International Journal of Advance and Applied Research
Peer Reviewed | International Open Access Journal
ISSN: 2347-7075 | Impact Factor – 8.26 | *Website:* https://ijaar.co.in/
Volume-14, Issue-1 | September - October 2026

Original Article

Millets for Health and Sustainable Nutrition

Dr. Varsha Kulkarni
Head of the Department, Dept. of Home Science,
Mahila Kala Mahavidyalaya, Beed, Maharashtra, India

Manuscript ID: IJAAR-140133

ISSN: 2347-7075
Impact Factor – 8.26

Volume – 14
Issue – 1
September- October 2026
Pp. 267 - 272

Submitted: 04 Oct 2026
Revised: 13 Oct 2026
Accepted: 20 Oct 2026
Published: 25 Oct 2026

Corresponding Author:
Dr. Varsha Kulkarni

Quick Response Code:

Website: https://ijaar.co.in/

DOI: 10.5281/zenodo.23791337

DOI Link: https://doi.org/10.5281/zenodo.23791337

Creative Commons

OPEN ACCESS

Abstract:

Millets have a vital role in the traditional diets of many regions throughout the world. Millets have various advantageous properties like drought resistant, good yielding in areas where water is limited and they possess good nutritive values. Millet are rich with phytochemicals, however, the types and amount present vary greatly between and within different species. Therefore the phytochemical levels in millet foods and beverages are considerably lower than in the other cereal grains. There are evidences showing, millet foods and beverages have functional and health-promoting effects, specifically anti-diabetic, anti-obesity, cardiovascular disease, due to the actions of these phytochemicals and play a role in body immune system. However, there is a growing interest in millets due to its potential to support sustainable agriculture, nutrition, and food security. Observations from the review underscore the importance of millets as a wholesome and sustainable food source with significant health benefits. However, further research is necessary to fully explore their potential and promote their cultivation and consumption on a larger scale.

Keywords: Millets, Health, Advanatges, Phytochemicals, Food

Creative Commons (CC BY-NC-SA 4.0)

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (CC BY-NC-SA 4.0), *which permits others to remix, adapt, and build upon the work non-commercially, provided that appropriate credit is given and that any new creations are licensed under identical terms.*

How to cite this article:

Dr. Varsha Kulkarni (2026). Millets for Health and Sustainable Nutrition. International Journal of Advance and Applied Research, 14(1), 267 – 272. https://doi.org/10.5281/zenodo.23791337

Introduction:

The small-seeded grains known as millet crops have been grown for many years in India. Millets belong to minor cereals in the grass family Poaceae. Millets are cereal crops grasses with small-seeded structures planted in diverse tropical and desert climates with the capacity to thrive in less rich soil. The millets are enrooted to becoming a worldwide phenomenon. The United Nations (U.N.) has

decided to designate 2023 as the international year of millets, a resolution sponsored by India and supported by more than 70. Millets also called small millets are cultivated for their small kernels which are the products of small grassy plants belonging to the Poaceae family. The other name minor millets may indicate them to be minor crops yet are important for their nutritional values, medicinal benefits, feed for animals, and saviors during food crisis (Yenagi *et al*., 2010). The French word "mile," which means thousand, is where the word "millet" comes from, suggesting that a handful of millets contains thousands of grains. Millets are frequently cultivated on marginal or degraded fields with very low nutrient levels and in semi-arid environments with little rainfall. In regions where famine is a common occurrence, the crops provide a living for people, and in regions with little rainfall, millets provide a more consistent crop than other crops. Millets are small-seeded with different varieties such as pearl millet (*Pennisetum glaucum*), finger millet (*Eleusine coracana*), kodo millet (*Paspalum setaceum*),proso millet (*Penicum miliaceum*), foxtail millet (*Setaria italic*a), little millet (*Panicum sumatrense*), and barnyard millet (*Echinochloa utilis*). They are known as coarse cereals beside maize (*Zea mays*), sorghum(*Sorghum bicolor*), oats (*Avena sativa*), and barley (*Hordeum vulgare*). Millets are C_4 plants with very superior photosynthetic efficiency, short duration, higher dry matter production capacity, and a high degree of tolerance to heat and drought. They also easily adapt to degraded saline, acidic and aluminum toxic soils (Yadav and Rai, 2013). These extraordinary characters of millets make them suitable crops to tackle the hurdles of climate change and formulate millet-based climate resilient technologies. Millets are not currently regarded as a single significant item in the North American and European food basket, but their value as a component of multigrain and gluten-free goods has been emphasized. However, millet is a staple crop in many African and Asian regions, and it is used to make a variety of traditional dishes and drinks, including porridges, bread (fermented or unfermented), and snack foods, particularly among the less affluent portions of their respective societies. The world's largest producer of millet is India. In 2020, the two millets grown in India, Pearl Millet (Bajra) and Sorghum (Jowar), would account for roughly 19% of global production. In 2020, India produced 40.51% of the world's pearl millet, followed by 8.09% of the millet produced by sorghum. Rajasthan, Karnataka, Maharashtra, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, and Uttarakhand are the leading millets-producing states in India. Currently, these ten states collectively account for almost 98% of India's millet production in 2020–21. In India, Karnataka is the leading producer of millets. Over 58% of global production is millets, but very few Indians are acquiring the knowledge of its health benefits and their nutritional value. (Upadhyaya *et al*., 2007). According to conventional farming methods, millets don't need pesticides, and the land utilized to raise them is completely pest-free. Pest-free millets, such as foxtail millet, work as anti-pest agents when stored with pulses like green gram. Fumigants are not necessary for millets. Although millets rank lower among agricultural feed crops in India, they are crucial for regional and farm-level food security.

International Journal of Advance and Applied Research
Peer Reviewed | International Open Access Journal
ISSN: 2347-7075 | Impact Factor – 8.26 | *Website:* https://ijaar.co.in/
Volume-14, Issue-1 | September - October 2026

Table 1: Nutrient Value of Various Millets

Crop	Protein (g)	Fiber (g)	Minerals (g)	Iron (g)	Calcium (g)
Sorghum	11	6.7	2.7	3.4	13
Finger millet	7.3	3.6	2.7	3.9	344
Foxtail millet	12.3	8	3.3	2.8	31
Kodo millet	8.3	9	2.6	0.5	27
Proso millet	12.5	2.2	1.9	0.8	14
Barnyard millet	11.2	10.1	4.4	15.2	11

Types of Millets

Sorghum: According to conventional farming methods, millets don't need pesticides, and the land utilized to raise them is completely pest-free. Pest-free millets, such as foxtail millet, work as anti-pest agents when stored with pulses like green gram. Fumigants are not necessary for millets. Although millets rank lower among agricultural feed crops in India, they are crucial for regional and farm-level food security.

According to conventional farming methods, millets don't need pesticides, and the land utilized to raise them is completely pest-free. Pest-free millets, such as foxtail millet, work as anti-pest agents when stored with pulses like green gram. Fumigants are not necessary for millets. Although millets rank lower among agricultural feed crops in India, they are crucial for regional and farm-level food security.



Finger Millet: According to conventional farming methods, millets don't need pesticides, and the land utilized to raise them is completely pest-free. Pest-free millets, such as foxtail millet, work as anti-pest agents when stored with pulses like green gram. Fumigants are not necessary for millets. Although millets rank lower among agricultural feed crops in India, they are crucial for regional and farm-level food security. According to conventional farming methods, millets don't need pesticides, and the land utilized to raise them is completely pest-free. Pest-free millets, such as foxtail millet, work as anti-pest agents when stored with pulses like green gram. Fumigants are not necessary for millets. Although millets rank lower among agricultural feed crops in India, they are crucial for regional and farm-level food security.

Pearl Millet: Pearl millet consists of magnesium which helps in reducing the respiratory problems in asthma patients and helps to reduce the effect of migraine. The fibre content of pearl millet helps the reduction of gall stone occurrence. The insoluble fibre present in pearl millet help in reduction of excessive bile in our system, as excessive bile in our system leads to gall stones (Malik, 2015).

Kodo Millet: A traditional food that mimics rice and aids in weight loss is kodo millet. It is quickly absorbed and full of antioxidants and phytochemicals that help prevent certain diseases linked to a certain lifestyle. Additionally, kodo millet helps women regulate their menstruation and lessen joint and knee discomfort (Deshpande *et al*., 2015).

Proso Millet: Niacin, or vitamin B3, is the cause of pellagra, a disorder that proso millet helps avoid. Proso millet contains a lot of niacin. A skin condition called pellagra makes the skin rough, dry, and scaly. Niacin (Vitamin B3) and protein make up proso millet. It has historically been used as a recuperative food, particularly after pregnancy or illness.

Foxtail Millet: Foxtail millet helps in steady release of glucose without affecting the metabolism of the body. When people consume foxtail millet, the prevalence of diabetes is reduced and it is also known as healthy heart food due to its good source of magnesium.

Bioavailability of Nutrients from Millets:

There are certain obstacles to its availability even if it has the potential to contain a vast array of advantageous nutrients. Due to antinutritional effects, millets have limited nutrient bioavailability. Tannins and phytates are a couple of them. The decreased bioavailability of millets can also be attributed to their high fiber content. Mineral bioavailability is impacted by phytates and tannins. They discovered that millets had less absorption than wheat and rice. Because of their tannin concentration, in vitro research on widely grown or strongly pigmented finger millets revealed poor iron bioavailability. Pearl millet (20.8%) and finger millet (18.6%) had more total dietary fiber than sorghum (14.2%), wheat (17.2%), and rice (8.3%), according to Kamath and Belavady (1980). Dietary fiber's health advantages are linked to lower blood sugar and cholesterol levels as well as improved bowel movements millets are high in fiber and a variety of health-promoting phytochemicals, including polyphenols, phytosterols, phytoestrogens, lignins, and phytocyanins.

Health Benefits of Millets:

Patients with celiac disease can utilize millet as they are gluten-free. Consuming millet reduces blood glucose responses and glycosylated hemoglobin, lowering the risk of developing diabetes. Oxidative stress is reduced by removing free radicals from the body using the phenolic compound present in millet. Millets can reduce hypertension by oxidizing low-density lipoproteins, anticancer properties, and inhibiting DNA damage.

Diabetes: Millets may contribute to blood glucose regulation through several bioactive compounds and essential minerals. Certain millet-derived compounds have demonstrated inhibitory effects on pancreatic α-amylase and α-glucosidase, enzymes involved in carbohydrate digestion. By reducing the activity of these enzymes, millets may slow carbohydrate breakdown and glucose absorption, potentially helping to control postprandial blood glucose levels. In addition, some polyphenols and flavonoids found in millet varieties have exhibited inhibitory activity against aldose reductase, an enzyme responsible for converting glucose into sorbitol through the polyol pathway.

Cancer: Millets contain antinutrients such as phenolic, tannins, and phytates that can lower the chance of developing and spread ing cancer. Linolic acid, which is present in millet, aids in preventing tumors. Due to tannins and polyphenols, sorghum has antimutagenic and anticarcinogenic characteristics. According to Pawar *et al*. (2016) millet grains' phenolic acids, phytate, and tannins serve as "antinutrients". According to a recent study, millet phenolics may prevent the start and progression of in vitro cancer.

Cardiovascular Diseases: Finger millet contains several nutrients and bioactive constituents that may support lipid metabolism and cardiovascular health. Its nutritional composition, including essential amino acids and other beneficial compounds, may contribute to maintaining healthy lipid levels and regulating fat metabolism. Some studies have reported that finger millet consumption is associated with lower serum triglyceride concentrations, which may help reduce cardiovascular risk. Furthermore, millets provide important minerals, particularly potassium and magnesium, which play roles in vascular function and blood pressure regulation. Potassium supports the relaxation of blood vessel walls, while magnesium contributes to normal vascular tone and cardiovascular function (Babele *et al*., 2022).

Conclusion:

Growing consumer awareness of nutrition and health has encouraged the food industry to develop innovative products that offer additional functional benefits. Millets have attracted considerable attention because they contain polyphenols and other bioactive compounds associated with antioxidant, antimicrobial, antidiabetic, and cholesterol-lowering properties. These characteristics suggest that millets may contribute to improved dietary quality and support efforts to address nutrition-related health challenges, particularly in rural communities where access to diverse foods may be limited. Beyond their nutritional value, millets offer opportunities to promote sustainable agriculture, preserve traditional food practices, and strengthen food security. Their adaptability to different agroclimatic conditions and their potential contribution to human health

and environmental sustainability make them valuable crops for future food systems. Fermentation may further influence the nutritional composition, bioavailability, and functional properties of millet-based foods. However, additional research is required to clarify the mechanisms underlying these effects and establish their significance for human health. The benefits of fermented millet products may also differ among individuals depending on genetic factors, dietary habits, and overall health status.

References:

1. Deshpande, S. S., Mohapatra, D., Tripathi, M. K., & Sadvatha, R. H. (2015). Kodo millet-nutritional value and utilization in Indian foods. *Journal of grain processing and storage*, *2*(2), 16-23.
2. Kamath, M. V., & Belavady, B. (1980). Unavailable carbohydrates of commonly consumed Indian foods. *Journal of the Science of Food and Agriculture*, *31*(2), 194-202.
3. Malik, S. (2015). Pearl millet-nutritional value and medicinal uses. *International Journal of Advance Research and Innovative Ideas in Education*, *1*(3), 414-418.
4. Pawar, V. Y., Kute, N. S., Deshmukh, G. P., Patil, H. T., Awari, V. R., & Magar, N. M. (2016). Inheritance of blast resistance in pearl millet (*Pennisetum glaucum* L.). *Elect J Plant Breeding*. 2016;7(4):877–82.
5. Rao, B. R., Nagasampige, M. H., & Ravikiran, M. (2011). Evaluation of nutraceutical properties of selected small millets. *Journal of Pharmacy and Bioallied Sciences*, *3*(2), 277.
6. Upadhyaya, H. D., Gowda, C. L. L., & Reddy, V. G. (2007). Morphological diversity in finger millet germplasm introduced from Southern and Eastern Africa.
7. Yadav, O. P., & Rai, K. N. (2013). Genetic improvement of pearl millet in India. *Agricultural Research*, *2*(4), 275-292.
8. Yenagi, N. B., Handigol, J. A., Ravi, S. B., Mal, B., & Padulosi, S. (2010). Nutritional and technological advancements in the promotion of ethnic and novel foods using the genetic diversity of minor millets in India. *Indian Journal of Plant Genetic Resources*, *23*(01), 82-86.