weight control, and general wellness. Working closely with their medical professionals or dietitians to develop a specialized diabetes management plan that incorporates finger millet and other suitable food options is crucial for people with diabetes, as it is with other dietary modifications.

Finger Millet as a Gluten-Free Alternative

The procedures that pearl and finger millets grains go through are distinct process for the some of the food and drinks that are most frequently consumed in Asia, Africa, and Europe. These goods are designed to combat lifestyle illnesses like celiac disease, taking their advantages to health. Additionally, adding value to them could boost consumer acceptance and consumption in our everyday diet. To meet the needs of the urban population, fine grade grains are thought to be most suited for processing into a variety of value-added products. However, a significant barrier to value addition and marketing is the consistent availability of high-quality grains. The dishes, drinks, ice cream, and animal feeds made from pearl millet and finger millet grains can be roughly categorized as conventional and non-traditional. Overall, finger millet is a valuable gluten-free alternative that offers not only a safe option for those with gluten sensitivities but also a nutrient-rich addition to the diet for anyone looking to diversify their grain consumption. Its versatility and nutritional benefits make it an excellent choice for incorporating into various dishes for a wholesome and balanced diet

Conclusion

Finger millet has emerged as a promising solution to address malnutrition and its associated health challenges. Dietary Fiber and polyphenols found in finger millet have been shown to have a number of health advantages for regular users, including anti-diabetic, defence against chronic diseases linked to diet, antioxidant, and antibacterial activities. Additionally, finger millet is a crucial component of dietary and nutritionally balanced diets due to its high carbohydrate, energy, and nutritional content. Incorporating finger millet into diets, particularly in regions with high malnutrition rates, can be a transformative step in improving the overall health and well-being of vulnerable populations. Governments, policymakers, and nutritionists should recognize the potential of finger millet and promote its cultivation, processing, and consumption as part of comprehensive strategies to combat malnutrition on a global scale.