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Millets: A Solution to Nutritional Challenges

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Introduction

In declaring 2023 the International Year of Millets, the resolution calls on all stakeholders to provide support to "activities aimed at raising awareness of and directing policy attention to the nutritional and health benefits of millet utilization, and their suitability for cultivation under adverse and changing climatic conditions, while also directing policy attention to improving value chain efficiencies. Millets are cereals from the Poaceae grass family and are considered one of the oldest cultivated crops and has been grown throughout Africa and Southeast Asia for thousands of years. There are nine kinds of millets cultivated across various regions in India, such as sorghum, finger millet, little millet, kodo millet, foxtail millet and barnyard millet. These vary in colour, size and texture, but share roughly the same nutritional profile. And all of them have local names in many Indian languages, attesting to their historical popularity across regions. Generally, pearl millet (*Pennisetum glaucum*) and finger millet (*Eleusine coracana*) are known as the two major millets used for food and feed. Millets are a major source of human food, and their production has been steadily increasing in the last decades to meet the dietary requirements of the increasing world population. Millets are an excellent source of all essential nutrients like protein, carbohydrates, fat, minerals, vitamins, and bioactive compounds.

Compared to the more commonly known cereals such as wheat, rice or corn, millets are capable of growing under drought conditions, under non-irrigated conditions even in very low rainfall regimes, having a low water footprint. Millets can help contribute to some of the biggest global challenges in unison - nutrition and health needs, mitigation and adaptation to climate change, poverty of smallholder and marginalized farmers in the dry zones - some of the toughest areas that will take longer to reach the sustainable development goals.Millets began to be seen as the food of rural and tribal communities, who ate rustic dishes like *ragi*

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mudde (steamed balls made with finger millet) and *jowar roti* (sorghum flatbread) as cheap and filling meals. However, for pastoral folks, millets were much more than sustenance. For example, they believed that consuming *bajra raab* (a thin porridge) would help build immunity against winter colds.

Millets have some anti-nutritional factors so for maintain that processing of millets is required which decreases the anti-nutritional factors in millets and improves the bio-accessibility of nutrients. Many processing methods have been used traditionally like roasting/popping, soaking, germination and fermentation. All these methods have been reported to have a significant impact on the nutritional value of the grain. Malting of millets improves access to nutrients and has been reported to increase the bio-accessibility of iron by 300% and of manganese by 17% .The anti-nutritional factors decreased significantly with an increase in germination time due to hydrolytic activity of the enzyme phytase that increases during germination. The phytate content of millets can be reduced by germination as during the germination the hydrolysis of phytate phosphorus into inositol monophosphate takes place which contributes to the decrease in phytic acid. The tannins are also leached during soaking and germination of grains, and hence it results in the reduction in tannins. Boiling and pressure cooking also result in reduction in tannins. Fermentation is known to reduce the anti-nutritional factors and hence improves the protein digestibility. Irradiation has also shown inhibitory effect against anti-nutrients, and it enhances the protein digestibility. Extrusion cooking or high temperature short time (HTST) processing has been reported to reduce anti-nutrients like phytates, tannins and increase bioavailability of minerals.

Health Benefits of millet:

- Each 100 gram (g) of cooked millet contains the 3.51 g of protein, 23.7 g of carbohydrate, 1.3 g of dietary fiber, 44 milligrams (mg) of magnesium, 0.161 mg of copper, 100 mg of phosphorus and 0.272 mg of manganese.
- Millet is rich in niacin, which helps your body manage more than 400 enzyme reactions. Niacin is also important for healthy skin and organ function. In fact, it's such an important compound that it's often added to processed foods to enrich them.
- Millet, especially the darker varieties, is also an excellent source of beta-carotene. This natural pigment acts as both an antioxidant and as a precursor to vitamin A, helping your body fight off free radicals and supporting the health of your eyes.

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- Millet is low in simple carbohydrates and higher in complex carbohydrates, making it a low-glycemicindex (GI) food. This means millet takes longer to digest than standard wheat flour. Low-GI foods can help keep your blood sugar from spiking after eating, which allows people with diabetes to manage their blood sugar levels more easily.
- Millet is rich in dietary fiber, both soluble and insoluble. The insoluble fiber in millet is known as a "prebiotic," which means it supports good bacteria in your digestive system. This type of fiber is also important for adding bulk to stools, which helps keep you regular and reduces your risk of colon cancer.
- The soluble fiber in millet can help reduce the amount of "bad" cholesterol in your blood—a risk factor for atherosclerosis. Soluble fiber turns into a gel in your stomach and absorbs cholesterol, allowing it to be safely carried out of your system.
- Some studies show that millet can also raise your "good" cholesterol levels and lower triglycerides. Because cholesterol is such a big risk factor for heart disease, eating millet regularly may help keep your heart healthier.
- Millet is rich in potassium—a mineral that supports healthy kidney and heart function. Potassium also plays a role in nerve signal transmission, which is how your brain and muscles communicate.

Conclusion:

Millets can easily thrive in extreme conditions like drought, and some wild varieties can even prevail in flooded areas and swampy grounds. These have low glycaemic index, abode gluten-free protein and are rich in minerals (calcium, iron, copper, magnesium, etc.), B-vitamins and antioxidants. These extraordinary traits make them nutritious and climate change compliant crops. These can not only serve as an income crop for farmers but also improve the health of the community as a whole. Existing limitations, i.e. the presence of anti-nutritional factors and low sensory acceptability of millet-based products, can be overcome by the scientific interventions. The anti-nutritional factors can be inactivated by processing methods like cooking, roasting, germination and fermentation. The inclusion of millet-based foods in international, national and state-level feeding programs will help to overcome the existing nutrient deficiencies of protein, calcium and iron in developing countries.