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Introduction and identification of the miracle crop of the year

Millets

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Introduction

As humans depend predominantly on plant-based diets, nutritional security is the key to enhancing the health status of the global population. The primary source of nutrients necessary for normal growth and development is plants. As a result of their

reliance on cereal commodities, however, half of the world's population, particularly those in Asia and Africa, suffer from malnutrition. The productivity of cereals is being affected by climate change. However, millets perform well under these conditions.

Millets are nutrient-dense and may offer a solution to India's chronic disease burden. Millets are gluten-free, high in dietary fibre and rich in micronutrients including calcium, iron and phosphorus. Millets are superior to rice or wheat as a source of protein. Being slow-digesting, millets do not cause a sudden rise in blood sugar unlike refined cereals. Substituting millets for wheat and rice in the daily diet has multiple health benefits and can go a long way towards preventing and curing chronic diseases such as diabetes, heart disease and obesity (Saldivar, *et al*., 2003).

In addition to being a potential solution to India's health crisis, millets are also advantageous to our agricultural and environmental systems. Millets are farmer-friendly legumes because they are resistant to extreme weather conditions and drought. Unlike rice, which requires 5,000 litres of water to produce 1 kilogramme, millets require only 650 to 1,200 litres of water per kilogramme. They can also be grown with fewer chemical inputs, including fertilisers and pesticides. Millets are also more resistant to decay and deterioration. For instance, finger millet can be conserved and ingested even after a decade of growth.

Despite these benefits, millets continue to be primarily ignored as a grain source. Not even 50 years ago, however, was this the case. In 1950-51, almost one-third of all main foodgrains in India consisted of millets, but by 2018-19, this proportion had decreased to approximately 15% (Government of India, Pocket Book of Agricultural Statistics, 2019). During the Green Revolution, which began in the 1960s, the emphasis was placed on increasing food production to ensure food security for India's expanding population. The production of wheat and rice was increased and encouraged through the use of modern technology and high-yielding varieties. The area where millets were grown decreased. India is increasingly rediscovering these cereals' magical potential. Previously known as 'coarse grains' and considered a staple of the diet of the impoverished, the Indian government declared millets to be "nutri-cereals" in 2018. India proclaimed 2018 to be the National Year of Millets. The UN FAO has proclaimed 2023 the International Year of Millets in response to a request from India.

Millets and the history

Millets are a group of highly variable, small-seeded grasses that are extensively cultivated as cereal crops or grains for human consumption and as fodder around the globe. Millet cultivation on the Korean Peninsula dates back to the Middle Jeulmun Pottery Period (approximately 3,500–2,000 BCE). In India, foxtail millet (priyangava), Barnyard millet (aanava) and black finger millet (shyaamaka) are identified in some of the earliest Yajurveda texts, indicating that millet consumption was widespread prior to the Indian Bronze Age (4,500 BC). Prior to 50 years ago, millets were the predominant crop in India. Millets, once a staple food and integral part of local food

cultures, are now regarded by modern urban consumers as "coarse grains" – something that their village ancestors may have subsisted on, but that they have since abandoned in favour of a more "refined" diet. Unfortunately, this refined diet lacks essential nutrients (food should be as locally sourced and natural as feasible). Millets have reportedly been ingested in India for over 5,000 years, although few people recognise them today. Millets are a category of cereal grains that correspond to the grass family, or *Poaceae.* They hail from Asia and Africa. The following millets are acknowledged in India:

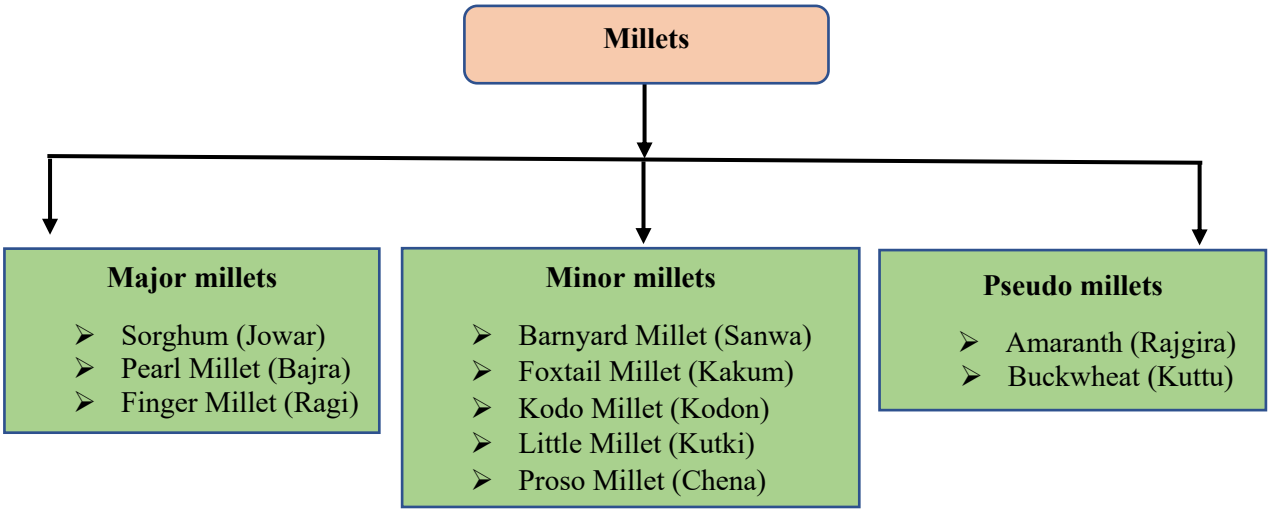
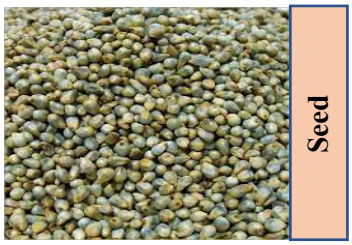


Table 1: Classification, Identification and health benefits of millets

Classification	Name	Nutritional characteristics
Major millets	**Sorghum (Jowar)**  **Seed**  **Plant**	• A significant proportion of sorghum protein is prolamin (kaffirin), which has the unique property of decreasing digestibility upon processing, which may be advantageous for the health of some dietary categories. • Sorghum proteins are substantially less digestible than other cereal proteins after preparation, which may be advantageous for the health of certain dietary groups. • It is abundant in protein, fibre, thiamine, riboflavin, folic acid and carotene. • It is abundant in potassium, phosphorus and calcium with adequate quantities of iron, zinc and sodium.

	Pearl millet (Bajra)  Seed  Plant	• It has an exceptionally high concentration of proteins (12-16%) and lipids (4-6%). • This item has 11.5% fibre content. It slows down the passage of food through the digestive tract. • It reduces the probability of developing inflammatory bowel disease. The cereal with the maximum niacin content is pearl millet. Folic acid, magnesium, iron, copper, zinc, vitamin E and the B-complex are also present. Compared to other millets, it contains more calories.In addition, it is a rich source of calcium and healthful unsaturated fats.
Minor Millets	**Barnyard millet (Sanwa)**  Seed  Plant	• It is the richest source of crude fibre and iron. • Its cereals contain other functional constituents, such as Gamma-aminobutyric acid (GABA) and beta-glucan. • It is used as antioxidants and for lowering blood lipid levels.
	Foxtail Millet (Kakum)  Seed  Plant	• It is rich in carbohydrates. • It contains twice as much protein as rice. • It contains minerals like copper and iron. • It contains an abundance of nutrients, has a pleasant, hazelnut flavour and is one of the most digestible and allergy-free grains.

	Kodo millet (Kodon)  Seed  Plant	• It is rich in protein (11%), low in fat (4.2%) and packed with fibre (14.3%). • Vitamin B, specifically niacin, pyridoxine and folic acid as well as calcium, iron, potassium, magnesium and Zinc are abundant in kodo millet. • Kodo millet contains a high concentration of lecithin and is ideal for enhancing nervous system health.
	Little millet (Kutki/ Shavan)  Seed  Plant	• It is more diminutive than other millets. • It is abundant in iron. • It has strong antioxidant properties. • It contains approximately 38% fibre.
	Proso Millet (Chenna/ Barri)  Seed  Plant	• It contains the greatest percentage of protein (12.5%). • Unique characteristics of proso millet contribute to its health benefits. • Significant quantities of carbohydrates and fatty acids are present. • Compared to other conventional sources of manganese, such as almonds and seeds, it is an inexpensive source. • It contains a high concentration of calcium, which is necessary for bone development and maintenance. • It also reduces the risk of heart disease by lowering cholesterol; levels.

Pseudo millets	**Amaranth (Ramdana/ Rajgira)**  Seed Plant	• High protein content (13-14%) and a carrier of lysine, an amino acid that is absent or present in negligible amounts in the majority of other cereals. • Contains 6-9% oil, which is higher than the majority of other cereals. High in linoleic acid, amaranth oil contains approximately 77% unsaturated fatty acids. • It is abundant in dietary fibre. • Significant quantities of iron, magnesium, phosphorus, potassium and calcium are present. • A significant dietary source of cholesterol-lowering phytosterols. • Contains a lunasin-like peptide and other bioactive peptides believed to have anticancer and antihypertensive properties.
	Buckwheat (Kuttu)  Seed Plant	• Rich in the amino acid lysine, it contains 13-15% protein. • Predominantly composed of carbohydrates. • Contains vitamins B1, C and E. • Rich in polysaturated essential fatty acids like linoleic acid.

Several essential aspects about millets

- Due to their high resistance to severe conditions, millets are sustainable for the environment, for the farmer who cultivates them and they provide inexpensive and nutrient-rich options for all (Chaturvedi *et al.,* 2023).
- Nearly forty percent of the food produced annually in India is squandered. Millets are not readily destroyed and some millets are still edible after 10 to 12 years of growth, thereby ensuring food security and playing a crucial role in preventing food waste.
- Millet contains fibre, magnesium, Niacin (Vitamin B_3), is gluten-free and contains a significant amount of protein.

The path ahead

Millets are experiencing a strong resurgence, but from an individual's perspective, it is essential to know what one's body is accustomed to and no drastic changes should be made. Millets' popularity is steadily gaining again and numerous efforts are being made to bring them back into the mainstream. A balanced approach to reintroducing this commodity to the public will go a long way towards resolving some of the nation's most pressing food issues.

Conclusion

Millets offer a promising solution for India's food and nutrition security on account of their health, agricultural and environmental benefits. India is still the largest producer of millets in the globe, despite a decline in millets production over time. India must take advantage of the current millet craze and endeavour to become the millet capital of the world in terms of both production and consumption.

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