



Inspiring Trust, Assuring Safe & Nutritious Food
Ministry of Health and Family Welfare, Government of India



GOVERNMENT OF INDIA



SHREE ANNA

"A holistic overview"

Standards on Millets

Prepared by
FSSAI





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**I am positive that the
International Year of
Millets 2023 will start a
mass movement towards
a secure, sustainable and
healthy future.**



**- Shri Narendra Modi
Hon'ble Prime Minister of India**







India is poised to become the global hub for millets with a production of more than 170 lakh tonnes which makes for more than 80 % of the millets produced in Asia. The ‘International Year of Millets’ stands to provide a unique opportunity to increase global production, ensure efficient processing and consumption, promote better utilization of crop rotations and encourage better connectivity throughout food systems to promote millets as a key component of the food basket.



Dr. Mansukh Mandaviya

Hon'ble Minister of Health and Family Welfare of India
Hon'ble Minister of Chemicals and Fertilizers





Millets are one of the oldest cultivated cereals in the world. It is rich in proteins, fibre, vitamins, minerals like iron and is a better option on the nutritional test. Seeing their health benefits, millets are also being called the super foods. Millets can play a huge role in taking India towards food and nutritional security. Millets are extremely beneficial for the consumer, the farmer and the climate. This initiative of the government will be helpful in increasing the global production of millets, as well as provide an opportunity to establish millets significantly in Indian cuisine.

Today the craze for millets is increasing all over the world. On India's initiative, the United Nations has declared the year 2023 as the International Year of Millets. In order to make the International Year of Millets a success, the Honorable Prime Minister has also talked about running a campaign to promote the cultivation and consumption of millets.

Let us all together take this campaign forward and make it a mass movement.

I congratulate the entire team for the millets based coffee table book being released by FSSAI dedicated to this campaign.

Dr. Bharati Pravin Pawar
Hon'ble Union Minister of State for
Health and Family Welfare





Foreword

I am delighted to share this Coffee Table Book on millets which provides a complete overview on millets available in India, their health benefits, nutritional composition and regulation & standards. With 2023 being celebrated as the “International Year of Millets”, our country is honored to be promoting and popularizing millets across the globe.

Millets are traditional and nutritionally rich cereals which provides number of health benefits. As part of the Eat Right India initiative, Food Safety and Standards Authority of India (FSSAI) under the Ministry of Health and Family Welfare is focusing on promoting safe and wholesome diets. Moreover, FSSAI promotes consumption of a variety of whole grains ranging from wheat, rice, millets and other indigenous grains for better nutrition through this program.

FSSAI has been undertaking various efforts to promote Millets as a nutri-cereal and this book anchors around the great potential this superfood comprises of in terms of health, nutrition and environment sustainability. I hope this book will be useful to the readers to enhance their knowledge about millets, its health benefits and help them understand millets from a holistic perspective.

Shri Rajesh Bhushan, IAS

Secretary (Health and Family Welfare) and Chairperson FSSAI



What are millets?

Millets are group of small grained cereal food crops which are highly tolerant to drought and other extreme weather conditions and are grown with low chemical inputs such as fertilizers and pesticides. Most of the millets are native of India and are popularly known as Nutri-cereals as they provide most of the nutrients required for normal functioning of human body. Millets are gluten-free, highly nutritious and rich in dietary fiber making them easy for the body to absorb. They are also rich in micro-nutrients including Calcium, Iron, Phosphorus, etc. They are low in Glycemic Index (GI) and as such do not cause huge spike in blood sugar. Millets should ideally be an integral part of our daily diet as they impart

substantial health benefits.

Millets are classified into Major Millets and Minor Millets based on their grain size. Pseudo millets are so called because they are not part of the Poaceae botanical family, to which ‘true’ grains belong, however they are nutritionally similar and used in similar ways to ‘true’ grains

Millets are high in nutrition and serve as good source of protein, micronutrients and phytochemicals. Millets contain 7-12% protein, 2-5% fat, 65-75% carbohydrates and 15-20% dietary fibre. The essential amino acid profile of the millet protein is better than that of various cereals, such as maize, rice and wheat. Millets

are very good sources of micronutrients, such as vitamins and minerals.

Millets are a traditional staple food of the dry land regions of the world. They are nutri-cereals which are highly nutritious and are known to have high nutrient content which includes protein, essential fatty acids, dietary fibre, B-Vitamins and minerals, such as calcium, iron, zinc, potassium and magnesium. They help in rendering health benefits like reduction in blood sugar level (diabetes), blood pressure, thyroid, cardiovascular and celiac diseases. However, the direct consumption of millets as food has significantly declined over the past three decades.



Did you know ?

Globally, India is the largest producer of millets accounting for about 41% of the world production in 2020 and 83% of Asia's millet cropping area. India produces around 12 million MT of millets annually, according to Ministry of Agriculture and Farmers Welfare data. In India, millets have been an integral part of tribal food in the states of Odisha, Madhya Pradesh, Jharkhand, Rajasthan, Karnataka, and Uttarakhand.



 **India is the largest producer of millets in the world. Hence the responsibility of making this initiative a success also rests on the shoulders of us Indians.** 

- Shri Narendra Modi
Hon'ble Prime Minister of India



Millets - An integral part of Indian culinary heritage

In India, millets have been mentioned in some of the oldest Vedic scriptures. The Yajurveda texts, identify foxtail millet (priyangava), Barnyard millet (aanava), and black finger millet (shyaamaka), thus indicating that millet consumption was very common, pre-dating to the Indian Bronze Age (4,500BC). Indian Vedic scriptures like Sathapatha Brahmana have ample references to millets. Kalidasa, in his legendary literary masterpiece ‘Shakuntala’ shows sage Kanya pouring foxtail millet while bidding farewell to Shakuntala in Dushanta’s court.

From a staple food and integral part of local food cultures, millets are an important part of the cuisine of many Indian communities especially the tribes of India. Over 50 million people in India, majorly tribal communities consume millets as a significant source of nutrition in their diets, especially during food scarcity. The rural tribal communities of Odisha, Maharashtra, and Madhya Pradesh prominently use sorghum, foxtail millet, little millet and finger millet and are proficient in the preparation of traditional recipes



such as Mandia Sijha Pitha (best described as finger millet steamed dumplings), Kandul Raav, Nachni Sattva and Mandia tampa (best described as finger millet porridge), etc. Dongria kondh community grows native varieties of millets,

tribal of Koraput have an assortment of rustic finger millet recipes which form their daily diet.

The indigenous farmers have recognized and re-asserted the values of millets that was once



central to their staple diet as a perfect adaptation to ensure nutritional security in times of climate distress and sustainable goal of food security. "About 45 traditional varieties of millets were once harvested by the community" as stated by Dongria Kondhs tribal community. Further, the Kutia Kondh tribe of Odisha has rediscovered a palate for the native crop and is now engaged in the cultivation of 12 types of millets while Lahari Bai famously known for being the Millet woman of India, belonging to the Baiga tribe from Dindori district has collected dozens of varieties



of millets over the past decade and now has a seed bank of over 60 varieties of the tiny husky grains; Attapady in Kerela is famously known for its unique "Millet Village. However, despite the decline in consumption, India is the largest producer of millets in the world.

In India, millets are cultivated in an area of 12.45 million hectares, producing 15.53 million tonnes with a yield of 1247 kg/ha. The state of Rajasthan has the highest area under millets cultivation (29.05%) followed by Maharashtra (20.67%), Karnataka (13.46%), Uttar Pradesh (8.06%), Madhya Pradesh (6.11%), Gujarat (3.94%) and Tamil Nadu (3.74%).

Though India cultivates a large variety of millets, bajra contributes to more than 50 percent cultivation of millets in India. Further, it is interesting to note that, India is the topmost producer of Barnyard, Finger, Kodo, Little millet and pearl millet globally.

Initiatives taken by the Government of India to promote millets

The Government of India, in its effort to reinforce the magic of millets into the Indian diets is undertaking dynamic initiatives promoting the consumption and production of millets. The Aadi Mahotsav which was an attempt to showcase and celebrate the spirit of tribals organized by

 
**India is honoured
to be at the forefront
of popularising millets,
whose consumption furthers
nutrition, food security and
welfare of farmers.**

**- Shri Narendra Modi
Hon'ble Prime Minister of India**

Tribal Co-operative Marketing Development Federation of India (TRIFED), the 'Nutrihub' the technology business incubator hosted by ICAR-IIMR and TRIFED is collaborating for the marketing of millets and mainstreaming tribal through livelihood opportunities. Promotion of millet value chain activities in the Van Dhan Vikas Kendras in the tribal belt and scaling up for the national security of the tribal population, these examples vouch for the active efforts of the Indian government in the advocacy of millets in diet especially through the tribal route.



Millets: A sustainable solution with opportunities for all

Millets have been the object of multipronged institutional campaigns aiming to increase urban demand as well as rural production in multiple states of India like Odisha and Karnataka. The state governments promote millets as “Good for you, good for the farmer, and good for the Earth”.

Indian urban demand for millets has increased, especially among the upper-middle class of South Indian cities like Bengaluru, Mysuru, and Chennai. Millet-based recipes are also gaining popularity among Indians. The rise in lifestyle diseases and increased appreciation for everything traditional has resulted in millets being extensively used. Restaurants and shops are increasingly including millets in their menus and shelves and promoting them as smart foods. Traditional recipes are being modified, and new ones are created to make millets appealing to young urban consumers as well.

Various national agricultural research institutions are also seeking to develop high-yielding and hybrid varieties as well as the appropriate

machinery for hulling, grading, and processing of millets into high-value products adapted to new urban consumption patterns and possibly for export markets.

To increase the production and consumption of millets a long-term partnership between governments agencies, local organizations, and farmers is necessary. The popularization of millets is also an effort to achieve the Sustainable Development Goals (SDGs), and in particular: SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 12 (sustainable consumption and production), and SDG 13 (climate action).

With demand for nutri-cereals rising steadily globally, the Department of Commerce, Government of India expects millets exports to increase exponentially in the coming years as Indian exporters find new markets abroad. Currently, India is the fifth largest exporter of millets in the world, according to 2020 data, with exports continuously increasing at around 3% CAGR in the last five years ending with 2020.

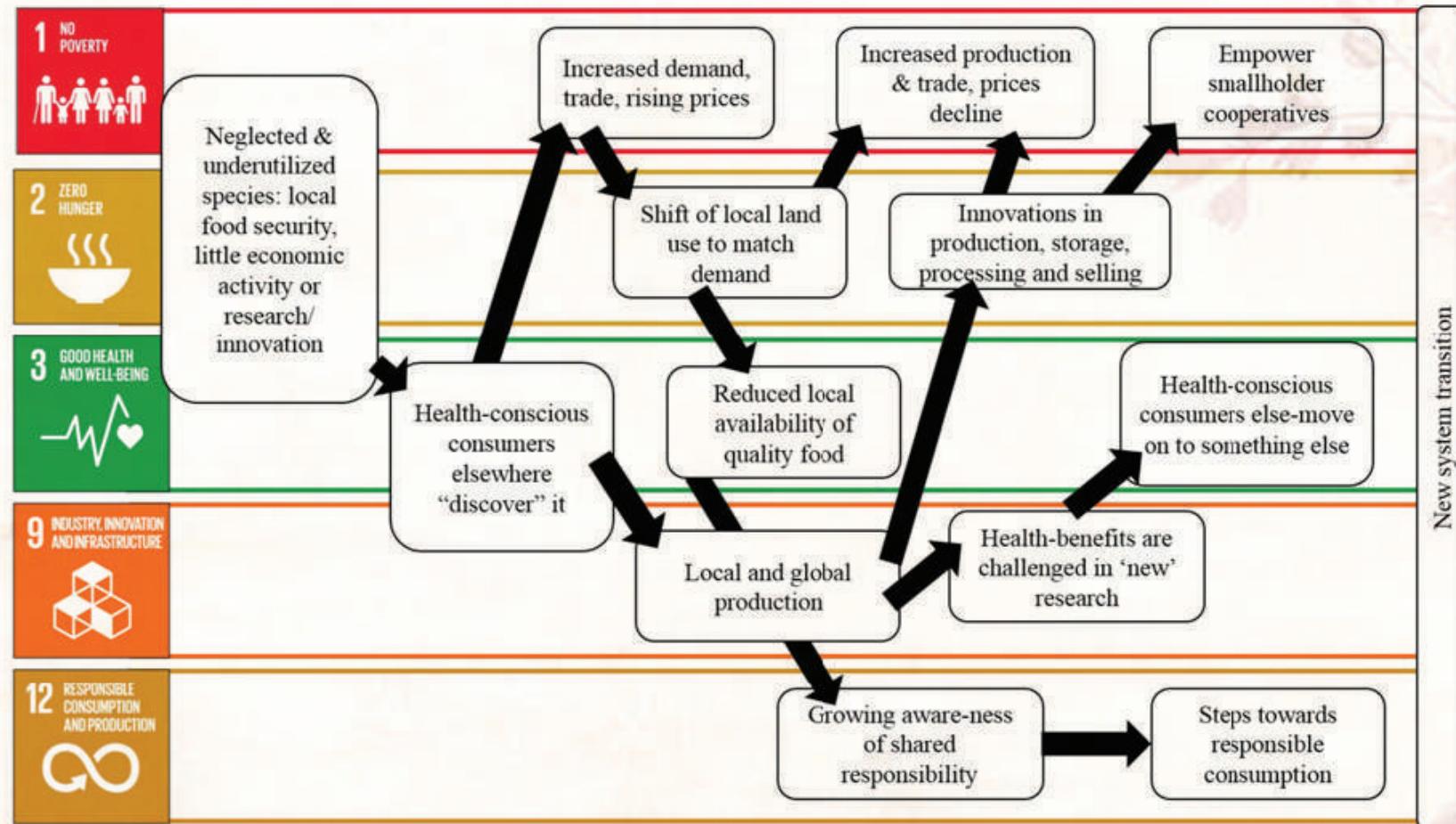
In 2020-21, India exported millets worth USD 26.97 million against USD 28.5 million in 2019-20.

World export of Millet has increased from USD 380 million in 2019 to USD 402.7 million in 2020.

The top three importers of millets from India in 2020-21 were Nepal (USD 6.09 million), UAE (USD 4.84 million) and Saudi Arabia (USD 3.84 million). The other seven destinations in the top-ten list of India's millet export are Libya, Tunisia, Morocco, UK, Yemen, Oman and Algeria.



“We have to reboot ourselves - by switching to Millets”



Sustainability transition framework with inclusion of millets. The five SDGs presented, namely 1,2,3,9 and 12, are the grid of the processes to analyse the transformation over time.



Farmers

The ever-changing climatic conditions have huge impact on agriculture production. Millets are well adapted for low-input agriculture and display vast genetic variability for key mineral elements like iron, zinc, and calcium and have better climate resilience as compared to major cereal crops. Millets can grow in both low and high altitudes and across a wide latitudinal range, on arid lands, under non-irrigated conditions, in very low rainfall regimes, and have a low water footprint. They require less water than rice and wheat. They are very tolerant to heat (up to 64 degrees Celsius), drought and flood and it makes the crop

an obvious choice for farmers in an era of climate change and depleting natural resources.

Consumer

Nutritional characteristics of millet seeds and their derivatives are important to human health. Millets with their high fibre content, gluten-free nature and low glycaemic response, are powerhouse of nutrients and are often referred as ‘nutri-cereals’. From a nutritional point of view, high fibre, protein, vitamin and mineral content in millets can benefit from millets, specifically those with specific health needs, such as celiac disease or gluten intolerance. These Nutri-

Cereals are being recognised for their antioxidant, antihypertensive, immunomodulatory or anti-inflammatory, antibacterial or antimicrobial, hypocholesterolemic, hypoglycemic, and anti-carcinogenic potential, and their role as modulators of gut health .

Environment

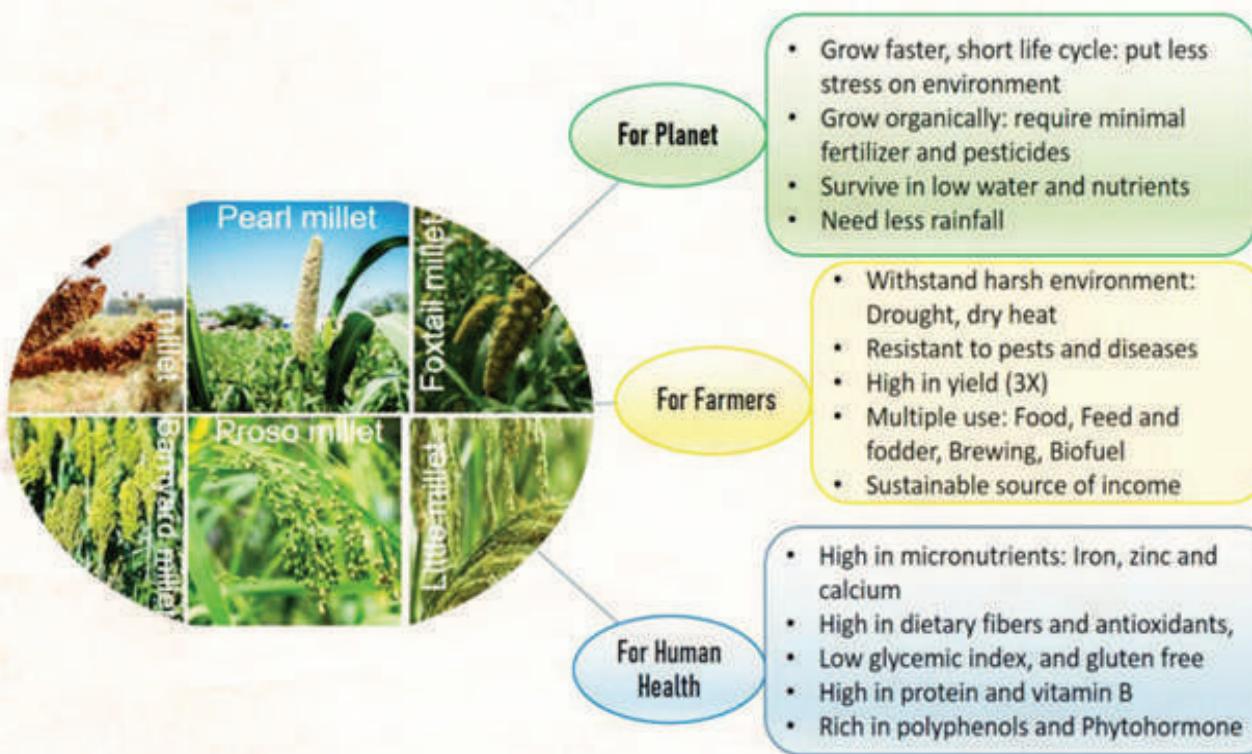
Millets being rain fed crops, do not require standing water in their fields. Therefore, there is no need for big dams, forests going under reservoirs and elaborate canal systems to get water to the farms. Millets do not need any fertility enhancement or pesticides to grow well and yield a good harvest. Further, millets possess several morpho-physiological, molecular and biochemical characteristics which confer better tolerance to environmental stress than major cereals. Primarily, the short life-cycle of millets assists in escaping from stress as they require 12–14 weeks to complete their life-cycle (seed to seed) whereas rice and wheat requires a maximum of 20–24 weeks. However, the prevalence of stress conditions and their consequences are circumvented by several traits, such as short stature, small leaf area, thickened cell walls, and the capability to form dense root system. Thus, millets are the ideal solution for the next generation for “Climate-Smart Agriculture”.



**Millets are good for
the consumer,
cultivator and climate.**

**- Shri Narendra Modi
Hon'ble Prime Minister of India**





*Unique properties of millets for climate smart agriculture,
ensuring human health, food and nutritional security*

Entrepreneurs

Millets are taking their position on the plate and becoming part of the diet of health-conscious people, not by force but by choice. The demand for millets-based products is increasing especially in the urban areas and thus creating ample opportunities for start-ups entrepreneurs. There is a huge opportunity in various sectors, such as millet seeds, millet primary processing units for millets, millet value addition processes, millet aggregators, packaging, bakery industry, hotel industry, organisations, farmer producer organisations, and e-commerce to channel value-added products name a few.



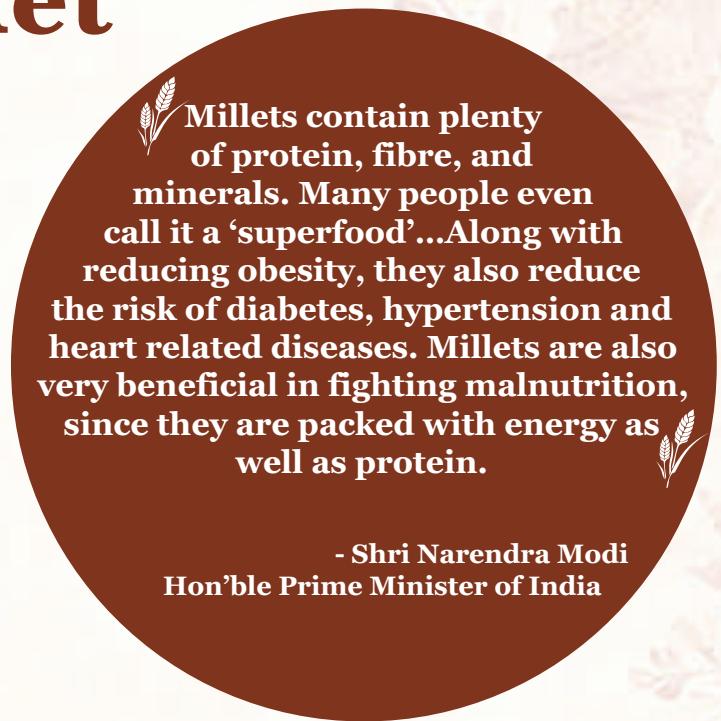
General benefits of millet

Millets are highly adaptive to a wide range of ecological conditions and thrive well in rain-fed; arid climate and have minimal requirement of water, fertilizers, and pesticides.

- Millets have many nutritional, nutraceutical and health promoting properties such as high fiber content besides being source of minerals like iron, zinc, and calcium.
- Millets have a low Glycemic Index (GI) and some of the millets are associated with the prevention of diabetes.
- Millets are gluten-free and can be consumed by patients suffering from celiac disease.
- Niacin in millets can help lower cholesterol.

Millet has a beneficial effect on the management and prevention of hyperlipidemia and may reduce risk of Cardio Vascular Diseases.

- Millets are found to be helpful with the reduction of weight, BMI, and high blood pressure.
- In India, Millets are generally consumed with legumes, which balances mutual supplementation of protein, increases the amino acid content, and enhances the overall digestibility of protein.
- All millets show high antioxidant activity.
- Millet cultivation helps to reduce the carbon footprint.



How much millet can one consume per day?

According to ICMR-National Institute of Nutrition, the quantity of millet should be around 33% of the total cereal consumption during the day. For example, for a reference man with sedentary activity 275 g of cereals is recommended including NutriCereals(Millets). So, if a person is consuming millets, then he can consume about 1/3rd or 33% (90-100gm of millets per day) of the recommended quantity.

Side effects of millets only occur if they are consumed excessively. A balanced diet can help in lowering these adverse effects. Furthermore, if millet is soaked overnight, rinsed, and then cooked, the anti-nutrient content can be decreased.



How to include millets in our diet?

Millets can be used in preparing a variety of dishes. Cereals can be replaced with millets for any preparation like roti, dosas, cheela, cookies, cakes, porridges, upma, biscuits, idli, pancakes, tikki, salad, ladoo, pulao, payasam, breads etc. In addition, the proportion of essential amino acids in millets and legumes complement each other. So, combination of millets and legumes provide a better quality of complete protein. It is recommended to add legumes (Pulses) to millets in the ratio of 3:1(Millets: Pulses) for having an optimum balance of essential amino acids.



Types of millets

The major millets include Sorghum (jowar) and Pearl Millet (bajra). The Finger Millet (ragi/mandua), Foxtail Millet (kangni/Italian millet), Little Millet (kutki), Kodo Millet, Barnyard Millet (sawan/jhangora), Proso Millet (cheena/common millet), and Brown Top Millet (korale) are categorized under minor millets.

 **Raising awareness to create 'Millet Mindfulness' is an important part of this movement. Both institutions and individuals can make a tremendous impact.** 

- Shri Narendra Modi
Hon'ble Prime Minister of India



Pearl Millet

(*Pennisetum glaucum*)

Common name: Bajra

Vernacular names: Spiked millet or Pearl millet (English), Bajra (Bengali, Hindi, Oriya, Punjabi, Urdu), Bajree (Rajasthani, Gujarati, Marathi), Sajje (Kannada), Kambu (Tamil), Sajja (Telugu)

It is the sixth major cereal in terms of area and production and has the highest drought tolerance

potential among all millets. Pearl millet is the most widely cultivated cereal in India after rice and wheat.

Health benefits:

- Reduces cholesterol
- Promotes bone health
- Beneficial in treating stomach ulcers
- Improves blood lipid levels as it has highest niacin levels amongst all cereals and promotes heart health

- Aids in weight loss as it is high in dietary fibre.

Products: Khichdi, Roti, Upma, Idli, Khakhra, Parathas

Cultivation areas: Rajasthan, Maharashtra, Gujarat, Uttar Pradesh and Haryana

Nutritional Value (per 100 gm)

Energy	347 Kcal
Protein	10.9 g
Fat	5.43 g
Carbohydrates	61.8
Calcium	27.4 mg
Fiber	6.4 mg
Folic Acid	36.1 µg



Sorghum

(*Sorghum bicolor*)

Common name: Jowar (Hindi), Great millet

Vernacular names: Jwari (Marathi), Juar (Bengali, Gujarati), Jola (Kannada), Cholam (Malayalam, Tamil), Janha (Oriya), Jonnalu (Telugu), other names: Milo, Char

Sorghum is a traditional staple food of the dry land regions of the world, a warm season crop intolerant to low temperatures, resistant to pests/diseases and is highly nutritious. It ranks fifth in terms of cereals produced world-wide and fourth largest produced millet in India.

Health Benefits:

- Helps in enhancing bowel movement due to presence of prolamin.
- Anti-inflammatory & anti-carcinogenic properties due to high riboflavin content.
- Helps in improving blood circulation as it is rich in folic acid.
- Aids in cell regeneration

Products: Dosa, Upma, Roti, Cookies, Rice, Salads

Cultivation: Maharashtra, Karnataka and Tamil Nadu



Nutritional Value (per 100 gm)

Energy	334 Kcal
Protein	9.9 g
Fat	1.73 g
Carbohydrates	67.7 g
Calcium	27.6 mg
Fiber	3.9 mg
Folic Acid	39.4 µg



Little Millet

(*Panicum sumatrense*)

Common name: Kutki

Vernacular names: Kutki, Shavan (Hindi), Sava, Kutki (Marathi), Same, Save (Kannada), Samalu (Telugu), Samai (Tamil), Sama (Bengali), Gajro, Kuri (Gujarati), Suan (Oriya), Swank (Punjabi)

Little millet is grown throughout India and is considered as one of the traditional crops. It is mostly grown as mix crop with other millets, pulses and oilseeds. Little millet appears to be

related to Proso Millet but the plant is generally shorter in stature, has smaller panicles and seeds, and is grown on a limited scale voluntarily or with minimum care on poor lands. Little millet matures quickly and withstands both drought and water logging. It is generally consumed as rice and any recipe that demands staple rice can be prepared using little millet.

Health Benefits:

- Rich in antioxidants along with high iron content
- Helps in decreasing blood cholesterol levels

- Helps in regulating blood sugar levels
- Improves respiratory ailments

Products: Curd Rice, Payasam, Pulao, Upma

Cultivation areas: Madhya Pradesh, Odisha, Jharkhand, and Uttar Pradesh.

Nutritional Value (per 100 gm)

Energy	346 Kcal
Protein	10.1 g
Fat	5.89 g
Carbohydrates	65.5 g
Calcium	16.1 mg
Fiber	1.2 mg
Folic Acid	36.2 µg

Proso Millet

(Panicum miliaceum)

**Common name: Chena, Common Millet,
Brown-corn millet**

Vernacular names: hena, Barri (Hindi), Vari (Marathi), Baragu (Kannada), Variga (Telugu), Pani Varagu (Tamil), Cheena (Bengali), Cheno (Gujrati), Bacharibagmu (Oriya), Cheena (Punjabi)

Proso millet is a short season crop that grows in low rainfall areas. This millet can be cultivated

along with red gram, maize and sorghum. Proso millet is well suited for many soil types and climate conditions. Proso millet is highly drought-resistant, which makes it of interest to regions with low water availability and longer periods without rain.

Health Benefits:

- Helps in bone growth, strengthening and maintenance as it has high calcium content
- Helps in smooth functioning of nervous system

- Good for skin
- Lowers the risk of heart diseases by reducing cholesterol levels

Products: Idli, Khaja, Burfi, Samosa

Cultivation areas: Northern states of India

Nutritional Value (per 100 gm)

Energy	341 Kcal
Protein	12.5 g
Fat	2.55 g
Carbohydrates	70.4 g
Calcium	14 mg
Fiber	0.2 mg
Folic Acid	0.00 µg



Amaranth

(*Amaranthus cruentus*)

Common name: Rajgira

Vernacular names: Hena, Barri (Hindi), Vari (Marathi), Baragu (Kannada), Variga (Telugu), Pani Varagu (Tamil), Cheena (Bengali), Cheno

(Gujrati), Bacharibagmu (Oriya), Cheena (Punjabi)

Amaranth is one of the ancient groups of plants and has great potential for combating under-nutrition and malnutrition. Amaranth is an edible plant adaptable to tropical and subtropical climate;

its culture possesses valuable characteristics, such as fast growth and cultivation under water deficit conditions. Amaranth leaves and grain have good nutritional value.

Health Benefits:

- Helps in decreasing blood cholesterol levels
- Helps in stimulating the immune system
- Helps in reducing risk of osteoporosis
- Helps in reducing anemia
- Has anti allergic and antioxidant properties
- Has high content of proteins and an excellent amino acid balance

Products: Roti, Tikkis, Salads, Cupcakes, Cookies, Chikki and Laddoo

Cultivation areas: Kerala, Tamil Nadu, Karnataka, and Maharashtra

Nutritional Value (per 100 gm)

Energy	356 Kcal
Protein	13.3 g
Fat	5.6 g
Carbohydrates	61 g
Calcium	162 mg
Fiber	8 mg
Folic Acid	24.7 µg



Kodo Millet

(*Paspalum scrobiculatum*)

Common name: Kodo

Vernacular names: Kodon (Hindi), Kodra (Marathi), Harka (Kannada), Arikelu, Arika (Telugu), Varagu (Tamil), Kodo (Bengali), Kodra (Gujrati), Kodua (Oriya), Kodra (Punjabi)

Kodo millet was domesticated in India almost 3000 years ago. It is known to be extremely hardy, drought resistant and grows on stony or gravelly soils which do not support other crops. It is relatively long in duration requiring four to six months to mature compared with two to four months for the other millets. Short duration varieties have now been developed. It is an annual tufted grass that grows up to 90 cm high. The grain may vary in colour from light red to dark grey. It has the highest dietary fiber among all the millets.

Health Benefits:

- Contains high dietary fibre and prevents constipation
- Strengthens nervous system as it consists of lecithin
- Helps in blood sugar control as it has high niacin content

- Beneficial for postmenopausal women suffering from any metabolic diseases

Products: Chapati, Idli, Porridge, Cheela, Khichdi, Dal & Pulao

Cultivation areas: Odisha, Madhya Pradesh, Karnataka, Tamil Nadu



Nutritional Value (per 100 gm)

Energy	331 Kcal
Protein	8.9 g
Fat	2.55 g
Carbohydrates	66.2 g
Calcium	15.3 mg
Fiber	2.3 mg
Folic Acid	39.5 µg



Finger Millet

(*Eleusine coracana*)

Common name: Ragi

Vernacular names: Ragi, Mandika, Marwah, Mandua (Hindi), Nagli, Nachni (Marathi), Ragi (Kannada), Ragulu, Chodi (Telugu), Keppai, Kelvaragu (Tamil), Marwa (Bengali), Nagli, Bavto (Gujrati), Mandia (Oriya), Mandhuka, Mandhal (Punjabi)

It is an important primary food especially for the rural populations of Southern India and East & Central Africa. Finger millet or ragi can be grown under wide range of adaptation that is from sea level to hilly regions of Himalayas but thrives best under well drained, loamy type of soils. About 60% of finger millet is produced by the state of Karnataka which account for about 34% of global production. Finger millet is a dwarf, highly tillering plant with characteristic finger like terminal inflorescences. The height of a mature plant ranges from 30-150 cm and the seeds are very small like mustard and are light brown, or dark brown or white in colour.

Health Benefits:

- Reduce blood glucose levels
- Anti microbial properties
- Promotes bone health at it contains high amount of calcium
- Revive skin and hair health



Nutritional Value (per 100 gm)

Energy	320 Kcal
Protein	7.2 g
Fat	1.92 g
Carbohydrates	66.8 g
Calcium	364 mg
Fiber	4.6 mg
Folic Acid	34.7 µg

Barnyard Millet
(Echinochloa frumentacea)
Common name: Sawan

Vernacular names: Sanwa, Jhangora (Hindi), Bhagar (Marathi), Oodalu (Kannada), Udhalu, Kodisama (Telugu), Kuthiraivali (Tamil), Shyama (Bengali), Khira (Oriya), Swank (Punjabi)

It is predominantly cultivated in India, China, Japan, and Korea for food as well as fodder. Japanese and Indian species of this millet are vigorous and have a wide adaptation in terms of soil and moisture requirements. They grow well in different seasons and at higher elevations, but require three to four months for maturation. It

is cultivated on marginal lands where rice and other crops will not grow well. Barnyard millet is an erect plant 60-130 cm tall and are brownish to purple.

Health Benefits:

- Rich source of fiber - both soluble and insoluble and prevents constipation
- Anti mutagenic, anti inflammatory & antioxidant properties
- Prevents high blood pressure

- Helps in controlling blood glucose levels and lipid levels due to presence of gamma amino butyric acid (GABA) and beta-glucan

Products: Porridges, Dosas, Idlis, Upma, Chapatis, Khichdi, cutlets, Payasam & Pulao

Cultivation areas: Uttarakhand, Tamil Nadu, Andhra Pradesh, and Karnataka.

Nutritional Value (per 100 gm)

Energy	307 Kcal
Protein	11.2 g
Fat	2.2 g
Carbohydrates	65.5 g
Calcium	11 mg
Fiber	15.2mg
Folic Acid	0.00 µg



Foxtail Millet

(*Setaria italica*)

Common name: Kakun

Vernacular names: Kangni, Kakum (Hindi), Kang, Rala (Marathi), Navane (Kannada), Korra (Telugu), Keppai, Thenai (Tamil), Kaon (Bengali), Kang (Gujrati), Kanghu, Kangam, Kora (Oriya), Kangani (Punjabi)

Foxtail millet is one of the oldest cultivated millets. It is the third largest crop among the millets, cultivated for food in semi-arid tropics of Asia and as forage in Europe, North America, Australia, and North Africa. Foxtail or Italian millet may well have unrealized potential for grain production. It forms a slender, erect, leafy stem varying in height from 1-5 feet. Seeds are borne in a spike-like, compressed panicle resembling yellow foxtail, green foxtail, or giant foxtail. The grains are very similar to paddy rice in grain structure. They contain an outer husk, which needs to be removed in order to be used and matures in 65-70 days. Three to four decades ago, foxtail millet was consumed as the staple food. It has double quantity of protein content compared to rice.

Health Benefits:

- Helps in functioning of the nervous system
- Helps in maintaining bone and muscle health
- Good for cardiac health
- Good for skin and hair growth
- Improves immunity as it has high copper content

Products: Dosas, Cheelas, Chapatis, Breads, Kheer/Pudding & Pancakes

Cultivation: Meghalaya, Karnataka, Andhra Pradesh, Telangana and Rajasthan



Teff Millet

(*Eragrostis tef*)

Common Name:Abyssinian lovegrass

The cultivation of this cereal confined largely to the highlands of Ethiopia and Eritrea (mostly cultivated at up to 2700 meters above mean sea level) . Teff is more like a grass, can be grown under a wide range of conditions, including situations not suitable for other cereals. Teff also thrives in both water logged soils and during droughts. It bears very tiny seeds which are highly nutritious, especially in protein content. This crop needs minimum tillage to cultivate, though productivity is less. A handful of teff is enough to sow a typical field, and it cooks quickly, using less fuel than other foods.

Health Benefits:

- Excellent source of amino acids, especially lysine which is deficient in cereals.
- Rich in fiber and iron.
- Helps in absorption of calcium
- It has high polyphenols which is suitable to aid people with celiac disease

Preparation/Products: Roti, Pasta, Bread and Cookies

Cultivation: Karnataka

Nutritional Value (per 100 gm)

Energy	367 Kcal
Protein	13.3 g
Fat	2.38 g
Carbohydrates	7.13 g
Calcium	180 mg
Fiber	7.63 mg
Folic Acid	0.00 µg



Brown Top Millet

(Panicum ramosae)

Common name: Dixie signalgrass

Vernacular names: Korale (Kannada),
Andukorralu (Telugu)

A native millet of India, has relatively limited cultivation in parts of Karnataka and Andhra Pradesh, though its occurrence as a weed is noted in all states of India. It can be grown even in less fertile sandy loam soils and matures in 60-80 days and is the most inexpensive crop to grow and does not need weeding and has no serious pests and diseases.

Health Benefits:

- Promotes digestion as it is a good source for fibre.
- Helps in maintaining blood glucose level.
- Helps in strengthening of bones and muscles.
- Helps optimizing heart health and lowering the risk of developing cardiovascular disease
- Helps in maintaining immune system as it has high zinc content

Products: Dosa, Upma, Idli, Lemon Rice.

Cultivation: Karnataka and Andhra Pradesh



Buckwheat *(Fagopyrum esculentum)*

Common name: Kuttu

Buckwheat can grow on infertile, poorly drained soil and is relatively well suited for rough land. Globally, buckwheat is a minor crop and is often planted as a crop cover in order to protect soil from erosion between planting seasons. Its short growth period offers the flexibility of planting

late in the season, and its deep root system helps prevent erosion. Buckwheat further benefits a farmer's field by smothering weeds and attracting beneficial insects.

Health Benefits:

- Aids in weight loss.
- Helps in lowering blood pressure and improving cardiovascular health as it is a good source of lysine and polyphenols

- Having low glycemic index helps in improving bloodsugar control.

Products: Khichdi, Chapatis, Dosas, puri, Laddoo, Sandwich, Halwa, Cutlets & Cheela

Cultivation: Jammu & Kashmir, Uttarakhand, Himachal Pradesh and Chhattisgarh

Nutritional Value (per 100 gm)

Energy	343 Kcal
Protein	13.3 g
Fat	3.4 g
Carbohydrates	71.5 g
Calcium	18 mg
Fiber	2.2 mg
Folic Acid	0.00 µg





FSSAI STANDARDS FOR MILLETS



Need for common Standards for millets

Ministry of Agriculture and Farmers Welfare vide notification dated 10.04.2018 identified Sorghum(Jowar), Pearl Millet(Bajra), Finger Millet (Ragi/Mandua), Minor Millets i.e Foxtail Millet (Kangani/Kakun), Proso Millet (Cheena), Kodo Millet (Kodo), Barnyard Millet (Sawa/ Sanwa/Jhandora), Little Mileet (Kutki) and

two Pseudo Millets (Black-wheat (Kuttu) and Ameranthus (Chaulai) as “Nutri-Cereals” for production, consumption and trade.

Food Safety and Standards Authority of India took the initiative to have standards for all the identified millets and formulated the following

standards under the Food Safety and Standards (Food Product Standards and Food Additives) Regulations, Second Amendment 2023 vide notification no. CG-DL-E-23022023-243823 dated 21 February, 2023, which will become operational with effect from 01 September, 2023.



These standards apply to the whole or dehulled millets, which shall be free from poisonous, toxic, noxious, or obnoxious seeds and added coloring matter, rodent hair and excreta.

(1) The following millets shall be covered under this standard, namely: -

- (i) Amaranthus (Chaulai or Rajgira)- *Amaranthus caudatus, A. cruentus, A. Hypochondriacus*
- (ii) Barnyard Millet (Samakechawal or Sanwa or Jhangora)- *Echinochloa crus-galli, E. Colona*
- (iii) Brown top (Korale)- *Urochloa aramosa*
- (iv) Buckwheat (Kuttu)- *Fagopyrum esculentum*
- (v) Crab finger (Sikiya)- *Digitaria sanguinalis*
- (vi) Finger Millet (Ragi or Mandua)- *Eleusine coracana*
- (vii) Fonio (Acha)-*Digitaria exilis*(White fonio)-*D. iburua*(Black fonio)
- (viii) Foxtail Millet (Kangni or Kakun)-*Setaria italica*
- (ix) Job's tears (Adlay) – *Coix lacryma-jobi*
- (x) Kodo Millet (Kodo)- *Paspalum scrobiculatum*
- (xi) Little Millet (Kutki)- *Panicum sumatrense*
- (xii) Pearl Millet (Bajra)- *Pennisetum glaucum, Pennisetum americanum, Pennisetum typhoideum*
- (xiii) Proso Millet (Cheena)- *Panicum miliaceum*
- (xiv) Sorghum (Jowar)- *Sorghum bicolor*
- (xv) Teff (Lovegrass)- *Eragrostis tef*

(2) The raw and dehulled millets shall conform to the following standards, namely: -

S. No.	Parameter	Limit
(1)	(2)	(3)
1.	Moisture Content (not more than, % by mass)	13.0 for whole grains 13.0 for dehulled grains
2.	Extraneous Matter	Not more than 1.0 per cent by mass , of which not more than 0.25 per cent by mass shall be mineral matter and not more than 0.10 per cent by mass shall be impurities of animal origin.
3.	Other edible grains (not more than, % by mass)	2.0

S. No.	Parameter	Limit
4.	Grains with serious defects. (Grain in which the cotyledon has been affected or attacked by pests; grains with very slight traces of mould or decay; or cotyledon staining.) (not more than, % by mass)	1.0
5.	Grains with slight defects. (Grains which have not reached normal development; grains with extensive seed coat staining, without the cotyledon being affected; grains in which the seed coat is wrinkled, with pronounced folding or broken grain) (not more than, % by mass)	7.0
6.	Weevilled Grains, (not more than, % by count)	4
7.	Immature and Shrivelled grains (not more than, % by mass)	5.0
8.	Uric acid (not more than, mg/kg)	100

4. Contaminants, Toxins and Residues. -

The product shall comply with the limits of pesticides, heavy metals, aflatoxins as stipulated under the Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011.

5. Hygiene-

The product shall be prepared and handled in accordance with the requirements specified in Schedule 4, as applicable, of the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 and such other guidelines as specified from time to time under the provisions of the Food Safety and Standard Act, 2006.

6. Labelling. -

The product shall be labelled as per Food Safety and Standards (Labelling and Display) Regulations, 2020.

7. Method of Sampling and Analysis. -

The methods of sampling and analysis mentioned in the manuals as specified by the Food Safety and Standards Authority of India from time to time shall be applicable.



Millet flours

Bajra Flour (Pearl Millet Flour).

1. "Bajra flour (pearl millet flour)" means the product obtained from pearl millet grains (*Pennisetum americanum* L., *Pennisetum typhoideum*, *Pennisetum glaucum*) through a process of milling.
2. It shall be free from abnormal flavours, odours, living insects, filth (impurities of animal origin including dead insects).
3. It shall conform to the following requirements, namely:-

S. N.	Requirements	Limits
1	Moisture (% by mass), not more than	13.0
2	Acid Insoluble Ash, % on dry mass basis, not more than	0.15
3	Protein ($N \times 6.25$) (percent on dry mass basis), not less than	8.0
4	Fat (% on dry mass basis), not more than	7.0
5	Crude Fibre (percent on dry mass basis), not more than	2.5
6	Alcoholic acidity (with 90 per cent. alcohol) expressed as H ₂ SO ₄ , % on dry mass basis, not more than	0.25
7	Particle Size*	shall pass through 1mm sieve (18 mesh)
8	Uric acid (not more than), mg/kg	100



*The parameter 'Particle size' will not be applicable for intermediate products which are not meant for direct consumption.

Jowar Flour (Sorghum Flour).

1. Jowar Flour (Sorghum Flour) means the product obtained from grains of Sorghum bicolor (L.) moench through a process of milling.
2. It shall be free from abnormal flavours, odours, living insects, filth (impurities of animal origin including dead insects).
3. It shall conform to the following requirements, namely: -

S. N.	Requirements	Limits
1	Moisture (% by mass), not more than	12.0
2	Acid Insoluble Ash, % by mass (on dry basis), not more than	0.15
3	Protein ($N \times 6.25$), % on dry mass basis, not less than	8.5
4	Crude fat, % on dry mass basis, not more than	4.7
5	Alcoholic acidity (with 90 percent alcohol) expressed as H ₂ SO ₄ , % on dry mass basis, not more than	0.18
6	Particle size*	Minimum 80 per cent shall pass through a 1 mm sieve (18 mesh)
7	Uric acid (Not more than), mg/kg	100

*The parameter 'Particle size' will not be applicable for intermediate products which are not meant for direct consumption.



Ragi Flour

- (1) Ragi flour is the product obtained from dried mature grains of Eleusinecoracana L. Gaertn. through a process of milling, which shall be free from added colouring matter, flavouring substances, moulds, weevils, obnoxious substances, discolouration, and all other impurities except to the extent indicated below and shall also be free from rodent hair and excreta.
- (2) It shall conform to the following standards, namely:-

S.N.	Requirements	Limits
(i)	Moisture, per cent. by mass, not more than	10.0
(ii)	Crude fiber, per cent. by dry mass basis, not more than	4.5
(iii)	Crude protein, per cent. on dry mass basis (NX6.25), not less than	7.0
(iv)	Acid insoluble ash, per cent. on dry mass basis, not more than	0.15
(v)	Particle Size*	Shall pass through a 1mm sieve (18 mesh)
(vi)	Uric acid (mg per kg), maximum	100

*The parameter “Particle size” shall not be applicable for intermediate products which are not meant for direct consumption.



Mixed Millet Flour

Mixed millet flour means the product obtained by milling / grinding blend of clean millets/pseudomillets or by blending flour obtained from clean millets. The product shall be free from abnormal flavours, odours, living insects, visible mould and filth (impurities of animal origins, including dead insects).

Note:- Millets/pseudomillets are Sorghum/ Jowar (*Sorghum bicolor*), Pearl Millet / Bajra (*Pennisetum glaucum*), Finger Millet/ Ragi/Mandua (*Eleusine coracana*), Foxtail Millet/Kanngani/ kakun (*Setaria italica*), Proso Millet/ Cheena (*Panicum milliaceum*), Kodo Millet/ Kodo (*Paspalum scrobiculatum*), Barnyard Millet/ Sawa/Sanwa/Jhangora (*Echinochola crus-galli*), Little Millet/ Kutki (*Panicum sumatrense*), Brown top millet (*Brachiariaramosa*) and pseudo-millets are Buckwheat / Kuttu (*Fagopyrum esculentum*), Amaranth/ Chaulai (*Amaranthus cruentus*).

It shall conform to the following standards, namely:

S. N.	Parameters	Limits
1.	Moisture, % by mass, Not more than	11.0
2.	Acid Insoluble Ash on dry basis, % by mass, Not more than	0.15
3.	Protein (N x 6.25), % by mass (on dry basis), Not less than	8.0
4.	Alcoholic acidity, % by mass (on dry basis), Not more than	0.18
5.	Total Dietary fiber, % by mass (on dry basis), Not less than	12.0
6.	Particle size, Not less than	98% should pass through 40 mesh
7.	Uric acid, mg/kg, Not more than	100







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