

3. Importance and Scope of Millets

Abstract:

Millets, recognized for their resilience and nutritional richness, present a cost-effective alternative that can contribute to ensuring food security. These cereals encompass essential minerals, proteins, and antioxidants. The diverse fiber content in various millet varieties plays a crucial role in regulating intestinal function, blood sugar levels, and lipid metabolism. The United Nations General Assembly, in collaboration with the FAO, declared 2023 as the International Year of Millets (IYM 2023) during its 75th session. With a rising prevalence of both under- and over-nutrition, the shift to diets incorporating millets is becoming urgent due to their health benefits and affordability. India has committed to positioning itself as the 'Global Hub for Millets,' aiming to make the International Year of Millets 2023 a 'People's Movement.' This Millet Revolution is spurred by initiatives to revive ancient agricultural practices, support small-scale farmers, and heightened awareness of the health and environmental advantages of millets. The ongoing efforts to rejuvenate traditional agricultural practices and aid small-scale farmers are pivotal aspects of the millet cultivation revolution, considered a holistic response to both public health and sustainable agriculture challenges.

Keywords:

International Year of Millets, SDGs, Sustainability, Nutritional security, Revitalization.

3.1 Introduction:

India is the largest producer of millets in the world, and accounts for more than 40 per cent of the global consumption. Millet cultivation is the main stay of rained farming which provides livelihood to nearly 50 per cent of total rural work force and sustains 60 per cent of cattle population in India. Millets when grown under traditional methods do not attract any pest and can be termed as pest-free crops. A majority of them are not affected by storage pests either (Bragg *et al.*, 2016). Thus, they are a great boon to the agricultural environment. In addition, millets sequester carbon, thereby adding to CO₂ abatement opportunities, contribute to improved agro-biodiversity by their varietal diversity, allow for mutually beneficial intercropping with other vital crops and have significant cultural values due to their long history. Millet collectively refers to various cereal grasses characterized by small grains. This broad category encompasses major millets like sorghum and pearl millet, distinct from smaller grain millets such as finger millet (ragi), foxtail millet (kangni), kodo millet (kodo), proso millet (cheena), barnyard millet (sawan), and little millet (kutki), which have been categorized based on their respective sizes. India, holding the title of the world's largest millet grower and the second-largest millet exporter, has embarked on an initiative to enhance the popularity of this grain. In an effort to revive the ancient practice of incorporating millets into daily diets, the Indian government designated the year 2018 as the National Year of Millets. Millets, known for their versatility, can thrive in arid soils without irrigation, low rainfall conditions, and across a broad latitudinal range.

In comparison to rice and wheat, millets demonstrate greater water efficiency, making them a strategic choice for farmers amidst climate change and depleting natural resources. Their high tolerance for heat, drought, and flood positions millets as a resilient crop, offering nations an opportunity to enhance self-sufficiency and reduce reliance on imported cereals.

The cultivation of millets demands fewer resources, showcases higher resistance to diseases and insects, and requires reduced application of synthetic fertilizers and pesticides. Their adaptability to climate change further establishes millets as a sustainable choice, capable of improving livelihoods for small-scale farmers while diversifying the food chain. Recognizing the enormous potential and alignment with sustainable development goals, the Indian government prioritized millets, rebranding them as 'Nutri Cereals' to enhance marketing and demand. Emphasizing the need to highlight millets' diversity, nutritional value, and ecological benefits, the Government of India proposed the establishment of an International Year of Millets in 2023, which gained approval from the UN General Assembly and FAO Governing Bodies. The official launch of the International Year of Millets - 2023 occurred on December 6, 2022, in Rome, Italy, by the FAO of the United Nations. Simultaneously, scientists anticipate a steady growth in the global millets market, projecting a Compound Annual Growth Rate (CAGR) of 4.5% from 2021 to 2026.

The objectives of the International Year of Millets - 2023 focus on raising public awareness, encouraging stakeholders to enhance sustainable production, and increasing investment in extension services. This initiative serves as an opportunity to communicate the manifold benefits of millets in areas ranging from human health and the environment to economic growth. This article primarily centers on millet production, emphasizing its potential to sustain productivity in arid regions and ensure future food and nutritional security.

3.2 Types of Millets in India:

India is home to a diverse array of millets, each with its unique nutritional profile and regional names. Among the commonly grown millets are Jowar (sorghum), Bajra (pearl millet), Ragi (finger millet), Jhangora (barnyard millet), Barri (Proso or common millet), Kangni (foxtail/Italian millet), and Kodra (Kodo millet). Exploring them in detail reveals their nutritional benefits and the varied names they go by in different regions.

- Barnyard Millet, known as Kuthiravali in Tamil, Oodhalu in Kannada, Odalu in Telugu, Kavadapullu in Malayalam, and Sanwa in Hindi, stands out for its high iron and fiber content.
- Finger Millet, referred to as Ragi in Kannada, Ragulu in Telugu, Kelvaragu in Tamil, Koovarugu in Malayalam, and Mundua in Hindi, is a staple that serves as an excellent substitute for oats and cereals.
- Foxtail Millet, recognized as Thinai in Tamil, Kirra in Telugu, Thinna in Malayalam, Navane in Kannada, and Kangni in Hindi, is rich in minerals and vitamins.
- Little Millet, also abundant in iron and fiber, goes by the names Chama in Malayalam, Same in Kannada, Samai in Tamil, Sama in Telugu, and Kutki in Hindi across different regions.
- Proso Millet, known as Barri in Hindi, Panivaragu in Tamil and Malayalam, Baragu in Kannada, and Varigalu in Telugu, has its own distinct attributes.

- Pearl Millet, recognized for its high protein content, is called Bajra in Hindi, Sajje in Kannada, Sajjalu in Telugu, Kambu in Tamil, and Kambam in Malayalam. The rich variety of millets in India not only contributes to the country's agricultural diversity but also provides a wealth of nutritional options with regional significance.

3.3 Increasing Global Interest in Millets:

The global interest in millets has seen a significant upswing in recent years, marking a departure from their traditional and regional perception. This trend is depicted in the graph, showcasing a steady increase in millet consumption worldwide. The data reflects a growing demand for millets, signaling a shift in acknowledgment towards their nutritional and ecological benefits. This heightened interest is fueled by the awareness of millets' resilience to adverse climatic conditions, their rich nutrient content, and their potential contributions to sustainable agriculture. In the face of challenges posed by climate change, rural distress, hunger, and global food insecurity, millet production is emerging as a promising solution. The prevalence of food insecurity, malnutrition, agrarian distress, and climate change is driving a reevaluation of millet cultivation as a viable alternative. Globally, around 700 million people grapple with hunger, with African and Asian nations facing particularly severe impacts, underscoring the pervasive nature of food security challenges across continents. Millet's commendable nutritional profiles position them as potential remedies for addressing nutritional inadequacies and promoting healthier dietary patterns. Regions like the Middle East and Africa, grappling with declining water levels, are gaining international attention for the significance of millets in sustainable agriculture. Advocating for millet cultivation becomes crucial in the current context, where promoting new land-use practices, enhancing farmer income opportunities, and encouraging better consumer choices come to the forefront. The global impact economy of millets is gaining momentum as these versatile grains demonstrate their potential to contribute to a more sustainable and resilient food system.

3.4 Nutritional Value of Millets:

This table emphasizes the nutritional significance of millets compared to other staple grains. Millets are rich in essential nutrients such as fiber, protein, vitamins, and minerals. The comparison chart illustrates how millets outperform traditional grains like rice and wheat in terms of nutritional content. As health-conscious consumers and dietary trends prioritize nutrient-dense foods, millets have gained prominence as a valuable source of wholesome nutrition.

Table 3.1: Nutrient Composition of Minor Millets (Per 100 G)

| Food grains | Carbs (g) | Protein (g) | Fat (g) | Energy (kcal) | Mineral matter (g) | Ca (mg) | P (mg) | Fe (mg) |
|----------------------|------------------|--------------------|----------------|----------------------|---------------------------|----------------|---------------|----------------|
| Finger millet | 72.0 | 7.3 | 1.3 | 328.0 | 2.7 | 344.0 | 283.0 | 3.9 |
| Kodo millet | 66.9 | 8.3 | 1.4 | 309.0 | 2.6 | 27.0 | 188.0 | 0.5 |
| Proso millet | 70.4 | 12.5 | 1.1 | 341.0 | 1.9 | 14.0 | 206.0 | 0.8 |

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|------------------------|------------------|--------------------|----------------|----------------------|---------------------------|----------------|---------------|----------------|
| Foxtail millet | 60.9 | 12.3 | 4.3 | 331.0 | 3.3 | 31.0 | 290.0 | 2.8 |
| Little millet | 67.0 | 7.7 | 4.7 | 341.0 | 1.5 | 17.0 | 220.0 | 9.3 |
| Barnyard millet | 65.5 | 6.2 | 2.2 | 307.0 | 4.4 | 20.0 | 280.0 | 5.0 |

Nutritive value of Indian foods, NIN, 2017. MILLET in your Meals, <http://www.sahajasamrudha.org/>

3.5 Millets' Role in Sustainable Agriculture:

The role of millets in the development of sustainable agriculture extends beyond their nutritional and ecological benefits. Millets play a pivotal role in enhancing agrobiodiversity, as they are well-adapted to diverse agro-climatic conditions. Their ability to thrive in arid and semi-arid regions, with minimal water requirements, makes them crucial for water-use efficiency in agriculture. This inherent resilience contributes to the conservation of water resources, especially in regions facing water scarcity and erratic rainfall patterns. Furthermore, millets promote soil health and fertility. Their root systems are often extensive, aiding in soil structure improvement and nutrient retention. The cultivation of millets can thus contribute to mitigating soil erosion, enhancing organic matter content, and reducing the reliance on chemical fertilizers. This aligns with the principles of sustainable agriculture, emphasizing environmentally friendly practices that maintain or improve soil health over the long term. In the context of small-scale and subsistence farming, millets offer economic resilience to farmers. Their shorter growth cycles and adaptability to diverse soil conditions provide farmers with a more reliable and stable source of income. Additionally, millets can serve as a valuable crop rotation option, breaking pest and disease cycles, reducing the need for synthetic pesticides, and contributing to overall farm sustainability. As nations worldwide seek sustainable agriculture solutions to address the challenges of climate change, millets emerge as a strategic crop. The promotion of millet cultivation aligns with global sustainability goals, offering a resilient, low-input alternative that contributes to food security, economic stability for farmers, and environmental conservation. Thus, integrating millets into agricultural practices can pave the way for a more sustainable and resilient future in the realm of food production.

3.6 Economic Opportunities and Scope in Millet Production:

The economic opportunities and scope in millet production present a promising avenue for agricultural development and rural prosperity. As global interest in millets continues to rise, the cultivation of these versatile grains offers numerous economic benefits. Millets have the potential to generate income and employment opportunities for farmers, particularly in regions where they are well-suited to grow. The diverse uses of millets, ranging from food products to animal feed and industrial applications, create a multi-faceted market that contributes to a robust agro-economy. Furthermore, millet production can play a role in

fostering entrepreneurship, as value addition and processing industries related to millets can flourish, creating additional economic avenues. Initiatives such as the 'Global Hub for Millets' in India underscore the commitment to maximizing economic opportunities in millet production. The increasing demand for millets also opens up possibilities for export markets, enhancing trade and contributing to a more sustainable and diversified agricultural economy. Overall, the economic prospects in millet production reflect not only immediate financial gains for farmers but also a broader potential for regional economic development and global market integration.

3.7 Reasons for Decline of Minor Millets Cultivation:

- The Green Revolution of the 1960s saw government policies for promotion of rice and wheat, which pushed minor millets into ever more marginal areas.
- Policy-makers also contributed to the lack of importance/status by keeping millets largely out of the scope of both official research and development and price support agreements.
- Reduced production due to lack of suitable higher-yielding varieties, poor quality seed, as well as lack of improved cultivation practices etc.
- Further, lack of awareness of the nutritional value of millets and generally unfavorable policy besides, lack of attractive recipes for adding value.
- Lack of infrastructure for processing, marketing and storage facilities of minor millets.
- Lack of RandD (Research and Development) in minor millets.

3.8 Problems to Be Addressed by Millet Cultivation:

Globally, minor millets account for less than one percent of the food grains produced, thus, not important in terms of overall world food consumption, but they are strategic in terms of their nutritional contribution, and their role in local agro-ecosystems. In Asian and African countries, millets are the staple food for the people and are used to make foods and beverages like idly, dosa, papad, chakli, porridges, breads, and infant snack foods. Millets do not have place in the daily diet of urban people, but now these people have recognized the importance of millets as ingredient in multigrain and gluten free cereal products. (ICRISAT, 2013)

Many countries including India, China, USA etc. have now started research projects to study and develop processing technology for nutritional improvement and to harvest health benefits and promote their utilization as on a large scale. Also, millet production is not dependent on the use of synthetic fertilizers. Most millet farmers use manures and biofertilizers as nutrient sources. Therefore, they can significantly reduce the huge burden of fertilizer subsidy borne by the government.

Moreover, Government of India has announced budget allocation of Rs. 300 crores in under Rashtriya Krishi Vikas Yojana (RKVY) for promotion of millets as Nutri-Cereals. A scheme on Initiative for Nutrition Security through Intensive Millets Promotion has been formulated to operationalize the announcement. Coarse cereal crops covered under NFSM are maize, sorghum, barley, pearl millet, and small millets (finger millet, kodo, barnyard, foxtail, proso, and little millet). To ensure that millets make successful comeback, the

Governments of Telangana, Odisha and Andhra Pradesh have launched pilot projects where children in Anganwadis are being served millet-based meals replacing the traditional rice meal. Millets are being promoted as nutritious crops currently and there is increasing importance and demand for them in urban areas.

3.9 Potential of Minor Millets:

A. Millets Are Store-Houses of Nutrition:

- Finger millet has 30 times more Calcium than rice while every other millet has at least twice the amount of Calcium compared to rice
- Foxtail and little millet are rich in Iron
- Millets are rich in Beta Carotene, which most of us seek in pharmaceutical pills and capsules. Whereas, the much privileged rice, has zero quantity of this micro-nutrient

B. Millets Grow On the Poorest of Soils:

Poor farmers especially in dryland India are owners of very poor lands. The only crops that sustain agriculture and food security on these lands are millets. Millets can withstand drought like conditions in the Deccan and Rajasthan and produce food and fodder for people and livestock, respectively.

C. Millets Demand Less Synthetic Fertilizer:

Under dry land conditions, millets can grow in the absence of chemical fertilizers. Therefore, most millet farmers grow them using farmyard manure under purely ecofriendly conditions.

D. Millets Are Less Prone to Insect Pest Damage:

Growing traditional local landraces and under ecological conditions, most millets such as foxtail are totally pest free and hence do not need any pesticides. Even in storage conditions, most millets such as foxtail not only need any fumigants, but act as anti pest agents to store delicate pulses such as green gram.

E. Millets Produce Multiple Security:

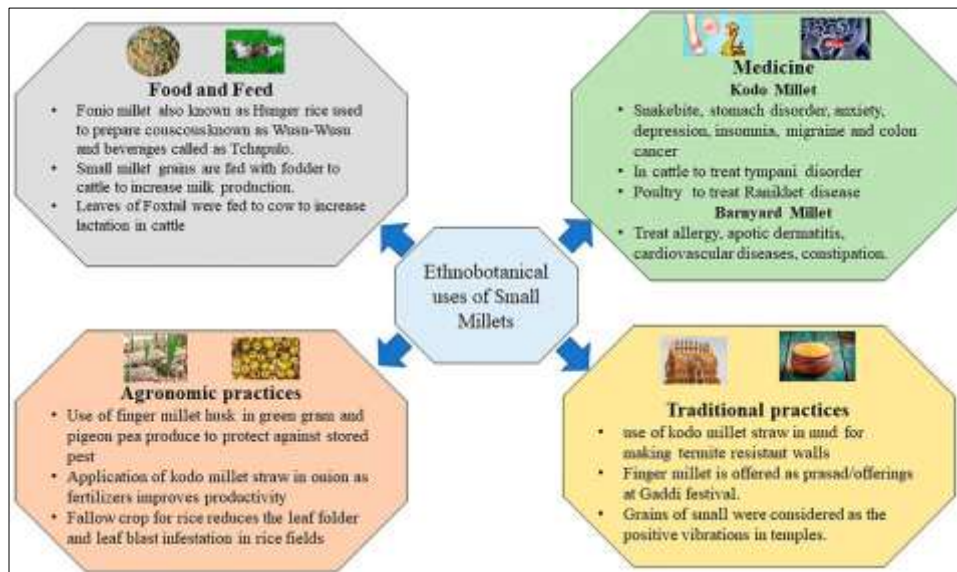
Major food crops like rice and wheat provided food security to India. But various other securities such as nutrition, fodder, fiber, health, livelihood, ecology, etc. are provided by millets

F. Millets Are Climate Change Compliant Crops:

Climate Change is expected to confront us with three challenges

- Increase in temperature up to 2-5 degree Celsius
- Increasing water stress
- Severe malnutrition

Only millets have the capacity to meet this challenge. Since they are already capable of growing under drought conditions, they can withstand higher heat regimes and water stress conditions. Each of the minor millets include major and micro nutrients needed by the human body. Hence they can help people withstand malnutrition. In view of all these features that they so amazingly combine, millets can only be called as *Miracle Grains*.



3.9.1 Health Benefits of Minor Millets:

- Beneficial in detoxifying body
- Lowers body cholesterol level
- Prevent onset of cancer
- Help to prevent Type 2 diabetes
- Effective in reducing blood pressure
- Good source of Antioxidant
- Reduces risk of gastrointestinal conditions like gastric ulcers or colon cancer
- Helps to prevent Aging and celiac diseases
- Millets perform anti-inflammatory activity
- Helps to protect against heart diseases
- Aids in treating respiratory conditions such as asthma
- Gluten free

3.10 Strategy to Promote Millet Cultivation:

Indian economy is predominantly agrarian, with the responsibility of providing food and nutritional security to millions of people. The declining trend in land holdings size is a serious challenge to the sustainability and profitability of farming. Nationally, 84% of the average agriculture holding is less than 2 acres i.e. 0.81 ha. Majority of them are dry lands and even irrigated areas depend on the vagaries of monsoon.

Hence, it is imperative to develop strategies for promotion of diversified a crop that provide regular income as well as nutritional security to farmers (Patel *et al.*, 2019). In Jammu and Kashmir, about 58.0 percent of the area is rain fed, which is locally called ‘*Kandi belt*’ (Gupta *et al.*, 2023). It is characterized by water scarcity during the crop growing season and undulated topography. Economically, the farmers of this area are poor with small holdings. Since most of the agricultural land is rain-dependent, the use of inputs is very important to make farming economically viable in these areas.

Millets grow under dry conditions, can perform well in relatively poor soil and require low inputs. Compared to irrigated commodity crops currently promoted by policy measures, millets need very less irrigation and require just around 300-350 mm per cent of the rainfall. Thus, they do not burden the state with demands for irrigation or power. Millets are adapted to wide range of ecological conditions often growing on skeletal soil that are less than 15cm deep.

It does not demand rich soil for their survival and growth. Hence millets are a boon for vast dryland area. Moreover, millets are a staple food with superior nutritional qualities compared to other cereals for the poor and farmers in dry areas including the Deccan, Central India, Western Indian states such as Gujarat and Rajasthan.

Used as a dual-purpose crop (food and fodder) they make strong economic sense in mixed farming systems. Minor millets are high-energy, nutrient-dense meals, and some of them are even better in terms of protein and mineral content (Saini *et al.*, 2021). They are abundant in dietary fiber, iron, calcium, and B vitamins and especially low in phytic acid. The use of millets by the underprivileged protects them against the food and nutritional insecurity brought on by many agronomic, socioeconomic, and political reasons.

Therefore, minor millets may protect against nutritional problems and provide dietary stability. Further, under National Food Security Mission (NFSM) coarse cereals are being promoted as nutritious crops currently and there is increasing importance and demand for them in urban areas. This will lead to formation of new, healthy and alternate products in the market which will form part of urban diets and replace rice and wheat to some extent.

The farmers may not readily accept the new/traditional crops. They may have to be motivated to take up these crops and also to process them to get additional income benefits. Besides, nutritional security and diversified food for consumption. The marketing of the value added produce would also be challenging. Thus, extension of such millet based cropping systems as suitable to a region will help in mitigating drought, compared to other crop systems. Adoption of minor millets would reduce risk due to drought, increase farm income and improve standard of living of resource poor farmers.

Therefore, to catalyze production of millets in the region, we need to develop complete package and practices for the cultivation of minor millets in Jammu region and post-harvest management in an integrated manner. Besides increasing production of millets, the processing and value addition techniques is expected to generate consumer demand for millet-based food products. Further, under National Food Security Mission (NFSM) coarse cereals are being promoted as nutritious crops currently and there is increasing importance

and demand for them in urban areas. Besides, to ensure that millets make successful comeback, the products/floor from the millet cultivation will be promoted through Anganwadis by serving millet-based meals replacing the traditional meals. Millets are being promoted as nutritious crops currently and there is increasing importance and demand for them in urban areas too.

3.11 Conclusion:

This chapter has underscored the paramount importance and expansive scope of millets in various dimensions, ranging from their nutritional significance to their resilience in diverse climatic conditions. The versatility of millets, coupled with their potential to enhance food security and contribute to sustainable agriculture, highlights their pivotal role in addressing global challenges. As we recognize the myriad benefits and applications of millets, it becomes evident that further research and concerted efforts are essential to fully unlock their potential for a healthier and more resilient future.

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