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Popular Article

Unlocking Health Potential: Nutritional Supplements from Multi-Millet Based Foods

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Introduction

In earlier times, the major cereals and millets consumed in India are, sorghum, rice flour, bajra, foxtail, little and ragi. These grains are the main sources of energy as they contain 70-80% of starch and contributing about 70-80% of daily energy intake of Indian diet. Since cereals/millets are the cheapest source of energy, their contribution of energy intake is highest among the poor income families. Cereals contain protein, calcium, iron, and B-complex vitamins and provide more than 50% of daily protein intake. Millet is a generic term used for small sized grains that form heterogeneous group and referred along with maize and sorghum as 'coarse cereals'. Millets are small-seeded, annual cereal grasses which can be well adapted to warm climates. At least four verities of millets are extensively grown in certain components of the world.

India is the largest producer of many kinds of small millets, which are often referred to as coarse cereals. Pearl millet, ragi or finger millet, foxtail millet little millet,and barnyard millet are the important millets cultivated largely in the Asian and African countries. Though millets occupy relatively a lower position among food crops in Indian agriculture, they are quite important from the point of food security at regional and farm level. The total small millets production for the year 2011-12 is 0.40 million tones, covering an area of 0.80 million hectares with a productivity of 565 kg/ha. (Ministry of Agriculture, Government of India). Their cultivation extending from sea level in coastal Andhra Pradesh up to an altitude of 8000 feet above sea level in hills of Uttaranchal and North-Eastern states.

In recent years, there has been a growing awareness of the importance of a balanced and nutritious diet in promoting overall health and well-being. One significant development in the realm of nutrition is the emergence of multi-millet-based foods as a powerhouse of essential nutrients. Millets, a group of

small-seeded grains, have been a staple in various cultures for centuries, and their nutritional value is now being harnessed to create innovative and effective nutritional supplements.

The Millet Advantage

Millets, such as finger millet (ragi), pearl millet, sorghum, foxtail millet, and others, are rich sources of nutrients like vitamins, minerals, fiber, and antioxidants. Incorporating these grains into the diet can contribute to improved digestion, sustained energy levels, and enhanced immunity. Multi-millet-based foods offer a diverse range of nutrients, making them an ideal candidate for nutritional supplementation.

Essential Nutrients in Multi-Millet Based Foods:

Proteins: Millets are known for their protein content, which is crucial for muscle development, repair, and overall cellular function.

Fiber: The high fiber content in millets aids in digestion, helps maintain healthy cholesterol levels, and supports weight management.

Vitamins and Minerals: Millets contain essential vitamins such as B-complex vitamins (B1, B2, B3, B6) and minerals like iron, magnesium, phosphorus, and zinc. These nutrients play key roles in various physiological processes, including energy metabolism and immune function.

Antioxidants: The presence of antioxidants in millets helps combat oxidative stress, protecting cells from damage and reducing the risk of chronic diseases.

Why Millets

- A group of small-grained cereals with far superior nutritional properties compared to paddy rice and wheat.
- Helps to control weight.
- Helps to control diabetes.
- Low Glycemic Index and Gluten Free
- Contains a well-balanced amino acid profile.

Health awareness

Importance of millets

It has a special nature of its carbohydrates and high fiber-content, helps lower blood cholesterol, prevent constipation, and aid the slow release of glucose to the blood stream during digestion. It also

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sets the body's acid-alkaline balance in order and is especially rich in minerals such as Sulphur, phosphorus, and iron and in important vitamins such as thiamine, riboflavin, niacin. These properties make millets extremely healthy foods that are especially good choices for heart, gastric and diabetic patients. Millets are highly nutritious, non-glutinous and non-acid forming foods. Millets are soothing and easy to digest and considered to be the least allergenic and most digestible grains available. Compared to rice, especially polished rice. It releases a lesser percentage of glucose over a longer period. This lowers the risk of diabetes. Millets are particularly high in minerals like iron, magnesium, phosphorus, and potassium. Finger millet (Ragi) is the richest in calcium content, about 10 times that of rice or wheat.

Different types of millets and images

Foxtail millet

Vernacular names- Kaon, Kang, Kakun, Kangni, Navane, Thena, Rala, Kangam, Kanghzu, Kangani, Korra, Tenai

Pearl Millet

Vernacular names-Bajra, Bajri, Sajja, Sajje, Cumbu

Sorghum Millet

Vernacular names- Jowar, Jondhla, Jola, Jonna, Cholam, Juara, Rotla

Finger millet

Vernacular names- Ragi, Mandua, Keppai, Kaelvaragu, Nagli, Nachni, Mandiya, Marwa

Little millet

Vernacular names- Gajrao, Kuri Kutki, Sava, Same, Save, Sama, Sava, Suan, Samalu, Swank, Sama

Compression between millets and other grains

Sr. no.	Agriculture Parameter	Millets	Rice, Wheat, maize and other	Small farmer benefits
01	significant culturalvalue	Long history about5000 years	Less history	Millets is traditionally cultivated by small former
02	Environmental problems	All season crop	Seasonal crop	More time for millets growing.
03	Water requirement	Very less water requires.Millets is dry land crops and rain fed area crop.	High, medium water require.	Irrigation is main problem for small former solution is millets
04	Soil requirement	Millets demand less	High fertile land requires	

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		fertile land, dry land,		
05	Recommended dosages Fertiliser & pesticide	Approximate Nil., very less	high fertiliser and pesticide require	Millets save money and land for small farmer
06	Section of crop	Three seasons in year	One time year	
07	Impact of climate change.	Millets is C-4 plant so it is climate resilience.	Mostly affected by climate change	
08	Economic effects	Cultivation cost is very low	Cultivation cost is very high	
09	Multiple Security	Millets give multiple securities. Like food, nutrition, fodder, fibre, health, livelihood, and ecology.	Only food security	
10	Agriculture machinery required	Very less	High	
11	Risk and vulnerability	No risk and very less vulnerability	High risk and high vulnerability	
12	Productivity growth	Remain Same or Stable	Declining	
13	Cost of seeds	Low-cost seeds	Costly seeds	

Nutritional Importance of Millets

Sorghum and millet namely, Pearl millet, Finger millet, Kodo millet, Proso millet, Foxtail millet, little millet, and Barnyard millet are important staples to millions of people world-wide. Generally, these are rain fed crops grown in areas with low rainfall and thus resume greater importance for sustained agriculture and food security. Almost all the millets are used for human consumption in most of the developing countries, but their use has been primarily restricted to animal feed in developed countries. Millets are nutritionally comparable to major cereals and serve as good source of protein, micronutrients, and phytochemicals. Processing methods like soaking, malting, decortications, and cooking affect the antioxidant content and activity. While sorghum and most of the millets contains about 10% protein, 3.5% lipids, finger millet contains 12-16% protein and 2-5% lipids. Sorghum and millets are very good sources of micronutrients such as vitamins and minerals. Major portion of sorghum protein is prolamin (kaffirin) which has a unique feature of lowering digestibility upon cooking whereas, the millets have a better amino acid profile? It has been reported that sorghum proteins upon cooking are significantly less digestible than other cereal proteins, which might be a health benefit for certain dietary groups. On the other hand, millets contain fewer cross-linked prolamins, which may be an additional factor contributing to higher digestibility of the millet proteins.

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Composition of small millets, wheat & rice (100g)

	Protein (g)	Carbohydrates (g)	Fat (g)	Minerals (g)	Fiber (g)	Calcium (mg)	Phosphorous (mg)	Iron (mg)	Energy (Kcal)	Thiamin (mg)	Niacin (mg)
Finger	7.3	72	1.3	2.7	3.6	344	283	3.9	336	0.42	1.1
Sorghum	10.4	70.7	3.1	1.2	2.0	25	222	5.4	329	0.38	4.3
Pearl	11.8	67.0	4.8	2.2	2.3	42	-	11.0	363	0.38	2.8
Foxtail	12.3	60.2	4.3	4.0	6.7	31	290	2.8	351	0.59	3.2
Little	7.7	67.0	4.7	1.7	7.6	17	220	9.3	329	0.3	3.2
Kodo	8.3	65.9	1.4	2.6	5.2	35	188	1.7	353	0.15	2.0
Proso	12.5	70.4	1.1	1.9	5.2	8	206	2.9	354	0.41	4.5
Barnyard	6.2	65.5	4.8	3.7	13.6	22	280	18.6	300	0.33	4.2
Paddy Rice	6.8	78.2	0.5	0.6	1.0	33	160	1.8	362	0.41	4.3
Wheat	11.8	71.2	1.5	1.5	2.0	30	306	3.5	348	0.41	5.1

Properties of Dietary Fiber and their Health consequences

The dietary fiber contents of several Indian foods have been determined components exert their beneficial effects mostly by way of their swelling properties, and by increasing transit time in the small intestine.

Function	Health consequences	Millet
Water absorbing and bulking property	Energy diluents to formulate low calorie diets	All Millets
Increased transit time of food in the gut	Reduced risk of inflammatory bowel disease.	Sorghum and Finger Millet
Bile acid and steroid binding	Hypocholesterolemia activity and reducing the risk of cardiovascular diseases	Pearl Millet, Sorghum and Finger Millet
Retardation of carbohydrate absorption and impaired glucose tolerance	Management of certain type of diabetes	Sorghum, Pearl Millet, and Finger Millet
Binding of toxins	As a detoxifying agent	Sorghum
Binding of divalent cations	Reduced bioavailability of Ca, Mg, Zn, Fe	Proso Millet and Foxtail Millet (unprocessed)

Innovative Nutritional Supplements:

Millets in Protein Powders: Millet-based protein powders provide a plant-based alternative to traditional protein supplements. They are easily digestible and suitable for individuals with lactose intolerance or those following a vegetarian or vegan diet.

Millet Flour in Baked Goods: Millet flour can be incorporated into bread, muffins, and other baked goods, offering a nutrient-rich alternative to conventional flour. This enables individuals to boost their

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daily nutrient intake without compromising on taste.

Millet-based Snacks: Snack foods like millet-based granola bars and puffed millet snacks provide a convenient way to incorporate the nutritional benefits of millets into daily routines.

Health Benefits of Multi-Millet Supplements:

Weight Management: The high fiber content in millets promotes a feeling of fullness, helping with weight control and management.

Heart Health: Millets contribute to heart health by supporting healthy cholesterol levels and blood pressure due to their fiber and magnesium content.

Digestive Health: The fiber in millets aids in digestion and helps prevent constipation, promoting a healthy digestive system.

Blood Sugar Control: Millets have a low glycaemic index, making them a suitable option for individuals looking to manage blood sugar levels effectively.

Conclusions

Millets have good grain qualities suitable for processing. Processing of the grain for many endues involves primary (wetting, dehulling and milling) and secondary (fermentation, malting, extrusion, flaking, popping, and roasting) operations. Being a staple and consumed at household levels, processing must be considered at both traditional and industrial levels, involving small, medium, and large-scale entrepreneurs. Dehulling is not favorable to millets due to their small grain's sizes. In addition, dehulling causes nutrients loss. All the Millets can be milled by hand grinding (household level) or machine milling (cottage, small-to-medium scale service and large scale industrial). Millet and sorghum malt production is a traditional practice in Africa, where malt is used in lactic acid- and alcoholic-fermented beverages and infant food production.

Multi-millet-based foods offer a promising avenue for nutritional supplementation, providing a natural and holistic approach to meeting dietary requirements. With their rich array of nutrients, these foods not only contribute to overall health but also present sustainable and environmentally friendly options. As awareness grows, integrating multi-millet based nutritional supplements into our daily diets could be a significant step towards a healthier and more resilient future.

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