

# Miracles of Indian Traditional Foods: Nutritional Quality of Millets and Their Traditional Products with Potential Health Benefits

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## Abstract:

Millets are important crops for dry land farmers. They are highly nutritious and climate compliant crops. But due to drudgery in preparation, their consumption is decreased over the years in India. Many cereals are available which economically feasible and tasty but not healthy. At present people are very conscious with health. Millets are one of the best solution to found highly nutritious and health benefits. So the review study focused on millet nutritive value and health benefits.

**Key words:** millets; nutritive value; traditional products; health benefits

## Introduction

Millets are the cheapest cereals and are consumed by the poorer people of peninsular India. They are known as 'coarse grains' because as compared to wheat their outer coats are thicker and contains more cellulose.

Little care and water is needed for their cultivation and so they can be grown in hilly regions where water is scarce. Millets are traditional 6th crop and cultivated in past 1000 years ago use as fodder and human meal. It is also called a poor man food. They do not form a taxonomic group but rather a functional or agronomic one. Millets are important crop in semi-arid tropic. The crop is favoured due to its productivity and short growing season under dry, high-temperature conditions.

The year 2023 has been declared by the United Nations as the International year of the millet. The Indian government has been promoting millets as a healthy and sustainable food option. Various initiatives have been launched to increase the production and consumption of millets in India. Millets are grown in different parts of India. In India, millets are grown on about 17 million ha with annual production of 18 million tonnes and contribute 10 percent to the country's food grain basket.

However, the direct consumption millets as food have significantly declined over the past three decades. The major reasons of decrease in consumption is the lack of awareness of nutritional merits, inconveniences in food preparation, lack of processing technologies, and also the government policy of disincentives towards millets and favouring of supply of fine cereals at subsidized prices. It has become imperative to reorient the efforts on the millet crop to generate demand through value-

addition of processed foods through diversification of processing technologies, nutritional evaluation and creation of awareness backed by backward integration. In that context it is important to explore ways for creating awareness on nutritional merits of millets.

India is the top most producers of millets. In India, eight millets species (Sorghum, Pearl millet, Finger millet, Foxtail millet, Kodo millet, Proso millet, Barnyard millet and little millet) are commonly cultivated under rain fed conditions. Further, in each of the millet growing areas at least 4 to 5 species are cultivated either as primary or allied crop in combination with the pulses, oilseeds, spices and condiments.

Sorghum (Jowar) - Sorghum (*Sorghum bicolor* (L.) Moench) is a warm season crop, intolerant of low temperatures but fairly resistant to serious pests and diseases. It is known by a variety of names (such as great millet and guinea corn in West Africa, Asia and parts of Middle East). Most of the sorghum produced in North and Central America, South America and Oceania is used for animal feed (FAO, 1995). The grain consists of naked caryopsis, made up of a pericarp, endosperm and germ. Although there is a huge range of physical diversity, sorghum is classed into four groups: (1) grain sorghum, (2) forage sorghum glum; (3) grass sorghum; or (4) Sudan sorghums and broomcorn (Macrae et al., 1993). It is as a safe food grain as a best alternative for celiac disease. Sorghum is best used for the replacement of wheat for making of bread, pasta, cookies, etc. East African people has used brew a drink from sorghum millets known as an ajono.

**Pearl Millet (Bajra)** - Pearl millet (*Pennisetum glaucum* (L.) R. Br.) Originated in Central tropical Africa and is widely distributed in the drier tropics and India. Pearl millet has traditionally been an important grain, forage, and Stover crop primarily in the arid and subtropical regions of many developing countries. As pearl millet cultivation expands into non-traditional areas in temperate and developed countries, production constraints from diseases are assuming greater importance. Its flour have poor keeping quality, off flavour and nutty taste due to lipase enzyme but it helps in reducing respiratory disease, migraine and gall stones.

**Finger Millet (Ragi)** - Finger millet (*Eleusine coracana* (L.) Gaertn) is a cereal grass grown mostly for its grain. Finger millet is a robust, tufted, tillering annual grass, up to 170 cm high. The inflorescence is a panicle with 4-19 finger-like spikes that resembles a fist when mature, hence the name finger millet. The spikes bear up to 70 alternate spikelets, carrying 4 to 7 small seeds (Dida et al., 2006). The seed pericarp is independent from the kernel and can be easily removed from the seed coat (FAO, 2012). Finger millet is a staple food in many African and South Asian countries. It is also considered a helpful famine crop as it is easily stored for lean years (FAO, 2012). The grain is readily digestible, highly nutritious and versatile, and can be cooked like rice, ground to make porridge or flour, or used to make cakes (De Wet, 2006). Sprouted grains are recommended for infants and elderly people. Finger millet is also used to make liquor (arake or areki in Ethiopia) and beer, which yields by-products used for livestock feeding (FAO, 2012). It helps to prevent constipation, anaemia, blood pressure, asthma and heart problems. Finger millets are used to make valuable and nutritious products such as cakes, pudding and porridge.

**Foxtail Millet (Kangni)** - Foxtail millet (*Setaria italica* (L.) P. Beauvois) is regarded as a native of China; it is one of the world's oldest cultivated crops. Foxtail millet ranks second in the total world production of millets and continues to have an important place in the world agriculture providing approximately six million tons of food to millions of people, mainly on poor or marginal soils in southern Europe and in temperate,

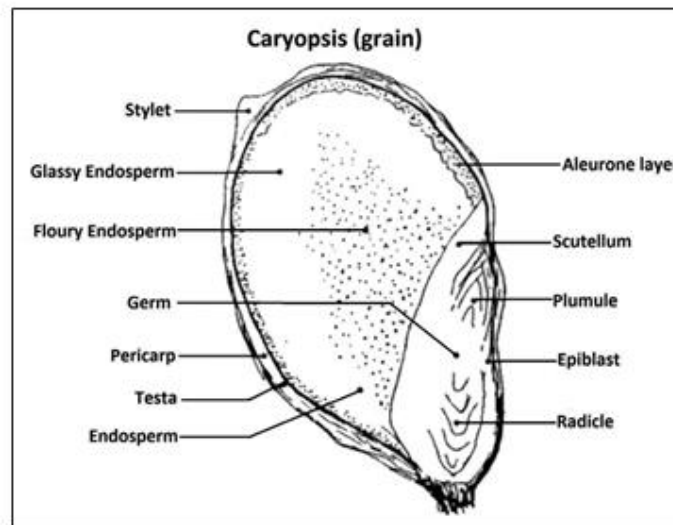
subtropical and tropical Asia. Foxtail millet helps in preventing diabetes to reducing glucose level in blood and maintains the heart due to magnesium content.

**Kodo Millet (Kodra)** - Kodo millet (*Paspalum scrobiculatum* (L.)) is widely distributed in damp habitats across the tropics and subtropics of the world. It is indigenous cereal of India and is grown today in Uttar Pradesh in the North and Kerala and Tamilnadu in the South. This cereal is also known as varagu, haraka and arakalu. It forms the main stay of the dietary nutritional requirements. It is a traditional food look like rice to easily digestible and helps in preventing joint, knee pain and women menstruation.

**Proso Millet (Chena)** - Proso millet (*Panicum miliaceum* (L.)) is an annual grass, growing from seed each year. Proso millet is a relatively low demanding crop and diseases aren't known. That's why Proso millet is often used in organic farming systems in Europe. In the United States it is often used as an intercrop. Proso millet has high content of niacin (Vitamin B3) which helps in preventing pellegra. Pellagra is skin disease.

**Barnyard Millet (Sanwa)** - Barnyard millet (*Echinochloa crusgalli* (L.) P. Beauvois) is a multi-purpose crop which is cultivated for food and fodder. It is also called by several other names viz., Japanese barnyard millet, ooda, oodalu, sawan, sanwa and sanwank. Nutritionally too, it is a good source of protein, which is highly digestible and is an excellent source of dietary fibre with good amount of soluble and insoluble fractions. It can be potentially recommended for the patients with cardiovascular disease and diabetes mellitus. Barnyard millet is most effective in reducing blood glucose and lipid levels.

**Little Millet (Kutki)** - Little millet (*Panicum sumatrense*) was domesticated in India. The seeds of little millet are smaller than those of common millet. Little millet is ideal use of pongal or kheer instead of rice and helps in preventing obesity due to its high fibre content.



**Figure:** General structure of millet grain

**Nutritional Importance of Millets:** Sorghum and millets namely, Pearl millet, Finger millet, Kodo millet, Proso millet, Foxtail millet, little millet, and Barnyard millet are important staples to millions of people worldwide. Millets are nutritionally comparable to major cereals and serve as good source of protein, micronutrients and phytochemicals. Processing methods like soaking, malting, decortications, and cooking affect the antioxidant content and activity. While sorghum and most of the millets contains about 10% protein, 3.5% lipids, finger millet contains 12-16%

protein and 2-5% lipids. Sorghum and millets are very good sources of micronutrients such as vitamins and minerals. Major portion of sorghum protein is prolamins (kaffirin) which has a unique feature of lowering digestibility upon cooking whereas, the millets have a better amino acid profile. It has been reported that sorghum proteins upon cooking are significantly less digestible than other cereal proteins, which might be a health benefit for certain dietary groups. On the other hand, millets contain fewer cross-linked prolamins, which may be an additional factor

contributing to higher digestibility of the millet proteins. The average of nutrient composition of millets is summarized in Table.

Millets	Protein (gram)	Carbohydrate (gram)	Fat (gram)	Minerals (gram)	Fiber (gram)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Energy (Kcal)	Thiamine (mg)	Niacin (mg)
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	2.0
Porso	12.5	70.4	1.1	1.9	5.2	8.0	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
Sorghum	10.4	70.7	3.1	1.2	2.0	25	222	5.4	329	0.38	4.3
Pearl	11.8	67	4.8	2.2	2.3	42	240	11	363	0.38	2.8
Finger	7.3	72	1.3	2.7	3.6	344	283	3.9	336	0.42	1.1

**Table:** Nutritional content in 100 gram of dry grains

**Health Benefits of Millets:** Millets are highly nutritious and renders various health benefits. The nutritional facts of millet are listed below.

Finger millet- Inhibit cataract eye lens, lower plasma glucose level, Antimicrobial activity against *Bacillus cereus* and *Aspergillus, flavus*.

Foxtail millet- Anti hyperglycemic activity.

Proso millet- Improved HDL, Lower triglycerides, Prevent cardiovascular disease.

Kodo millet- Inhibit glycation and cross linking of collagen leads to inhibition of aging.

Pearl millets- Inhibiting the growth of the phytopathogenic fungi.

Barnyard millets- Improved the levels of HDL.

Little millet- Inhibitory effects on lipid peroxidation.

Sorghum- As a detoxifying agent.

**Source:** Verma et al., (2012); Fereidoon Shahidi et al., (2013)

#### **Millet based fermented food products, beverage and microorganism:**

Busa (Liquid Beverages) - *Lactobacillus*, *sacchromyces*.

Chikokivana (Alcoholic) - *Sacchromyces cerevisiae*.

Dalaki (Thick Halwa) - Unknown.

Doro (Alcoholic drink) - Yeast, Bacteria.

Kwanu-Zaki (Liquid Beverages) - LAB, Yeast.

Ogi (Liquid Porridge) - *Lactobacillus sp.*, *Aerobacter*.

Bogobe (Solid Dough) - *Lactobacillus sp.*, yeast.

Kenkey (Solid Dough) - *Lactobacillus sp.*, yeast.

Merissa (Alcoholic) - *Sacchromyces*.

Mahewu (Liquid Halwa) - *Streptococcus lactis*, *Lactobacillus delbrukii*, *L. bulgarius*.

Uji (Halwa) - *Leuconostoc nesenterodes*.

Munkoyo (Liquid Beverages) - Unknown.

**Source:** Blandino et al., 2003 Osungbaro, 2009

**Traditional Products:** Millets are traditional food for poor farmers in various region of our country. Millets are also called nutri- cereals. Now a day, the demand of millets and their products are increase due to highly nutritious, affordable and environmentally friendly crop with numerous advantages. Traditional products of millets have found easily available, reasonable price and convenient to make in urban and rural areas where the people are conscious to take nutritious food. Millets are a powerhouse of nutrients. Millets can be cooked in a variety of ways and they are used in various traditional dishes including rotis, dosas, idlis, porridges etc.

**Processing of millets:** Millets have good grain qualities suitable for processing. Processing of the grain for many enduses involves primary (wetting, dehulling and milling) and secondary (fermentation, malting, extrusion, flaking, popping and roasting) operations. Being a staple and consumed at household levels, processing must be considered at both traditional and industrial levels, involving small, medium and large-scale entrepreneurs (Obilana and Manyasa, 2002; Hamad, 2012). Dehulling is not favourable to millets due to their small grains sizes. In addition, dehulling causes nutrients loss. All the Millets can be milled by hand grinding (household level) or machine milling (cottage, small-to-medium scale service and large scale industrial).

#### **Conclusions**

The emerging principal uses of millets as an industrial raw material include production of biscuits and confectionery, beverages, weaning foods and beer. Grits, flour, and meals from cereals such as millet, sorghum, and corn are now common items in the market. Soft biscuits and cookies are being made using sorghum, maize and wheat composites, while cakes and non-wheat breads have become a subject of increasing scientific and technological enquiry, showing encouraging results. Millets are bestowed with a wealth of nutrients and fiber that supports boost metabolism, augment heart health, control blood pressure & diabetes mellitus and promote weight loss. Thus they are healthy addition to the meal plan.

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