

Millets as Superfood

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ARTICLE ID: 30

Introduction:

Millets are a traditional staple food of dry land regions of the world. Millet cultivation dates back to around 4500 BC in China and in India Neolithic archaeological evidences found at sanganakallu (Ballari, Karnataka) proves the cultivation and processing of millets around 3000 BCE (5000 years ago). India is the largest millets producer in the world followed by Nigeria and China. In India, millets are grown on about 17 million ha with annual production of 18 million tonnes and contribute 10 percent to the country's food grain basket. Major millet producing states is Rajasthan followed by Gujarat, Telangana, Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and Haryana. Top three millets grown in India are sorghum, bajra and ragi. Millets has found its space in India kitchen from ancient times and hence, today we find a diversified array of indigenous varieties of various millets.

The Poaceae family of cereal grains includes a category of grains known as millets, which are frequently relegated to as superfoods. Cultivation of these climate smart crops is an approach to achieve healthy world and sustainable agriculture. Millets have numerous vantage that can address problems with food security, farmer welfare, and food systems security. Millets are a suitable crop that can withstand India's diverse agro-climatic conditions due to its numerous special characteristics. These are cultivated with minimal water & inputs. In light of these elements, India has requested that 2023 be designated as the "International Year of Millets" and the year 2018 has already been designated as the National Year of Millets. Although its importance as a superfood is acknowledged, millets are increasingly regarded as "poor man's food" in common opinion. In order to promote production and consumption of coarse cereals and millet, they must be rebranded as "nutri-cereals." Minor millets or small millets has the potential to rescue the poor and most vulnerable sections of

the population and provide food and nutrition security to the nation especially during situations such as the current pandemic of COVID 19.

Millets for health

Millets are good sources of carbohydrates (65%), essential amino acids, proteins (9%), fat (3%) and dietary fibre (2-7%). Nutri-cereals are also rich source of vitamins -vitamin A, C and B-complex and minerals like magnesium, manganese, phosphorus and also iron (Table 1). When compared to maize and barley, millets are 60% higher in crude protein, 40% richer in lysine and methionine and 30% richer in threonine. They are good source of antioxidants and combination of bioactive substances like resistant starch, oligosaccharides, lipids, flavonoids and phenolic acids. lignans and phytosterols which are hormonally active are also present in millets all these serve as a nutraceutical and functional food ingredient in food applications for treating various health problems. Hence, millets are highly nutritious and is best alternative food to patients suffering from Celiac disease as they lack gluten. According to reports, millets may prevent cancer by reducing the risk of tumour development and cardiovascular disease, blood pressure, cholesterol, and fat absorption, delaying stomach emptying, providing gastrointestinal bulk, and being gluten-free (Gowda *et al.*, 2022).

Table 1: Nutritional composition of different millets.

Name of the millet	Nutrients (mg/100g)						Total Phenols	Iron	Calcium
	Protein	Fat	Crude Fibre	Ash	Starch	Total Dietary Fibre			
Finger Millet	7.3	1.3	3.6	3.0	59.0	19.1	102	3.9	344
Sorghum	11.0	3.2	2.7	1.8	73.8	11.8	43.1	3.4	13
Pearl Millet	14.5	5.1	2.0	2.0	60.5	7.0	51.4	16.9	38
Proso Millet	11.0	3.5	9.0	3.6	56.1	8.5	13.3	0.8	14
Foxtail Millet	11.7	3.9	7.0	3.0	59.1	19.1	106.0	2.8	31
Kodo Millet	8.3	1.4	9.0	3.6	72.0	37.8	368.0	0.5	27
Barnyard Millet	10.5	3.6	10.1	3.8	60.5	16.1	141.5	15.2	11

1. **Finger Millet:** It is an excellent source of all the nutrients but especially iron, calcium and phosphorous. It has great antioxidant properties like phytochemicals which makes it easily and slowly digestible. Finger millet is known for wholesome health such as it helps in maintaining bone strength, monitor blood cholesterol levels, helps in losing weight and reduces the risk of anaemia. It can be consumed in many forms like roti, porridge, pancakes, etc. Many bakery products could also be easily developed by using this millet. Because of its excellent malting properties, the uniqueness of the grain has gained wider acceptability in the food processing.



2. **Sorghum:** Sorghum is an ancient cereal, which is widely accepted as a staple cereal in various parts of India. Jowar is considered superior in comparison to rice and wheat because of its higher nutrient content and is helpful to tackle various health conditions. It is reported that the Sorghum wax is rich in a particular nutrient called policosanols which is very helpful in reducing the levels of cholesterol.
3. **Pearl Millet:** Pearl millet is also a great source of all the nutrients and is comparable with majorly consumed cereals like wheat and rice and is accompanied by plenty of additional benefits. Because of its high fibre content; pearl millet aids in losing weight and maintains good digestion. It is rich in phosphorous which help in maintaining good bone health. This millet is highly efficient at lessening the severity of respiratory issues like asthma because of its high magnesium concentration.
4. **Proso Millet:** As of all the other millets, proso millet is also rich in fibre, protein and minerals. Proso millet protein is helpful in increasing the HDL cholesterol levels and decreasing the LDL and bad cholesterol from the body. It has good amount of lecithin present which helps in maintaining and repairing of neural health system. Proso millet is fairly rich in B-complex vitamins, folic acid and niacin. Because of high antioxidant properties, it may serve as a rescue from various cardio vascular related disease and cancer.
5. **Foxtail millet:** Foxtail millet also contains pertinent amount of all the nutrients such as protein, vitamins and minerals. The grains of the foxtail millet are relatively coarse than other cereals which makes its digestibility up to 79% and the remaining is the indigestible portion which contains a high level of fibre content. Due to this property it may serve many health benefits, like it lowers the risk of various degenerative diseases. Because of its high magnesium content, it is now known as healthy heart food. Foxtail millet is very nutritious which made its place as an important ingredient in preparing various foods like cereal porridge, pancakes, noodles, soup and brewing alcoholic beverages.
6. **Barnyard millet:** The nutritional composition of barnyard millet is also considered superior or comparable with other major and minor cereals. The higher crude fibre content of barnyard millet ensures slowly and steady release of sugars in the blood which ultimately helps in the maintenance of blood sugar levels. With all the other

nutrients present in adequate amounts, barnyard millet is relatively rich in iron levels i.e. around 15.6-18.6mg/100g. this makes the barnyard millet as best food for anaemic patients and other lifestyle disorders. When compared to other cereal grains this millet is also rich in polyphenols and carotenoids.

7. **Kodo Millet:** Kodo millet is a nutrient rich grain which resembles more to rice and can be a great substitute to rice and aids in losing weight. Kodo is rich source of antioxidants and other bioactive compounds and is helpful to tackle various lifestyle disorders. It is also rich in lecithin which is beneficial for the adequate functioning of the nervous system.
8. **Browntop millet:** it helps in improving metabolic activities, prevent gastric problem, reduce acidity in adults, contains good amount of phosphorous, helps in weight loss and it also acts as probiotic for gut health. Usually used in the form of porridge and rice.

Millets may also boost the food processing industry which is a focus area to uplift the economy of the state and the country. They possess sufficient potential to rescue us from various lifestyle disorders and adverse environmental disasters (Dayakar Rao *et al.*, 2017).



Finger millet



Sorghum



Pearl millet



Proso millet



Foxtail millet



Barnyard millet

**Kodomillet****Brown top millet****Importance of millets:**

- **Climate Resilient Crop:** Millets are a sustainable food supply for battling hunger in the face of a changing global climate because they are resistant to climatic stress, pests, and illnesses. Additionally, millets don't require a lot of water or other inputs, making them a sustainable method of combating climate change and creating robust agri-food systems.
- **Nutritional Security:** Nutri-cereals are a powerhouse of nutrients, including iron, folate, calcium, zinc, magnesium, phosphorus, copper, vitamins, and antioxidants. Millets are high in dietary fibre. Because they are gluten-free and have a low glycemic index, millets are healthy for diabetics and can fight off heart disease and nutritional deficiencies.
- **Economic Security:** Millets can be produced in arid, sparsely fertile, mountainous, tribal, and rain-fed regions. Millets also have shorter cultivation cycles, less expensive cultivation requirements, and are healthy for the land. Due to these characteristics, millets will only require a small initial investment to produce, making them a viable source of revenue for farmers.
- Millets can fit into many cropping systems specially, in the dryland and drought prone areas. They are resistant to many pest and disease and do not have any allelopathic effect on succeeding crop. Can also be integrate with animal component.

Constraints in millet cultivation:

1. **Lack of suitable varieties/ hybrids:** Usually farmer saved seeds are used for cultivation, but now breeding work has taken faster phase, and many research works are taking part across the county.

2. **Post harvesting technology:** Lack of efficient machineries like fine cleaner, destoner, centrifugal husker, sifter, unhull separator and color sorter is the major reason. these high-tech machineries are costly and are not affordable by the small farmers, nearly 30 per cent of the produce is wasted every year due to lack of post-harvest facilities. FPO or start-ups must be encouraged or public sector must provide custom hiring services to the millet growing farmers so that millets could be processed and packed. such products fetch high price in the market.
3. **Farmer acceptability:** due to higher monetary returns farmers prefer commercial crops over millets. Today millets are grown by resource poor farmers and in marginal lands. In order to overcome this issue government should introduced scheme to provide required inputs and good quality seeds to the farmers.
4. **Lack of support:** people must be educated about the benefits of millets and make millets an integral part of the kitchen. Processed and value-added products like baby foods (malt), ready to eat noodles, bakery products like millet cake, biscuit, muffins, fried sticks *etc.*, must be popularized. As the government has aimed to achieve malnutrition-free India along with doubling of farmers' income the Karnataka government has initiated a pilot project where millet-based food items like bajra/jowar roti, bisibelebath are included in mid-day meals twice a week. Such activities must be extended to all parts of the country.
5. **Lack of market facilities:** even there is huge demand in the market or millets there is lack of market chain and infrastructure for millets. Selling power of the farmer can be increasing by encourage more number Farmer Producer Organisations. Government need to include millets under MSP scheme and fix higher price for millets to provide steady market and should encourage farmers to grow millets by including millets in public distribution system.

Conclusion

The influence of Western food habits pushed for rice and wheat, bad eating habits. The increasing trend of high consumption of refined cereals and sedentary lifestyle has worsened the health scenario among Indian population. Millets seems to be one stop solution for all these problems. Millets can be used for traditional as well as novel foods. These being climate resilient can battle drought and are less input intensive with good yield. Recent surge



in demand for the millets is prompting farmers to take up millet's cultivation, contribute to sustainable agriculture, augmenting income of farmers, protecting environment and improving the health and nutritional status of population. Growing millets can come as blessing indisguise for small holding farmers.

References:

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