

MILLETS: THE FUTURE SMART FOOD

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ABSTRACT

Millets are nutrient-rich cereal crops valued for their climate resilience, low input requirements, and adaptability to marginal environments. They provide dietary fibre, protein, essential minerals, vitamins, and antioxidants, contributing to improved nutrition and dietary diversity. Their ability to tolerate drought, withstand high temperatures, and perform under rainfed conditions makes them suitable for sustainable agriculture. Millets can help address malnutrition, water scarcity, and climate change challenges. Promoting their cultivation, processing, and consumption is essential for strengthening food and nutritional security while supporting farmers' livelihoods and environmentally sustainable food systems.

KEYWORDS: Climate resilience, Dryland farming, Future smart food, Millets, Nutritional security, Sustainable agriculture

INTRODUCTION

Millets are among the oldest cultivated cereal crops and have traditionally formed an important part of human diets. India is a major millet-producing country, cultivating finger millet, pearl millet, foxtail millet, little millet, kodo millet, barnyard millet, proso millet, and browntop millet. However, their cultivation and consumption declined with the expansion of rice and wheat production during the Green Revolution.

Growing concerns about malnutrition, climate change, water scarcity, and agricultural sustainability have renewed interest in millets. Their nutritional richness, short growing seasons in many production systems, and adaptability to diverse environments make them promising crops for future food systems.

NUTRITIONAL IMPORTANCE OF MILLETS

Millets provide dietary fibre, protein, minerals, B-complex vitamins, antioxidants, and other beneficial

phytochemicals. Their nutritional composition varies among species and varieties. Finger millet is particularly rich in calcium, while barnyard and little millets can provide substantial dietary fibre and iron. Foxtail and proso millets are notable for their protein content.

Table 1. Selected nutritional components of millets compared with rice and wheat (per 100 g; Jacob et al., 2024).

Crop	Protein (g)	Fibre (g)	Calcium (mg)	Iron (mg)
Finger millet	7.3	3.6	344	3.9
Foxtail millet	12.3	8.0	31	1.1
Pearl millet	11.6	1.3	42	2.8
Barnyard millet	6.2	10.1	20	15.0
Kodo millet	8.3	9.3	27	0.6
Little millet	7.7	7.6	17	9.3
Proso millet	12.5	2.5	14	3.8
Brown top millet	9.0	7.3	28	7.7
Rice	6.4	0.3	2	0.6
Wheat	11.8	2.0	29	3.9

Millets can support dietary diversity and improve the intake of essential nutrients. Their fibre content may support digestive health, while low glycaemic responses reported for some millet-based foods may assist blood glucose management. However, health effects depend on the millet species, processing method, preparation, and overall diet.

AGRICULTURAL BENEFITS OF MILLETS

- Climate resilience and water conservation:** Millets generally perform well under rainfed conditions and are more drought-tolerant than water-intensive crops such as rice. Their adaptability to high temperatures, variable rainfall, and marginal soils makes them valuable in dryland farming and climate-resilient cropping systems. Water requirements vary with species, climate, and management.
- Low input requirements:** Many millet production systems require comparatively modest external inputs and can be cultivated by resource-limited farmers. Appropriate varieties, balanced nutrient management, weed control, and locally adapted agronomic practices remain important for achieving good yields.
- Soil health and biodiversity:** Millets can contribute to diversified cropping systems and provide residues that support soil organic matter when appropriately managed. Their inclusion in crop rotations can help diversify production and reduce dependence on a narrow range of staple crops.

HEALTH AND NUTRITIONAL SECURITY

Regular inclusion of millets in a balanced diet can improve nutrient diversity and contribute to dietary fibre, mineral, and protein intake. Calcium-rich finger millet may support bone health, while iron-containing millets can contribute to dietary iron intake. Whole-grain millet foods may also support digestive health.

Millets are naturally gluten-free, although cross-contamination during processing must be considered for people with coeliac disease. They can help diversify diets for different age groups and contribute to efforts to address micronutrient deficiencies. Nevertheless, millets should be considered part of a balanced diet rather than a standalone solution to health problems.

MILLETS AND SUSTAINABLE AGRICULTURE

Millets can strengthen sustainable food systems through their adaptability to rainfed environments, relatively low water demand, and contribution to crop diversification. Their cultivation may reduce pressure on irrigation resources and support agricultural resilience under changing climatic conditions. The environmental benefits depend on production practices, yield levels, and local conditions.

Promoting millet-based foods can also create opportunities for farmers, processors, entrepreneurs, and rural enterprises through value addition and the development of nutritious food products.

GOVERNMENT INITIATIVES AND CHALLENGES

The *International Year of Millets 2023*, declared by the United Nations, increased global awareness of millet production, nutrition, and consumption. In India, promotional efforts have included farmer training, millet-based product development, market development, and efforts to incorporate millets into nutrition programmes.

Despite these opportunities, millet production and consumption face several constraints, including limited consumer awareness, inadequate processing and storage facilities, insufficient market infrastructure, variable availability of quality seed, and changing dietary preferences. Strengthening research, extension services, supply chains, and consumer awareness is essential to overcome these barriers.

CONCLUSION

Millets are nutritious, climate-resilient crops with considerable potential to address food and nutritional insecurity, water scarcity, and agricultural sustainability challenges. Their diverse nutritional composition and adaptability to marginal environments make them valuable components of future food systems.



Strengthening production, processing, value addition, and market access can improve farmers' livelihoods while encouraging healthier and more diverse diets. Coordinated efforts by researchers, policymakers, farmers, and the food industry will be essential to realize their potential as the “*Future Smart Food*.”

REFERENCE

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