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Millets: Unlocking the Power of Ancient Grains for a Better Tomorrow

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Abstract

In the twenty-first century, agriculture and food security face numerous obstacles due to factors like population increase, urbanization, water scarcity, rising food prices, and global warming. To address this issue and eliminate hunger and poverty, it is essential for researchers to explore alternative food sources, from production to consumption. Cereal grains are fundamental to human diets and play a key role in food security. Therefore, reforming the food system is important to ensuring both food and nutritional security. A practical approach to this goal involves ensuring widespread access to affordable, nutritious, and wholesome food by promoting millets – nutrient-rich grains (often called Nutri-cereals). Once staple crops in many regions of the world, millets are now gaining renewed attention due to their exceptional nutritional profile, environmental sustainability, and adaptability to changing climates. This paper explores the potential of millets as a key food of the future, highlighting their nutritional benefits, ecological advantages, socio-economic impact, and potential for global food systems. It also discusses the challenges associated with scaling millet production and consumption, along with the opportunities for future growth and development in this sector.

Key Words: Food security, millets production, nutrients, organic, climate-resilient

INTRODUCTION

Feeding the world's growing population and combating hunger are two of the largest issues facing the globe today. A shortage of vital nutrients, a decline in food production that leads to an imbalance between supply and demand, and conflicts that destabilize different parts of the world are some of the many causes of this issue. Although there are fewer people suffering from hunger and malnutrition now than there were in 1990–1992, the threat posed by climate change and global warming remains a concern. Traditional staple crops, such as wheat, rice, and maize are often resource-intensive, require large quantities of water, and are susceptible to the impacts of climate variability. In contrast, millets, often referred to as "ancient grains," are hardy, drought-resistant, and nutritionally dense, making them an ideal crop for addressing both food insecurity and environmental sustainability. A sustainable and nourishing alternative for a world population in need of innovative solutions, millets represent the food of the future as we face the problems of the twenty-first century. The *Poaceae* family of grains, also referred to as the grass family, includes millet. Jowar (sorghum), Bajra (pearl millet), and Finger Millet (ragi) are examples of large (major) millets. Both Proso (Cheena) and Foxtail (Kagni) millet. Small (Minor) Millet: Kodo Millet (Kodra), Barnyard Millet (Sama), Browntop Millet (Hari Kagni), and Little Millet (Kutki) are characterized by their remarkable ability to thrive in arid and semiarid regions. These hardy crops are known for their drought tolerance, a trait that has earned them the title of "smart crops" in the face of climate change [1]. The Indian government has emphasized

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millet's advantages. The Indian government proclaimed 2018 to be the "National Year of Millets." Millets were also acknowledged as nutri-cereals that year and were incorporated into the "National Nutrition Mission" and "Poshan Abhiyan." The Indian government has recommended to the UN that 2023 be designated as the International Year of Millets (IYoM-2023) in order to generate demand both domestically and internationally and to provide nutrient-dense food to society. On March 5, 2021, the United Nations General Assembly (UNGA) proclaimed 2023 to be the International Year of Millets after 72 nations endorsed India's proposal. This prompted the Hon'ble Union Finance Minister to declare in a February 1, 2022, budget announcement that 2023 would be the International Year of Millets and that India would be the world's largest producer of millets, contributing 20% of global production and 80% of Asia's [1–4].

NUTRITIONAL VALUE OF MILLETS

Millets are high in quality protein, fiber, and vitamins [5]. Some of the key nutritional aspects of millets include:

High in Protein and Amino Acids

Especially for vegans and vegetarians, millets are a great plant-based protein source. Finger millet (ragi), for instance, contains 7–9% protein and other varieties like pearl millet and sorghum also contain significant amounts of protein. Crucial amino acids like lysine and methionine, which are frequently lacking in other staple grains, are also present in millets.

Rich in Dietary Fiber

Dietary fiber, which is abundant in millets, facilitates digestion and helps control blood sugar levels. The fiber content of millets is higher than that of rice and wheat, making them beneficial for weight management and preventing chronic diseases, such as Type 2 diabetes [5].

Vitamins and Minerals

Millets are packed with a variety of vitamins and minerals, including B vitamins (such as niacin, thiamine, and riboflavin), iron, calcium, magnesium, phosphorus, and potassium. For example, finger millet is a particularly good source of calcium and is beneficial for bone health [6].

Gluten-Free

The fact that millets are inherently gluten-free is one of their biggest benefits. This makes them a good choice for people who have gluten intolerance or coeliac disease, which is becoming more and more of a global problem.

Low Glycemic Index

When opposed to meals like white rice that have a high glycaemic index (GI), millets raise blood glucose levels more slowly because of their low GI. For those who have diabetes or are trying to control their blood sugar levels, this makes them very advantageous [4–7].

Ecological and Environmental Benefits

In an era of growing environmental awareness and climate change concerns, millets offer several advantages over traditional crops:

Drought and Heat Resistance

Millets are known for their resilience in arid and semi-arid regions. Compared to crops like rice, which are extremely water-intensive, they need a lot less. Millets can thrive in regions with limited rainfall, making them ideal for areas affected by droughts or water scarcity. For instance, pearl millet and finger millet are grown in the dry regions of Africa and India, where other crops struggle to survive.

Low Input Requirements

Millets grow well in marginal soils that are not suitable for other crops, requiring minimal chemical inputs like fertilizers and pesticides. Their capacity to thrive in unfavorable soil conditions lessen the need for intensive farming methods that worsen the environment.

Soil Health Improvement

Millets have deep root systems that help improve soil structure and prevent erosion. They are a crucial component of sustainable agricultural methods since their cultivation can gradually increase soil fertility. Crop rotation with millets can increase yields of other crops and reduce the need for synthetic fertilizers.

Reduced Greenhouse Gas Emissions

Compared to rice cultivation, which produces significant amounts of methane, millets have a lower carbon footprint. This makes them a more eco-friendly option for food production in the context of global efforts to mitigate climate change.

SOCIO-ECONOMIC IMPACT AND POTENTIAL

Enhancing Food Security

Millets are an important crop for improving food security in developing regions, particularly in Africa and Asia. Their ability to grow in marginal environments and provide nutritious food can contribute to reducing hunger and malnutrition. In rural areas, millet cultivation can improve farmers' resilience to climate variability and create stable income streams.

Cultural and Economic Revival

In regions where millets were once the staple food, their revival can support local economies by promoting traditional farming practices. In India, for example, millets are regaining popularity in rural communities, both for food and for their market value. As consumer awareness of the benefits of millets grows, farmers may see increased demand for these crops, leading to better economic prospects [8].

Job Creation and Agribusiness Opportunities

The growing global demand for millets presents an opportunity for job creation in the agriculture and food processing sectors. Value-added goods like millet flour, snacks, and drinks can boost regional economies and give small companies, farmers, and entrepreneurs additional streams of revenue.

Public Health Benefits

The nutritional benefits of millets, particularly their role in preventing chronic diseases like diabetes, obesity, and cardiovascular diseases, make them a key component of public health initiatives. Governments and organizations promoting millets as part of healthy eating strategies could potentially reduce healthcare costs and improve overall health outcomes.

Barriers to Widespread Adoption

While the potential of millets is vast, several challenges hinder their widespread adoption:

Lack of Awareness and Knowledge

Millets are still relatively unknown in many parts of the world, especially in Western countries. Their market expansion may be constrained by a lack of knowledge about their nutritional advantages and culinary variety [9].

Processing and Storage Challenges

Millets are highly perishable, and their small seeds can be difficult to process efficiently. Without adequate infrastructure for milling, storage, and transportation, millets may not be as accessible as other grains in urban and international markets.

Cultural Shifts

The global preference for wheat, rice, and maize often overshadows the cultural acceptance of millets. Introducing millets into the mainstream food system requires changing consumer perceptions and culinary habits [10, 11].

Policy and Research Gaps

Despite their benefits, millets have not received the same level of attention and research funding as more widely grown cereals. Governments and international organizations need to invest more in research and development to improve millet varieties, farming practices, and processing technologies.

CONCLUSIONS

Millets offer a special chance to tackle global issues related to sustainability, nutrition, and food security. Their high nutritional value, ecological benefits, and resilience to climate change make them a strong cereal for becoming a "food of tomorrow." However, to realize their full potential, significant efforts are required in terms of raising awareness, enhancing agricultural practices, and creating better market infrastructure. As interest in millets grows and innovations in production and processing continue, they could play a crucial role in transforming global food systems toward more sustainable, organic, nutritious, and climate-resilient alternatives. Future research and development should focus on improving millet varieties, increasing their yield, reducing processing costs, and enhancing consumer demand through education and product innovation. Governments, non-governmental organizations, and the private sector must work together to promote millets as a key solution for the food and environmental challenges of the future.

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