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Millets: A Nutritious and Sustainable Future Solution

Dr. Shweta Priyadarshini
Assistant Professor, P.G. Department of Home Science, B.R.A. Bihar University, Muzaffarpur
Dr. Vidisha Mishra*
Assistant Professor (Senior Scale), P.G. Department of Home Science, B.R.A. Bihar University, Muzaffarpur, Email: vidishamishra2007@gmail.com
Dr. Kusum Kumari
Professor, P.G. Department of Home Science, B.R.A. Bihar University, Muzaffarpur
Dr. Renu Kumari
Professor, P.G. Department of Home Science, B.R.A. Bihar University, Muzaffarpur
Dr. Sangeeta Rani
Professor, P.G. Department of Home Science, B.R.A. Bihar University, Muzaffarpur

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ABSTRACT

Millets are among the earliest domesticated crops and have formed an integral part of traditional Indian diets for more than 7,000 years. Despite their superior nutritional value and resilience to harsh climatic conditions, millet consumption declined significantly after the Green Revolution, which prioritized rice and wheat through procurement and distribution policies. Recent concerns related to non-communicable diseases, climate resilience, and sustainable food systems have revived global interest in millets. This review synthesizes existing literature on the nutritional composition, health benefits, cultural significance, and policy initiatives related to millets. Findings highlight that millets are rich in protein, dietary fiber, essential minerals, iron, and calcium, making them nutrient-dense foods capable of reducing the risk of several lifestyle-related disorders. Their climate-smart agricultural characteristics further establish them as vital components of

environmentally sustainable food systems. Increasing awareness, developing millet-based products, and integrating millets into public nutrition programs can significantly contribute to achieving long-term health and sustainability goals.

1. Introduction

Millets are small-seeded grasses cultivated extensively across Asia and Africa, particularly in semi-arid and low-rainfall regions (FAO, 1995). India is the world's largest producer of millets, contributing nearly 40% of global millet production (Nagaraj et al., 2012). The major millets cultivated in India include sorghum, pearl millet, finger millet, foxtail millet, proso millet, and little millet.

Historically, millets were central to Indian food traditions; however, their consumption declined during the Green Revolution. Government policies promoting high-yield rice and wheat varieties—supported by procurement schemes and subsidized distribution—led to reduced millet cultivation and usage (Behera, 2017). In recent years, rising lifestyle diseases, increasing climate variability, and the need for resilient agricultural systems have renewed interest in millets as "nutri-cereals" (Rao et al., 2019). Their nutritional richness, minimal water requirements, and adaptability make them essential components of climate-smart and sustainable diets.

2. Methods

This review is based on secondary data collected from peer-reviewed journals, government publications, FAO reports, and scientific literature related to millet cultivation, nutritional composition, health benefits, and sustainability. Literature published between 1995 and 2024 was systematically reviewed. Nutrient composition data were sourced from FAO food composition tables and validated nutrition research studies.

3. Results

3.1 Major Millets Cultivated in India

Millets have been integral to India's agricultural and culinary history. Table 1 presents commonly consumed millets along with their traditional names.

Table 1. Common Millets and Their Traditional Names

Millet	Traditional Name
Barnyard Millet	Sanwa
Buckwheat	Kuttu
Finger Millet	Ragi
Little Millet	Sama
Pearl Millet	Bajra
Proso Millet	Chena
Sorghum	Jowar

3.2 Nutritional Composition of Millets

Millets are recognized for their high nutrient density, especially in terms of protein, dietary fiber, minerals, iron, and calcium. Table 2 presents the nutrient profiles of commonly consumed millets.

Table 2. Nutrient Profile of Selected Millets (per 100 g)

Millet	Protein (g)	Fiber (g)	Minerals (g)	Iron (mg)	Calcium (mg)
Sorghum	10.0	4.0	1.6	2.6	54
Pearl Millet	10.6	1.3	2.3	16.9	38
Finger Millet	7.3	3.6	2.7	3.7	344
Foxtail Millet	12.3	8.0	3.3	2.8	—
Proso Millet	12.5	2.2	1.9	0.8	14
Little Millet	7.7	7.6	1.6	9.3	17

These values indicate considerable variation among millet types, making them suitable for diverse nutritional needs.

3.3 Health Benefits of Millets

Millets offer multiple health advantages due to their high fiber content, balanced proteins, and essential minerals. Research shows that millets can:

- Promote digestive health through high dietary fiber
- Aid glycemic control due to their low glycemic index
- Reduce risks of type 2 diabetes, cardiovascular disease, and obesity

- Improve lipid profiles by lowering LDL cholesterol
- Serve as gluten-free alternatives for individuals with celiac disease
- Support detoxification and gut health (Rao et al., 2019)

Finger millet, rich in calcium, supports bone health, while pearl millet's high iron content makes it effective in combating anemia.

4. Discussion

4.1 Cultural and Historical Significance

Archaeological findings indicate millet consumption during the Indus Valley Civilization (3300–1300 BCE), and references appear in Vedic literature (FAO, 1995). Their ability to thrive in drought-prone regions made them essential in traditional farming systems.

However, perceptions of millets as "coarse grains" or "poor man's food" contributed to reduced consumption, particularly in urban areas (Behera, 2017). Policy interventions that favored rice and wheat further marginalized millets.

4.2 Decline and Resurgence of Millets

Major factors contributing to the decline include:

- Green Revolution emphasis on rice and wheat
- Public Distribution System (PDS) excluding millets
- Social stigma associated with coarse grains (Nagaraj et al., 2012)

Factors leading to resurgence include:

- Rising incidence of lifestyle diseases
- Scientific evidence supporting millet-based diets for disease prevention (Rao et al., 2019)
- Recognition of millets as climate-resilient crops (Mehta et al., 2018)
- Government initiatives such as the declaration of 2018 as the "National Year of Millets"

In addition, the global market for millet-based products is expanding, with a projected CAGR of 4.5% (Global Market Insights, 2022). Millets are being incorporated into value-added foods such as noodles, pasta, cookies, and beverages, increasing their acceptance among younger consumers.

5. Government Initiatives

The Government of India reclassified millets as "nutri-cereals" in 2008 and has since implemented policies to promote their cultivation, processing, and consumption. Efforts include:

- Inclusion of millets in nutrition programs and midday meals
- Support for millet-based startups and FPOs
- Campaigns under the International Year of Millets (2023)
- Research and development programs to enhance productivity and processing

These initiatives aim to integrate millets into mainstream diets and ensure long-term nutritional security.

6. Conclusion

Millets are nutritionally rich, climate-resilient, and culturally significant grains with the potential to address challenges related to public health, climate change, and food security. Their reintegration into daily diets can enhance nutrient intake while supporting sustainable agriculture. Strengthening consumer awareness, enabling policy support, promoting millet-based products, and investing in processing technologies are essential steps toward positioning millets as key components of future food systems.

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