



Review Article

NUTRITIONAL AND HEALTH BENEFITS OF MILLETS

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ABSTRACT

Millets are group of small seeded grasses that have been cultivated for thousands of years in various parts of the world. They are highly nutritious and versatile, making them an essential part of many traditional diets. Millets are also drought-resistant and require less water than other cereal crops, making them an ideal crop of regions with limited water resources. There are several types of millets like Sorghum, Pearl millet, Proso millet, Kodo millet, Finger millet, Foxtail millet and Barnyard millet, Little millet, Browntop millet. Each type has its unique nutritional profile and uses. Apart from being a nutritious food source, millets also have several health benefits. They are gluten-free, making them an excellent alternative for people with celiac disease or gluten intolerance. Millets are also low in glycemic index, making them an ideal food for people with diabetes. They also have a environmental benefits as they require less water than other crops like rice, wheat, making them ideal for regions with limited water resources. So, this article is an effort to put emphasis on Nutritional and Health Benefits of millets.

INTRODUCTION

Millets are group of nutritionally rich, drought resistant small seeded grasses belonging to the Poaceae family. They are mostly grown in the arid and semi-arid regions of India as they require less water when compared to other crops like rice, wheat. Millets are known for their varied nutritional as well as therapeutical significance. Millets are rich in protein, vitamins, minerals and fibres. Some of the general health benefits of millets include weight loss, maintainance of blood sugar level, immune boosting, decreases the risk of cardiovascular diseases and improves digestive power as well it acts as an antioxidant. In Ayurveda millets are categorized under Dhanya varga, Suvarnaadivarga, Shaalyadivarga, Trinadhanyavarga in Bhavaprakash Nighantu, Kaiyadeva Nighantu, Dhanvantari Nighantu, Raja Nighantu and Shodala Nighantu.

Millets are a staple food in many parts of World, particularly in Africa and Asia^[1]. In India, millets have been cultivated for over 5000 years and were once a significant part of the diet. However, with the introduction of rice and wheat, millets lost their popularity. Today, there is a renewed interest in millets due to their nutritional value and environmental benefits.

Millets are not only nutritious but also versatile. They can be used to make porridge, bread, pancakes, and even beer. In India, *Ragi* (finger millet) is used to make *Dosa* and *Idli*, while *Bajra* (pearl millet) is used to make *roti*. In Africa, millets are used to make porridge and couscous. Millets are also environmentally friendly and require less water than other cereal crops, making them an ideal crop for regions with limited water resources. With the renewed interest in millets, they are set to become a significant part of the global food system.

Millets

Sorghum Millet

Sorghum millet, also known simply as sorghum, is a versatile and nutritious grain that has been cultivated for thousands of years. It belongs to the Poaceae family and is native to Africa, where it

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remains an important staple crop in many regions. However, sorghum is now grown and consumed worldwide due to its numerous health benefits and adaptability to various climates.

Sorghum millet is a hardy crop that can tolerate drought, high temperatures, and poor soil conditions, making it a valuable option for farmers in arid and semi-arid areas. It comes in different varieties, including red, white, and brown, each with its unique taste and nutritional profile. The grain is typically harvested when it reaches maturity and can be processed into various forms, such as whole grain, flour, flakes, or popped like popcorn.

One of the key advantages of sorghum millet is its exceptional nutritional composition. It is a rich source of dietary fiber, protein, and essential minerals like iron, magnesium, and phosphorus. Sorghum is a gluten-free millet. The grain also contains antioxidants like phenolic compounds, which have been linked to reducing the risk of chronic diseases such as heart disease and certain types of cancer.

In terms of culinary uses, sorghum millet offers great versatility. Whole grain sorghum can be cooked and used as a rice substitute or added to soups, stews, salads, and pilafs. Sorghum flour can be used for baking bread, cakes, cookies, and other gluten-free recipes. It can also be ground into a fine powder to make porridge or used as a thickening agent in sauces and gravies. Sorghum flakes make a nutritious and crunchy addition to breakfast cereals or can be used in granola bars and energy bites.

Beyond its nutritional and culinary benefits, sorghum millet also has various industrial applications. Its stalks can be used to produce biofuels, paper, and building materials. Additionally, sorghum is a valuable animal feed, providing sustenance for livestock in many parts of the world.

Pearl Millet

Pearl millet, also known as bajra, is another nutritious and versatile grain that has been cultivated for thousands of years. Like sorghum, it belongs to the Poaceae family and is native to Africa, particularly in the Sahel region. However, pearl millet is now grown and consumed in many parts of the world due to its numerous health benefits and adaptability to diverse climates.

Pearl millet is a resilient crop that can tolerate drought, high temperatures, and poor soil conditions, making it a valuable option for farmers in arid and semi-arid areas. It is characterized by its tall stalks and large clusters of small round grains, which can vary in color from white to yellow or brown. The grain is typically harvested when it reaches maturity and can

be processed into various forms, such as whole grain, flour, or couscous-like grains.

It is a rich source of dietary fiber, protein, and essential minerals like iron, calcium, and magnesium. Additionally, pearl millet is gluten-free, making it suitable for individuals with gluten sensitivities or celiac disease. The grain also contains antioxidants like phenolic compounds, which have been associated with various health benefits, including reducing inflammation and improving digestion. It can also be ground into a fine powder to make porridge or used as a base for fermented drinks like mahewu or ogi.

Apart from its nutritional benefits, pearl millet also has various industrial applications. Its stalks can be used for animal bedding, thatching roofs, or as a source of biofuel. Additionally, pearl millet straw can be used to make paper or woven into mats and baskets.

Finger Millet

Finger millet, also known as ragi, is another ancient and nutritious grain that has been cultivated for thousands of years. Like pearl millet, it belongs to the Poaceae family and is native to Africa, specifically the Ethiopian Highlands. However, finger millet is now grown and consumed in many parts of the world due to its numerous health benefits and versatility.

Finger millet is a hardy crop that can thrive in diverse climates and soil conditions, making it suitable for both tropical and subtropical regions. It is characterized by its tall stalks and finger-like grains, which can vary in color from white to red or brown. The grain is typically harvested when it reaches maturity and can be processed into various forms, such as whole grain, flour, or malted grains.

One of the key advantages of finger millet is its exceptional nutritional profile. It is a rich source of dietary fiber, protein, and essential minerals like calcium, iron, and potassium. Additionally, finger millet is gluten-free and the grain also contains antioxidants like phenolic compounds and flavonoids, which have been linked to various health benefits, including reducing the risk of chronic diseases like diabetes and heart disease.

In terms of culinary uses, finger millet offers great versatility. Finger millet flour can be used for baking bread, cookies, cakes, or as a thickening agent in sauces and gravies. It can also be fermented to make traditional beverages like beer or used to make traditional dishes like idlis or dosas.

Beyond its nutritional and culinary benefits, finger millet also has various agricultural applications. Its straw can be used for animal fodder or as a source of organic matter for soil improvement. Additionally,

finger millet can be grown as a cover crop to prevent soil erosion and suppress weed growth.

Kodo Millet

Kodo millet, also known as *Varagu* or *Kodra*, is another ancient grain that has been cultivated for thousands of years. Like finger millet, it belongs to the Poaceae family and is native to India. However, kodo millet is now grown and consumed in many parts of the world due to its nutritional benefits and versatility.

Kodo millet is a resilient crop that can adapt to various climates and soil conditions, making it suitable for both tropical and subtropical regions. It is characterized by its tall stalks and small, round grains, which can vary in color from white to brown or black. The grain is typically harvested when it reaches maturity and can be processed into various forms, such as whole grain, flour, or puffed grains.

One of the key advantages of kodo millet is its nutritional value. It is a rich source of dietary fiber, protein, and essential minerals like iron and magnesium. Additionally, kodo millet is gluten-free, making it an excellent choice for individuals with gluten sensitivities or celiac disease. The grain also contains antioxidants like phenolic compounds, which have been linked to various health benefits, including reducing inflammation and promoting heart health.

In terms of culinary uses, kodo millet offers great versatility. Whole grain kodo millet can be cooked and used as a rice substitute or added to pilafs, salads, or stir-fries. It is used as a thickening agent in soups and sauces. It can also be used to make traditional dishes like idlis or dosas.

Beyond its nutritional and culinary benefits, kodo millet also has various agricultural applications. Its straw can be used for animal fodder or as a source of organic matter for soil improvement. Additionally, kodo millet can be grown as a cover crop to prevent soil erosion and suppress weed growth. Whether consumed as a whole grain or flour, kodo millet offers a range of culinary possibilities while contributing to a healthy and sustainable diet.

Proso Millet

Proso millet, also known as broomcorn millet or white millet, is another ancient grain that has been cultivated for thousands of years. It is native to Asia and is now grown in many parts of the world, including Africa, Europe, and North America. Proso millet is a small, round grain with a creamy white color and a mild, nutty flavor.

Like other millets, proso millet is a resilient crop that can adapt to various climates and soil conditions. It is drought-tolerant and can be grown in arid regions where other crops may struggle. Proso millet is also known for its short growing season,

typically maturing within 60 to 90 days, making it a suitable option for areas with shorter growing seasons.

Nutritionally, proso millet is a good source of dietary fiber, protein, and essential minerals such as iron and magnesium. It is also low in fat and contains antioxidants that contribute to its health benefits. Proso millet is gluten-free, making it suitable for individuals with gluten sensitivities.

In terms of culinary uses, proso millet can be cooked and used as a rice substitute or added to soups, stews, or salads. It can be used as an ingredient in granola bars or energy balls.

Barnyard Millet

Barnyard millet, also known as *Sanwa* millet or *Sama* rice, is another ancient grain that has been cultivated for centuries. It is native to India and is now grown in various parts of Asia. Barnyard millet gets its name from the fact that it was traditionally used as animal feed.

Barnyard millet is a small grain with a slightly sweet flavor and a chewy texture. It is gluten-free and a good source of dietary fiber, protein, and essential minerals such as calcium and phosphorus. Barnyard millet is also low in fat and rich in antioxidants.

In terms of culinary uses, barnyard millet can be cooked and used to make traditional dishes like upma or khichdi.

Little Millet

Little Millet, also known as *Kutki* or *Samai*, is a gluten-free grain, making it an excellent alternative for people with celiac disease or gluten intolerance. It is also rich in dietary fiber, which helps in maintaining healthy digestion and preventing constipation. The high fiber content also makes it an ideal food for weight loss as it keeps you full for longer periods, reducing the urge to snack between meals.

This millet is also a good source of essential minerals like iron, calcium and magnesium, which are necessary for maintaining strong bones and teeth. It is also rich in antioxidants that help protect the body against oxidative stress and reduce the risk of chronic diseases like cancer, heart disease and diabetes.

Foxtail Millet

Foxtail millet, also known as Italian millet or German millet, is another ancient grain that has been cultivated for thousands of years. It is native to China and is now grown in many parts of Asia, including India, Japan, and Korea.

Foxtail millet is a small, yellow grain with a mild, nutty flavor. It is gluten-free and a good source of dietary fiber, protein, and essential minerals such as iron and copper. Foxtail millet is also low in fat and rich in antioxidants.

In terms of culinary uses, foxtail millet can be cooked and used as a rice substitute or added to porridges, pilafs, or salads. It can also be ground into flour and used for baking bread, cookies, or cakes. Additionally, foxtail millet can be popped like popcorn or used to make traditional dishes like upma or pongal.

It is gluten-free, rich in fiber and essential minerals, and can be used in various dishes as a rice substitute or flour alternative. This ancient grain contributes to a healthy and sustainable diet while offering unique flavors and textures.



Barnyard Millet



Browntop Millet



Foxtail Millet



Finger



Millet Kodo Millet



Little Millet



Pearl Millet



Proso Millet



Sorghum Millet

Nutritional Composition of millets (for 100gm)^[2]

Millet	Protein (G)	Carbs (G)	Fat (G)	Minerals (G)	Fiber (G)	Calcium (MG)	Phosphorus (MG)	Iron (G)	Energy (KCAL)	Thiamin (MG)	Niacin (MG)
Finger	7.3	72	1.3	2.7	3.6	344	283	3.9	336	0.42	1.1
Sorghum	10.4	70.7	3.1	1.2	2	25	222	5.4	329	0.38	4.3
Pearl	11.8	67	4.8	2.2	2.3	43	-	11	363	0.38	2.8
Foxtail	12.3	60.2	4.3	4	6.7	31	290	2.8	351	0.59	3.2
Little	7.7	67	4.7	1.7	7.6	17	220	9.3	329	0.3	3.2
Kodo	8.3	65.9	1.4	2.6	5.2	35	188	1.7	353	0.15	2
Proso	12.5	70.4	1.1	1.9	5.2	8	206	2.9	354	0.41	4.5
Barnyard	6.2	65.5	4.8	3.7	13.6	22	280	18.6	300	0.33	4.2

Millets in Ayurveda

In Ayurveda Millets are explained in *Bhavaprakash Nighantu*, *Kaiyadeva Nighantu*, *Dhanvantari Nighantu*, *Raja Nighantu*, *Shodala Nighantu* under the category of *Dhanya varga*, *Suvarnaadivarga*, *Shalyaadivarga*, *Trinadhanyavarga*.

Millets are also called as *Kshudra Dhanya*, *Kudhanya*, *Trina Dhanya* according to *Bhavaprakasha*.

Millets are having *Madhura* and *Kashaya Rasa*, possess *katuvipaka* and *Laghushna* in potency. They are *Laghu* in nature and causes *Kledashoshakam* and balances *Pitta*, *Raktha* and *Kapha*. *Kangu*, *Chinaka* and *Shamyaka* are the millets explained by classical authors^[3].

***Kangu Dhanya*^[4]**

According to *Bhavaprakash Nighantu* and *Kaiyadeva Nighantu*, *Kangu* is explained under *Dhanya varga*, and in *Shodala Nighantu* it is explained under *Trinadhanyavarga*.

Kangu, *Priyangu*, *Pitatandula* are its synonyms.

There are 4 varieties of *Kangu* – *Krishna*, *Raktha*, *Sita*, *Peeta*. *Peeta Kangu* is considered the best one.

Properties

Rasa – *Madhura*, *Kashaya*

Guna – *Ruksha*, *Guru*

Veerya – *Sheeta*

Doshagnata – *Kaphahara*

Karma – *Bruhmana*, *Dahagna*, *Vajinam*, *Bhagnasandhana*

Kangu is considered as Foxtail millet.

***Chinaka Dhanya*^[5]**

According to *Bhavaprakash Nighantu* and *Kaiyadeva Nighantu* *Chinaka* is explained under *Dhanya varga*. It is one among the variety of *Kangu* i.e., *Kaka Kangu*.

Kaka Kangu, *Sushlakshna* and *Shlakshnaka* are its synonyms. It can be considered as Proso Millet.

***Shamyaka Dhanya*^[6]**

According to *Bhavaprakash Nighantu* and *Kaiyadeva Nighantu*, *Shyamaka* is explained under *Dhanya varga*, and in *Shodala Nighantu* it is explained under *Trinadhanyavarga*.

Shyamaaka, *Shyamaka*, *Shyama*, *Tribija*, *Avipriya*, *Sukumara*, *Rajadhanya*, *Trinabijothama* are its synonyms.

Properties

Rasa – *Madhura*, *Kashaya*

Guna – *Laghu*, *Ruksha*

Veerya – *Sheeta*

Karmukatha – *Sangrahi*, *Visha doshanuth*, *Shoshana*.

Doshagna – Increases *Vata*, balances *Kapha* and *Pitta* *Dosha*

Indication – *Sthoulya*^[7], *Prameha* and *Amavata*

DISCUSSION

- Millets are rich in nutrition and are greatest food source for the people with gluten sensitivity as all the millets are gluten free. Millets have lots of Nutritional as well as Health benefits. As people now days are more conscious about their health and lifestyle, millets being the source of antioxidants, phytochemicals, energy, proteins, minerals and etc help to promote health by increasing immunity.
- Millets are helpful in diabetes, cancer, celiac disease, heart disease, lifestyle disorders like obesity, thyroid problems.
- Millets help regulate the blood sugar levels in people with diabetes mellitus, as millets are gluten free, they become great alternative of wheat recipes in persons with gluten sensitivity and celiac disease. They also reduce the risk of heart diseases and also prevents dyslipidemia, diabetes.

CONCLUSION

- As there is a growing concern about lifestyle disorders, millets plays a major role in controlling them.
- Millets are nutrient-dense, gluten free, versatile in nature.
- Being a sustainable crop it is beneficial even for farmers. Apart from all these they have great health benefits. So, it is a need of hour to promote awareness about millets worldwide.

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