

CHAPTER 4

Exploring Nutritional Benefits and Health Impacts of Barnyard Millet as a Sustainable Food Source

Amrutwad B. B., V. R. Marathe*

PG Department of Botany, N. E. S. Science College, Nanded 431605 Maharashtra, India

Corresponding author Email: dr.vishalmarathe@gmail.com

Received: 24 August 2025; Accepted: 27 October 2025; Available online: 17 November 2025

Abstract: Bhagar, also known as "Sama Rice" or "Barnyard Millet," is a tiny, nutritious grain that is commonly utilized in traditional cuisines, especially in Indian and South Asian civilizations. It refers to a variety of millet recognized for its substantial amount of fiber, minimal glycemic index, and abundant concentrations of vital elements such as calcium, magnesium, iron, and phosphorus. Bhagar is gluten-free, which makes it a popular alternative for people who have gluten intolerance or celiac disease. This grain is commonly used in devotional a fast, weight loss programs, and as a rice alternative in several cuisines. The grain's appeal stems from its ease of digestion and capacity to offer prolonged energy. Bhagar is also considered to be a sustainable crop because of its resistance in regions with frequent droughts and minimum requirement. It requires far less water

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/). This allows re-distribution and re-use of a licensed work on the condition that the author is appropriately credited and the original work is properly cited.

Interdisciplinary Research in Life Sciences: A Path Towards Sustainability (Vol. 3) - Jayvardhan V. Balkhande & Jalander Vaghmare (Eds.)

ISBN: 978-93-95369-86-2 (paperback) 978-93-95369-58-9 (electronic) | © 2025 Advent Publishing.

<https://doi.org/10.5281/zenodo.17634182>

than rice and wheat. It is capable of being consumed in a variety of ways, including khichdi and is frequently included in healthy recipes due to its low calorie content. Bhagar's strong antioxidant and vitamin content has been linked to improved heart health, diabetes management, and overall wellness, according to recent studies. This abstract shows Bhagar's nutritional content, culinary variety, and significant benefits for health, establishing it as a beneficial, historic delicacy that is both sustainable and health-promoting within contemporary diets.

Keywords: Barnyard millet, Sustainable food source, Health benefits.

Introduction

In the face of escalating global challenges such as climate change, food insecurity, and the rising prevalence of lifestyle-related diseases, there is an urgent need to identify and promote sustainable, nutritious food sources. Millets are small, drought-tolerant grains which require less water to grow than many staple crops and emit little carbon dioxide. Barnyard millet is one of the fastest growing forms and can survive in poor soil conditions. Millets are acquiring popularity as a sustainable food source due to their low impact on the environment. They require fewer inputs, like as water and pesticides, and are adaptable to shifting climates, making them a promising choice for food security in the face of global warming.

Barnyard millet (*Echinochloa frumentacea*), a traditional grain cultivated predominantly in Asia, particularly India, China, Japan, and Korea, emerges as a promising candidate. Despite its long history of cultivation, barnyard millet has often been overshadowed by more widely consumed cereals like rice and wheat. However, its exceptional nutritional profile and resilience to adverse environmental conditions have garnered renewed interest in recent years. Barnyard millet contains several necessary elements, such as excellent protein sources, carbs that are complicated, digestible fiber, and a variety of minerals and vitamins¹.

Additionally, it has a greater quantity of zinc and iron than many large grains, which makes it especially useful for correcting micronutrient deficits common in many communities. Furthermore, its low glycemic value as well as elevated fiber content promote better sugar regulation, potentially benefiting diabetics. Besides its nutritional benefits, barnyard millet is a robust crop that can thrive in a variety of agro-climatic situations, including drought-prone locations. Its growing requires little inputs, which makes it an environmentally friendly choice. The grain's adaptability in food preparation adds to its the appeals court, as it may be used in a variety of ways, including grain flour, porridge, and snacks, that suit a wide range of dietary preferences.

The purpose of this study paper is to investigate the nutritional and health benefits of barnyard millet, with a focus on its role as a source of food that is sustainable. This study aims to highlight barnyard millet's potential contribution to global food security and public health by studying its nutritional composition, health benefits, and sustainability advantages.

Nutritional Profile of barnyard millet:

Barnyard millet is known for its high nutritional value. Barnyard millet has a nutritional profile of 10.1% amino acids, 8.7% humidity, 3.9% lipids, 6.7% fiber in crude form, 2.0% total fatty acids, 68.8% carbohydrates, and 398 calories per 100gm energy. Barnyard millet has a high dietary fiber content of 12.5%, with both soluble (4.2%) with insoluble (8.4%) components².

Carbohydrate: Barnyard millet is high in complex carbs. One cup of boiled millet has approximately 40-45 grams of carbs, largely from starch, which offers long-term energy. This renders it an excellent choice for those seeking steady glucose levels. Barnyard millet is a high-carbohydrate grain with a relatively low glycemic index (GI), making it ideal for regulating glucose levels. It contains more nutritional fiber than wheat and rice, which aids digestion and provides more sustained energy.

Protein: Barnyard millet has a greater protein concentration than other grains, with a crude protein percentage ranging from 11.3-17.2%. It stands out for the elevated lysine content, which is commonly low within numerous cereals, which renders it a significant protein alternative³.

Vitamins: Millet is rich in B-vitamins such as niacin (B3), riboflavin (B2), and thiamine. Vitamins like these are necessary for the breakdown of energy and neural activity. It includes trace levels of beta-carotene (a precursor to vitamin A), which promotes immune system function, eyesight, and healthy skin. Barnyard millet has about 20-30 grams of folate per cup, which helps with the production of DNA, red blood cells development, and overall wellness during pregnancy.

Minerals: Barnyard millet contains vital minerals like magnesium, iron, potassium, phosphorus, and calcium. It has more iron than wheat or rice, making it useful for preventing deficiencies in iron anemia. It also includes trace levels of copper, selenium, and salt, making it a nutritious addition to a balanced diet.

Fats: Despite barnyard millet is low in fat, it contains an excellent balance of healthy fats, notably monounsaturated and polyunsaturated fats, which make it an important part of a balanced diet. Barnyard millets contain substantial amounts of unsaturated lipids, specifically linoleic and oleic acids⁴.

Antioxidants: Barnyard millet contains several antioxidant compounds such as phenolic acids and flavonoids, that can help neutralize free radicals and prevent oxidative stress. These types of antioxidants help to reduce inflammation and protect from long-term diseases such as cardiovascular disease and carcinoma⁵.

Health Impacts of Barnyard Millet:

1. Digestive Health:

One of the most notable health benefits of barnyard millet is its high dietary fiber content. Fiber is important for digestive health because it promotes regular bowel motions and helps to prevent constipation. Here is the way barnyard millet improves digestion⁶.

Fiber Content: It supplies approx 12-15% dietary fiber, which promotes stool production and facilitates effortless travel through the intestines.

Gut health: Barnyard millet fiber acts as a prebiotic, stimulating the proliferation of beneficial microbes in the gut, so contributing to a healthy gastrointestinal microbiota.

Prevents Constipation: A high-fiber eating habits, particularly one that includes barnyard millet, can help prevent constipation by smoothing stools and shortening the time feces stays in the colon.

Digestive Diseases: Regular consumption of fiber from barnyard millet may lower the incidence of digestive illnesses such as diverticulitis and hemorrhoid.

2. Cardiovascular Diseases:

Barnyard millet is low in total fat yet includes a good balance of monounsaturated and polyunsaturated fats. These fats are essential for cardiovascular health. Monounsaturated fats aid to lower levels of LDL (low-density lipoprotein) cholesterol, also known as "bad" cholesterol. High levels of LDL cholesterol are associated with an increased risk of heart disease because they contribute to plaque formation in the arteries, which leads to atherosclerosis (artery hardening). Polyunsaturated Fats (Omega-3 and Omega-6 Fatty Acids): These beneficial fatty acids are very good for your heart. Barnyard millet contains omega-3 fatty acids, which are known for their anti-inflammatory properties and capacity to decrease triglyceride levels in the blood, potentially lowering the risk of cardiovascular disease. Omega-3 fatty acids also lower blood pressure and inhibit blood clot formation, which can help safeguard against strokes and coronary artery disease⁷.

3. **Weight management:**

Fiber is renowned for its ability to aid in weight loss and management. Barnyard millet contains both soluble and insoluble fiber, which aids digestion and promotes satiety (a sense of fullness). Fiber slows digestion, which might help you feel less hungry and avoid overeating. This helps to control hunger and lower overall consumption of food, which is essential for maintaining a healthy weight⁸.

4. **Blood Sugar Regulation:**

Low Glycemic Index: Barnyard millet has a mild to moderate glycemic index, which means that your blood sugar levels rise slowly and steadily. This makes it an excellent choice for diabetics or those looking to control their glucose levels².

Prevention of Type II Diabetes: The slow-release carbohydrates as well as the fiber content help to minimize rapid blood glucose increases, lowering the risk of being resistant to insulin and type 2 diabetes⁹.

Insulin Sensitivity: Consuming low-GI foods on a regular basis, such as barnyard millet, may enhance insulin sensitivity, which is essential for blood sugar control and reducing diabetic complications.

5. **Gluten free grain:**

Barnyard millet, like other millets, is good for persons who are gluten sensitive (for example, those with celiac disease) or those follow a diet free from gluten and behavior that excludes the use of wheat, barley, or other rye-based foods. Millet, which is commonly available, can be made in a relatively brief period of time, and has a delightful flavor, may easily replace the use of wheat, rice, and other gluten-rich grains¹⁰.

6. **Improves Immune System:**

Barnyard millet has moderate amounts of zinc and iron (Ugare et al., 2014). Iron and zinc both serve as vital components of our immune system. Consumption of barnyard millet offers the human organism with benefits that enable it to successfully battle against foreign substances and ailments⁶.

7. **Bone Health:** Barnyard millet, with its excellent magnesium and calcium content, can help promote bone strength while minimizing osteoporosis¹¹.

8. Celiac Disease: Barnyard millet is a naturally gluten-free grain and a safe and nutritious option for people with celiac disease, as it does not contain the gluten proteins found in wheat, barley, and rye that trigger the immune response in celiac patients. It can be incorporated into various dishes like porridges, breads, and snacks, offering a healthy alternative for a gluten-free diet¹².

Sustainability as a Food Source:

Resistant to drought: Barnyard millet is a resilient crop that survives in drought-prone locations, which makes it a viable option for areas enduring water scarcity.

Low Intake requirements: It needs not much water and may thrive on soil that is poor, minimizing the necessity for fertilizers containing chemicals and pesticides¹¹.

Supports Ecosystem:

Cultivating barnyard millet can increase agricultural biodiversity, hence contributing to ecological equilibrium and resilience. Incorporating barnyard millet into diets additionally has significant health benefits, but it also promotes sustainable agriculture techniques, making it an essential source of food in the future.

Conclusion

Barnyard millet has significant nutritional benefits and great health outcomes, making it a fantastic option for a sustainable food supply. It contains critical nutrients such as protein, fiber, vitamins, and minerals, which promote overall health by aiding digestion, heart health, and immunological function. Its low glycemic index makes it ideal for regulating blood sugar levels, making it an excellent choice for diabetics. Furthermore, barnyard millet's gluten-free status makes it a nutritious option for persons with gluten intolerance. As a drought-tolerant and low-input crop, it helps to promote sustainable agriculture and food security, particularly in environmentally challenged areas. Thus, boosting barnyard millet as a food staple could benefit both health and the environment.

References

1. Sood, S., Khulbe, R., Kumar, R. A., Agrawal, P. K., and Upadhyaya, H. (2015). Barnyard millet global core collection evaluation in the sub mountain Himalayan region of India using multivariate analysis. *Crop J.* 3, 517–525.

2. Ugare, R., Chimmad, B., Naik, R., Bharati, P. and Itagi, S. (2014) Glycemic index and significance of barnyard millet (*Echinochloa frumentaceae*) in type II diabetics, *Journal of Food Science and Technology*, 51: 392-395.
3. Renganathan VG, Vanniarajan C, Karthikeyan A, Ramalingam J (2020) Barnyard millet for food and nutritional security: current status and future research direction. *Front. Genet.* 11:500.
4. Rao BD, Bhaskarachary K, Christina GDA, Devi GS, Tonapi VA. *Nutritional and Health benefits of Millets*. ICAR- Indian Institute of Millets Research (IIMR), Hyderabad, India, 2017.
5. Sadhu Vijaya Jyothi and Naidu S. 2021. A Study on Functional and Nutritional Characteristics of Barnyard Millet and Foxtail Millet. *Food & Nutrition Journal*. Vol 6 (3): 1-10.
6. Maurya Neelesh Kumar Maurya, Joginder Sood, Ena Gupta, Neha Kumari, Latika Yadav and Poonam Maurya. 2023. Barnyard Millet's Health and Nutritional Significance. *International Journal of Agricultural Invention*. Vol. 8(2): 156-160.
7. Anitha, S., Botha, R., Kane-Potaka, J., Givens, D. I., Rajendran, A., Tsusaka, T. W., Bhandari, R. K. 2021. Can Millet Consumption Help Manage Hyperlipidemia and Obesity? : A Systematic Review and Meta-Analysis, *Front Nutr.* Vol – 17 (8):700-778.
8. Vissapragada A. 2021. A Case Study on Using Millets in Daily Diet for Weight Loss. *Int J Nutr Sci.* Vol. 6(3): 1057.
9. Oswal, M. S. (2023) Millet: the old food revolution to our new life, *Agricultural Engineering Today*, 47(1): 27-28.
10. Kaur Hardeep and Shilpa Sharma. 2020. An overview of Barnyard millet (*Echinochloa frumentacea*). *Journal of Pharmacognosy and Phytochemistry*. Vol. 9(4): 819-822.
11. Singh Jyoti and Ayushi Joshi. 2024. The Nutritive Gems of Uttarakhand: Barnyard and Finger Millet. *Agriculture and Food: E-Newsletter*. Vol. 6 (11): 341-342.
12. Rao BD, Ananthan R, Hariprasanna K, Bhatt V, Rajeshwari K and Sharma S. 2018. *Nutritional and Health benefits of Nutri Cereals*. ICAR- Indian Institute of Millets Research (IIMR), Hyderabad, India.