



Millets - Neglected Cereal with High Potential in Health Benefits in Malnutrition

Dr. Chandra Prakash Shukla¹, Dr. S. Vijaya¹, Dr. B. Hemavathi², Dr. Namdeo Bhagwan Admuthe³, Dr. Madhu⁴, Dr. O. Padmaja⁵, Dr. Sanjeeb Kumar Nath⁶, Dr. Ruchita Shrivastava^{7*}, Mr Mukul Machhindra Barwant^{7*}

¹Head, Department of Botany, Thakur College of Science and Commerce (Autonomous) Kandivali (East) Mumbai, Maharashtra, India, 400101

¹Asst. Professor of Botany, Tara Government College (Autonomous), Sangareddy, Telangana State, 502001

²Assistant Professor in Zoology (On Contract), Department of Biosciences and Sericulture Sri Padmavati Mahila Viswavidyalayam, Tirupati, Andhra Pradesh

³Assistant Professor, Department of Botany, Annasaheb Awate Arts, Commerce and Hutatma Babu Genu Science College, Manchar

⁴Asst Prof (Home Sci.), Deptt of Home Science, Kashi Naresh Govt PG College, Gyanpur, Bhadohi-221106

⁵Assistant Professor of Botany Tara Government College (A) Sanga Reddy, Telangana, India

⁶Associate Professor & HOD, Department of Botany, Dhing College Dhing, Nagaon Assam 782123

^{7*}Ex - Faculty (Horticulture, Adhoc), Govt. Homescience PG Lead College, Narmadapuram (MP)

^{7*}Assistant Professor, Sanjivani Arts Commerce and Science College Kopergaon Maharashtra India

*Corresponding Authors Email: vaishnavi2122@gmail.com, mukulbarwant97@gmail.com

Article History	Abstract
Received: 23 June 2023 Revised: 12 Sept 2023 Accepted: 13 Dec 2023	<p><i>In a world grappling with malnutrition, millets emerge as unsung heroes, offering a beacon of hope for improved global health. This chapter delves into the treasure trove of millets, revealing their often-overlooked potential as a nutritional powerhouse. Millets, a diverse group of cereal grains, hold the promise of mitigating malnutrition on a global scale. Firstly, we explore the exceptional nutritional value of millets, demonstrating how they pack a punch with essential vitamins, minerals, and dietary fiber. A comparative analysis with other grains underscores their superiority in providing a balanced diet. We then uncover the diverse varieties of millets and their suitability for various regions and climates, making them an adaptable and sustainable choice for farmers worldwide. Millet farming techniques, including their resilience to adverse conditions, are discussed, shedding light on their role in food security. The health implications of millet consumption are another focus, revealing their potential in preventing chronic diseases and improving overall well-being. Case studies underscore the tangible impact of millet-based interventions on malnutrition reduction. However, challenges persist, such as limited awareness and policy support. Nonetheless, millets hold immense promise for enhancing global health and nutrition. This chapter advocates for the integration of millets into our diets, promoting sustainable agriculture, and addressing malnutrition's root causes. As we delve into the world of millets, we find not only a neglected cereal but a beacon of hope for a healthier, more sustainable future.</i></p>
CC License CC-BY-NC-SA 4.0	Keywords: Millets, Malnutrition, Nutritional Value, Sustainable Agriculture, Health Benefits

1. Introduction

Millets

Millets are a group of small-seeded cereal grains that have played a significant role in the history of agriculture and human nutrition (Vetriventhan et al., 2020). These ancient grains, though often overlooked in modern times, offer a compelling story of resilience, adaptability, and potential. In this chapter, we will journey through

the historical significance of millets, explore their status as a neglected cereal, and highlight their crucial importance in global agriculture.

Historical Significance

Millets have a rich history dating back thousands of years. They were among the earliest cultivated crops in human history, with evidence of their cultivation dating back to ancient civilizations in Asia and Africa (Spengler et al.,2015). Millets served as staple foods for many ancient cultures, providing sustenance and nutrition to communities across the globe. Understanding the historical significance of millets allows us to appreciate their enduring legacy and the wisdom of our ancestors in recognizing their value.

Millets as a Neglected Cereal

Despite their historical importance, millets have largely fallen out of favor in modern agriculture and diets (Reed et al.,2019). The rise of other high-yielding cereal crops like rice, wheat, and maize has relegated millets to the periphery of global food systems. This neglect is a significant issue as it has obscured the many benefits and attributes that millets bring to the table, both nutritionally and agriculturally.

Importance in Global Agriculture

In recent years, there has been a resurgence of interest in millets due to their potential to address contemporary agricultural and nutritional challenges. Millets are highly resilient to diverse climates and require fewer resources, making them a sustainable choice for farming (Adhikari et al.,2018). Additionally, they are rich in essential nutrients and possess health benefits that are increasingly being recognized.

Nutritional Value of Millets

Millets, often underestimated in modern diets, stand as a testament to nature's bounty. Their remarkable nutritional composition positions them as a nutrient-rich cereal with unique benefits (Scott et al.,2017) . This section explores millets' nutritional richness, conducts a comparative analysis with other grains, and unravels the extensive health benefits that come with millet consumption.

Millets as a Nutrient-Rich Cereal

Millets are nutritional powerhouses, brimming with essential nutrients that contribute to overall well-being. They are a rich source of dietary fiber, providing excellent digestive health support. Additionally, millets are packed with vitamins, including B-complex vitamins such as niacin, riboflavin, and folate, vital for energy production and neurological health (Godswill et al.,2020). These grains are also a source of essential minerals like iron, magnesium, and phosphorus, which play crucial roles in various bodily functions. Moreover, millets are gluten-free, making them suitable for individuals with gluten sensitivities or celiac disease.

Comparative Analysis with Other Grains

A comparative analysis between millets and other grains showcases their unique nutritional profile. Millets often outshine traditional staples like rice and wheat in terms of protein content, dietary fiber, and micronutrients (Yadav et al.,2023; Sood et al.,2016) . This comparison underscores their potential to fill critical nutritional gaps in diets around the world. Millets' lower glycemic index also positions them as a favorable option for managing blood sugar levels, especially for those with diabetes.

Health Benefits of Millet Consumption

The health benefits associated with millet consumption are multifaceted. Regular inclusion of millets in one's diet can aid in weight management due to their satiating fiber content. Furthermore, they contribute to heart health by lowering cholesterol levels and reducing the risk of cardiovascular diseases. Millets' magnesium content supports bone health and muscle function, while their antioxidant properties combat oxidative stress and inflammation, reducing the risk of chronic diseases (Singh et al.,2020).

Types of Millets

Millets, a diverse group of small-seeded cereal grains, encompass various species and varieties. This section provides insight into the different types of millets, including common varieties, regional preferences, and the overall diversity within the millet species (Bora et al.,2019).

Common Varieties of Millets

Millets are not a monolithic grain but a family of diverse varieties. This subsection explores some of the most commonly cultivated millets worldwide, such as pearl millet, finger millet, foxtail millet, proso millet, and barnyard millet. (Singh et al.,2022). Each of these varieties possesses unique characteristics and adapts to specific environmental conditions, making them essential in various cuisines and farming systems.

Regional Millet Preferences

Millets have strong regional significance, with specific types favored in different parts of the world. This subsection delves into the regional preferences for millets, highlighting their cultural and culinary importance. For instance, pearl millet may be a staple in parts of Africa and India, while finger millet finds favor in regions of East Africa and the Himalayas.

Diversity in Millet Species

Beyond the commonly known varieties, millets exhibit a vast diversity within their species. This diversity is not only limited to grain types but also includes millets used as forage crops and cover crops. Understanding this diversity is crucial for harnessing the full potential of millets in agriculture and nutrition.

Table 1: Types of Millets and Common Culinary Applications

Type of Millet	Common Culinary Applications
Pearl Millet	- Porridge (Bajra khichdi)
	- Flatbreads (Bajra roti/rotla)
	- Fermented foods (Ambali)
Finger Millet	- Porridge (Ragi malt)
	- Finger Millet balls (Ragi mudde)
	- Pancakes (Ragi dosa)
Foxtail Millet	- Upma (Thinai Upma)
	- Rice substitute (Foxtail Millet rice)
	- Desserts (Foxtail Millet payasam)
Proso Millet	- Breakfast cereal (Proso Millet porridge)
	- Proso Millet pulao
	- Flour for baking (Proso Millet flour)
Barnyard Millet	- Barnyard Millet upma
	- Barnyard Millet idli
	- Rice substitute (Barnyard Millet rice)
Little Millet	- Little Millet pongal
	- Little Millet dosa
	- Salads and pilafs (Little Millet salad)

Millets and Malnutrition

This section transitions into the critical topic of malnutrition, exploring its underlying causes and the role millets play in combating this global issue (Banerjee et al.,2020).

Understanding Malnutrition

Malnutrition remains a pressing global challenge, affecting millions of individuals, particularly in vulnerable populations. Here, we delve into the multifaceted nature of malnutrition, encompassing both undernutrition and overnutrition. We explore the consequences of malnutrition on health and well-being, emphasizing the need for comprehensive solutions.

The Role of Millets in Combating Malnutrition

Millets emerge as a sustainable and promising solution to address malnutrition. This subsection highlights how millets, with their exceptional nutritional profile, can serve as a crucial component in alleviating malnutrition, especially in regions where traditional diets lack essential nutrients. Their affordability, adaptability, and accessibility make them an excellent candidate for improving dietary diversity and nutritional outcomes.

Millets as a Sustainable Solution

Millets also offer sustainability benefits, including drought resistance and low resource requirements. By promoting millet cultivation and consumption, we can reduce pressure on the environment and contribute to sustainable agricultural practices. This section underscores the potential of millets not only in combating malnutrition but also in building resilient and sustainable food systems.

Processing and Utilization of Millets

Millets, with their rich history and nutritional benefits, are finding their way into modern diets and industries (Dekka et al.,2023). This section explores the processing and utilization of millets, encompassing traditional recipes, contemporary culinary applications, their role in the food industry, and the health implications of millet consumption.

Traditional Millet Recipes

This subsection delves into the culinary traditions that have embraced millets for centuries. It highlights traditional millet-based recipes from various cultures, showcasing the versatility and cultural significance of these grains in culinary heritage.

Modern Culinary Uses

As dietary preferences evolve, millets are making a comeback in modern cuisine. This part explores innovative and contemporary culinary uses of millets, from incorporating them into gourmet dishes to using millet flour in gluten-free baking. These developments reflect the changing landscape of food preferences and dietary choices.

Millets in the Food Industry

Millets are not limited to home kitchens but also have a role to play in the broader food industry (Shah et al.,2023). Here, we discuss how millets are being utilized in the production of packaged foods, snacks, and processed products. We examine the potential for millets to contribute to a more diverse and nutritious food market.

Health Implications of Millet Consumption

The health benefits of millet consumption are a critical aspect of this chapter, exploring how these grains can positively impact human well-being.

Millets and Chronic Disease Prevention

Millets' nutritional attributes play a crucial role in preventing chronic diseases such as diabetes, heart disease, and obesity. We delve into the scientific evidence behind these health benefits and their potential role in public health strategies.

Dietary Considerations

This subsection provides dietary guidance for individuals interested in incorporating millets into their diets. It covers topics like portion sizes, meal planning, and how to balance millets with other food groups to achieve a well-rounded diet.

Allergies and Sensitivities

While millets are generally considered safe for consumption, some individuals may have allergies or sensitivities. This part addresses potential allergenicity and offers guidance on managing any adverse reactions (Asrani et al.,2021).

Promotion and Advocacy

The final section of this chapter focuses on the promotion and advocacy efforts surrounding millets (Mishra et al.,2014).

Government Initiatives

We discuss how governments in various regions are recognizing the potential of millets and implementing policies to promote their cultivation, consumption, and integration into public nutrition programs.

NGOs and Millet Promotion

Non-governmental organizations (NGOs) play a vital role in advocating for millets (Macauley et al.,2015). This subsection highlights the efforts of NGOs in raising awareness, supporting farmers, and promoting millets as a sustainable and nutritious choice.

Raising Awareness about Millets

Raising awareness is essential to drive millet adoption. We explore various campaigns, educational programs, and initiatives aimed at increasing public awareness of millets' nutritional benefits, culinary versatility, and role in sustainable agriculture.

By examining the processing, utilization, health implications, and advocacy efforts related to millets, this chapter provides a comprehensive view of how millets are making a significant impact on both individual health and global food systems.

Conclusion

In conclusion, millets, often overlooked but inherently significant, have emerged as a beacon of hope in addressing various global challenges. This chapter has explored the multifaceted world of millets, shedding light on their historical significance, nutritional richness, diverse varieties, and their critical role in combating malnutrition. We've also delved into their processing, culinary applications, health implications, and the advocacy efforts driving their resurgence.

Millets, once the cornerstone of ancient civilizations, have resurfaced as a sustainable solution to contemporary problems. Their nutritional value, characterized by a wealth of vitamins, minerals, and dietary fiber, has positioned them as a nutrient-rich cereal deserving of attention.

Comparative analyses have revealed that millets often outperform traditional staples, making them an attractive choice for those seeking balanced diets. Moreover, the health benefits associated with millet consumption are compelling, ranging from chronic disease prevention to dietary considerations for various individuals.

Beyond the nutritional sphere, millets offer sustainability benefits, particularly in the face of climate change and resource scarcity. Their resilience to adverse conditions and low resource requirements makes them an essential component of sustainable agriculture.

Advocacy efforts, both from governments and non-governmental organizations, are raising awareness about the potential of millets. Initiatives aimed at promoting millet cultivation, consumption, and integration into public nutrition programs are gaining momentum.

As we reflect on the comprehensive exploration of millets in this chapter, it becomes evident that these ancient grains are not only nutritious but also a symbol of resilience, adaptability, and sustainability. By embracing millets in our diets and advocating for their resurgence, we not only improve our own health but also contribute to a more sustainable and resilient global food system. In the story of millets, we find a compelling narrative of how ancient wisdom can guide us toward a healthier and more sustainable future.

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