Importance of Millet Crops

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Introduction

Millets area traditional grains grown and consumed for the last more than (5000) years in India. Indian millets are a group of nutritionally rich, drought tolerant mostly grown in the arid and semi-arid regions of India. These grasses are tiny seeds that are a part of the Poaceae family of plants. They are a critical component of India's ecological and economic security and provide millions of resource-poor farmers with food and fodder. Coarse cereals or impoverished people's cereals are other names for these millets.

What are Millets?

Millets, also known as coarse grains, are small-grained cereals. "Superfood" is a term that is frequently used. They were among the first domesticated crops. They are members of the Graminae grass family.

Origin

It is believed that Uganda or a neighboring region is the centre of origin of Eleusine coracana (finger millet).Mehra (1962) proposed E.coracana to be of African origin .Originally Millet is native to the Ethiopian highlands and was introduced into India approximately 4000 year ago .

History of Millets

Millet cultivation in India has a long history dating back to the dawn of human civilization. Evidence suggests that various types of millets were cultivated at various times in Indian history, with documented evidence of their presence. Foxtail millet cultivation was documented during the Harappan civilization. Pearl millet was grown in South India during the Neolithic period ("2000-1200 BC"). The early Iron Age "1200-1000 BC" saw the cultivation of kodo millet and finger millet. Brown top millet and bristly foxtail millet (Seteria verticillara) were also grown during the Neolithic-Chalcolithic period.

Type of millets

Major millets

Sorghum (Jowar)

Prolamin, also known as kaffirin, makes up the majority of the protein in sorghum. Its special ability to reduce digestibility when cooked makes it advantageous for some dietary categories.

After heating, sorghum proteins are much less digestible than those from other cereals, which could be advantageous for some dietary groups. Protein, fiber, thiamine, riboflavin, folic acid, and carotene are all abundant in it.Along with iron, zinc, and sodium, it has significant levels of potassium, phosphorus, and calcium.

Pearl Millet (Bajra)

Pearl millet contains a significant amount of protein (12-16%) as well as lipids (4-6%). It has a dietary fibre content of 11.5%. It lengthens food transit time in the gut. As a result, the risk of inflammatory bowel disease is reduced. Pearl millet has the highest niacin content of any cereal. It also has folicate, magnesium, iron, copper, zinc, and the vitamins E and B-complex. When compared to other millets, it has a high energy content. It also contains a lot of unsaturated fats and calcium, both of which are good for you.

Finger Millet (Ragi)

Finger millet contains the most calcium (300-350 mg/100g), while ragi contains the most minerals. It has a lower protein (6-8%) and fat (1.5-2%) content. Finger millet proteins are distinct due to their high sulphur content. The grains have excellent malting properties and are commonly used as weaning foods. It has a high level of antioxidant activity.

Miner millets

Foxtail millet (Kakum)

It is high in carbohydrates, has twice the protein content of rice, and contains minerals such as copper and iron. It is high in nutrients, has a sweet nutty flavour, and is one of the most digestible and non-allergenic grains.

Kodo millets

Its protein level is high (11%), its fat content is low (4.2%), and its fiber content is high (14.3%). Kodo millet contains significant levels of minerals such as calcium, iron, potassium, magnesium, and zinc along with B vitamins, especially niacin, pyridoxine, and folic acid. Moreover, it has a high lecithin content, which supports the nervous system.

Branyard millets

Its grains contain other functional constituents, such as Gamma amino butyric acid (GABA) and Beta - glucan, which are used as antioxidants and in lowering blood lipid levels.

Little millet (Kutki/Shavan)

It is smaller than other millets, has a high iron content, and has strong antioxidant properties.It contains approximately 38% dietary fibre.

Proso millet (Chenna/Barri)

It has the highest protein content (12.5%). The unique properties of proso millet contribute to its health benefits. It contains a lot of carbohydrates and fatty acids. It is a less expensive source of manganese than other traditional sources such as spices and nuts. It is high in calcium, which is necessary for bone growth and maintenance. It lowers cholesterol levels and lowers the risk of heart disease.

Millet crops are important for several reasons

Nutritional Value:

Millets are high in nutrients, vitamins, minerals, and fibre. They contain essential nutrients such as iron, calcium, and B vitamins, making them an important part of a healthy diet. Millets are high in nutrients and fibre. They are high in protein, micronutrients, and phytochemicals. Millets have a protein content of 7-12%, a fat content of 2-5%, a carbohydrate content of 65-75%, and a dietary fibre content of 15-20%. The essential amino acid profile of millet protein is superior to that of other cereals such as maize. Millets contain fewer cross-linked prolamins, which may be another factor contributing to millet protein digestibility.Millet proteins, like cereal proteins, are low in lysine, but they work well with lysine-rich vegetables (leguminous) and animal proteins to form nutritionally balanced composites with high biological value. Millets are higher in nutrients than fine cereals. Iron and phosphorus levels are high in little millets. Millets play a significant role in ageing and metabolic illnesses due to their high content of phytates, polyphenols, tannins, anthocyanins, phytosterols,

and pinacosanols, all of which contribute to antioxidant activity. There is strong antioxidant activity in all millets.

Climate Resilience:

Millets are climate-resilient crops that can withstand temperature fluctuations and erratic rainfall patterns, making them a dependable food source in unpredictable climates. Millet is a climate resilient crop because it is photoinsensitive ("does not require a specific photoperiod for flowering") and resistant to climate changeMillets can grow in poor soil with little or no outside help. Millets require less water and can grow under drought and non-irrigated conditions, even in areas with very low rainfall. Millets have a low carbon and water footprint; "the rice plant requires at least three times more water to grow than millets." Millets are resistant to high temperatures. In the face of climate change. Millets are frequently the last crop standing, making them an excellent risk management strategy for resource-poor marginal farmers in the current changing climatic scenario. Abiotic stresses pose a significant risk to plant growth and development, resulting in a 50% decrease in yield among popular cereal crops. Globally, various abiotic stresses affect nearly 90% of cultivable land, while only 10% of agricultural land is free of these abiotic stresses. Among the various environmental stresses, drought and heat are the two most significant production constraints. Crop species such as millets, which are more resistant to higher temperatures and lower rainfall and have a higher tolerance to environmental stressors than main cereals, can be useful in this context play a critical role in meeting the world's growing food demand. Millets' short lifespan helps them avoid stress since they only need 12- 14 weeks to complete their life-cycle (seed to seed), but rice and wheat take up to 20-24 weeks. Millets are mostly grown on irrigated marginal lands and can survive and produce a large amount of grain even in drought-prone areas with an average annual precipitation of 250 mm

Drought Tolerance:

Nutritional content in 100 gms of dry Grain	Protein (in gms)	Carbohydrates (in gms)	Fat (in gms)	Minerals (in gms)	Fiber (in gms)	Calcium (in mgs)	Phosphorous (in mgs)	Iron (in mgs)	Energy (in kCals)	Thaimin (in mgs)	Nacin (in mgs)
Foxtail	12.3	60.2	4.3	4	6.7	31	290	2.8	351	0.59	3.2
Little	7.7	67	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
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
Sorghum	10.4	70.7	3.1	1.2	2	25	222	5.4	329	0.38	4.3
Pearl	11.8	67	4.8	2.2	2.3	42	240	11	363	0.38	2.8
Finger	7.3	72	1.3	2.7	3.6	344	283	3.9	336	0.42	1.1
Paddy Rice	6.8	78.2	0.5	0.6	1	33	160	1.8	362	0.41	4.3
Wheat	11.8	71.2	1.5	1.5	2	30	306	3.5	348	0.41	5.1
Quinoa	14	64	6	*	7	36	457	4.6	368	0.36	*

Compiled from a study published by the National Institute for Nutrition, Hyderabad and other sources for Quinoa.

Millets are known for their resilience in harsh environmental conditions, particularly drought. They require less water compared to other cereal crops, making them suitable for regions with limited water resources.

Climate Adaptability:

Millets can grow in a variety of climates, from arid to semi-arid. Because of their adaptability, they are an important crop for food security, particularly in areas prone to climate change-induced fluctuations.

Crop Diversity:

Millets include several species such as pearl millet, finger millet, and sorghum. This variety adds to dietary diversity and food security by providing alternatives to wheat and rice.

Low Input Requirements:

Millets frequently require fewer inputs such as fertilisers and pesticides, lowering agriculture's overall environmental impact..

Income Generation:
Millets can be a source of income for many small-scale farmers in developing countries due to their ability to grow in difficult conditions and market demand for their nutritional value.

Biodiversity Conservation:
Millets cultivation helps to preserve traditional crop varieties and genetic diversity, which is critical for long-term food security.

Soil Health:
Millets have deep root systems that can improve soil structure and fertility, reducing soil erosion and degradation.

Cultural Significance:
Millets have cultural significance in many parts of the world, often being a staple in traditional diets and culinary practices. They are used in various dishes, beverages, and rituals, preserving cultural heritage.

Livestock Feed:
Millets are not only important for human consumption but also serve as valuable livestock feed. They can be a source of animal nutrition, supporting livestock farming.

Crop Rotation:
Millets are useful in crop rotation strategies. They break the life cycles of pests and diseases, helping maintain soil health and reduce the need for chemical interventions.

Sustainable Agriculture:
Due to their low resource requirements and ability to grow in marginal lands, millets contribute to sustainable agricultural practices, reducing the environmental impact of farming.

Food Security in Marginalized Areas:
Millets are often grown in regions where other crops struggle to thrive. They serve as a critical food source in areas with limited agricultural options, helping combat hunger and malnutrition.

Conclusion
Overall, millets are adaptable and resilient crops with numerous advantages that include not only nutrition and agriculture but also cultural and environmental aspects. Their significance extends to global issues such as food security, climate change, and sustainable agriculture.