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MILLETS

Reviving Health and Heritage: Shri Anna

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MILLETS

Reviving Health and Heritage: Shri Anna

According to UN's Food and Agriculture Organization "Millet is a collective term referring to a number of small-seeded annual grasses that are cultivated as grain crops, primarily on marginal lands in dry areas in temperate, subtropical and tropical regions." Examples of millets are Finger millets, Sorghum etc.

CLASSIFICATION OF MILLETS

MAJOR MILLETS AND MINOR MILLETS

The "major millets" and "minor millets" are often used to differentiate between two groups of millets based on their importance in terms of cultivation, consumption, and economic significance. Major millets consist of Sorghum (Jowar), Pearl millet (Bajra), Finger millet (Ragi) while Minor millets includes Foxtail millet (Kakum), Kodo millet (Kodon), Barnyard millet (Sanwa), Little millet (Kutki/Shavan), Proso millet (Chenna/Barri).

ORIGIN OF MILLETS

Millets as a food is not a new concept but it is forgotten one. Millets have been an integral part of our diet for centuries. The origin of millets dates back to several thousand years ago which is mainly associated with African and Asian region. In India we get reference of millets in Rig Veda, giving idea about the presence in context to Indian culture (Table 1).

S. No.	Millet English Name	Vernacular Name	Region of Origin
1.	Sorghum	Jowar	African Savannahs
2.	Finger millet	Ragi	East African highlands
3.	Kodo millet	Kodo	India
4.	Pearl millet	Bajra	West African Savannah
5.	Foxtail millet	Kangani	South India
7.	Proso millet	Cheena	China
8.	Barnyard millet	Sanwa	Japan

Source: The Story of Millets: Millets were the first crops, Millets are the future crops https://www.millets.res.in/pub/2018/The_Story_of_Millets.pdf

IMPORTANCE OF MILLETS

Owing to its importance Government of India has named Millets i.e., coarse grains as Shree Anna. Some of the properties of Millets are as follows:

Food Security

With the growing population around the world there is also need for increasing food production but this task of more production is challenged by extreme climate events posing threat on food security. To promote food security in the light of extreme weather events the focus has been shift on the plantation of climate resilient crops the most popular being the millets are resistant to environmental stress.

In the countries like India which are agriculture-based economy and where majority of farmers are small-scale or marginal farmers. These farmers heavily rely on rainfall for the crop irrigation. In addition to this, a number of other climatological variables, including the temperature, wind, and daily sunshine, have an impact on agricultural productivity. These all factors sometime are part of extreme weather events affecting food production due to crop failure or under production. Therefore, majority of millets which can withstand extreme weather events like drought, heat etc are sturdy and climate resilient decreases chances of crop failure.

Health

The millets are nutrient-rich seeded grasses that serve as a significant source of food and fodder for millions of resource-strapped farmers and are essential to the ecological and economic stability of an area. The terms "coarse cereals" and "cereals of the poor" are other names for these millets. Because millets are high in protein, vitamins, and minerals, they are

Table 2: Nutrient Content of the Millets

	Protein	Total Fat	Total Fibre	Carbohy-drates(g)	Energy (KJ)	Alumi-nium	Arsenic	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Lithium
Pearl Millet	10.96 ± 0.26	5.43 ± 0.64	11.49 ± 0.62	61.78 ± 0.85	1456 ± 18	2.21 ± 0.78	0.97 ± 0.24	0.003 ± 0.001	27.35 ± 2.16	0.25 ± 0.006	0.030 ± 0.015	0.54 ± 0.11	6.42 ± 1.04	0.008 ± 0.002	0.003 ± 0.001
Sorghum	09.97 ± 0.43	1.73 ± 0.31	10.22 ± 0.49	67.68 ± 1.03	1398 ± 13	2.56 ± 0.59	1.53 ± 0.04	0.002 ± 0.002	27.60 ± 3.71	0.010 ± 0.003	0.012 ± 0.007	0.45 ± 0.11	3.95 ± 0.94	0.008 ± 0.003	0.001 ± 0.001
Finger Millet	07.16 ± 0.63	1.92 ± 0.14	11.18 ± 1.14	66.82 ± 0.73	**1342 ± 10**	3.64 ± 0.69	_	0.004 ± 0.004	**364 ± 58**	0.032 ± 0.019	0.022 ± 0.009	0.67 ± 0.22	4.62 ± 0.36	0.005 ± 0.002	0.003 ± 0.003
Little Millet	08.92 ± 1.09	2.55 ± 0.13	06.39 ± 0.60	65.55 ± 1.29	1449 ± 10	_	0.49 ± 0.15	0.001 ± 0.000	16.06 ± 154	0.016 ± 0.006	0.001 ± 0.00	0.34 ± 0.08	1.26 ± 0.44	_	_
Kodo Millet	08.92 ± 1.09	2.55 ± 0.13	06.39 ± 0.60	66.19 ± 1.19	**1388 ± 10**	1.07 ± 0.83	_	_	15.27 ± 1.28	0.021 ± 0.027	0.005 ± 0.003	0.26 ± 0.05	2.34 ± 0.46	_	0.027 ± 0.003
Foxtail	12.30	4.30	_	60.09	331	_	_	_	_	0.030	_	1.40	_	_	_
Barnyard Millet	06.20	2.20	_	65.55	307	_	_	_	_	0.090	_	0.60	_	_	_
Proso Millet	12.50	1.10	_	70.04	341	_	_	_	_	0.020	_	1.60	_	_	_

Source: *Indian Food Composition Tables, NIN – 2017 and *Nutritive value of Indian foods, NIN – 2007*

nutritionally superior to wheat and rice. They are also glycaemic index-low and gluten-free, making them perfect for anyone with diabetes or celiac disease. Therefore, throughout the world they are being promoted as alternate to regular cereals to deal with lifestyle based common diseases such as diabetes, heart diseases etc.

- **High in Nutrients:** Millets are a rich source of vitamins, minerals, and other essential nutrients, such as fibre, protein, and antioxidants (Table 2). These nutrients help to improve overall health, boost the immune system, and reduce the risk of chronic diseases.
- **Help in Weight Loss:** Millets are low in calories and high in fibre, which helps to keep you feeling full for longer periods. This can lead to a reduction in overall calorie intake, aiding in weight loss and weight management.
- **Lowers Blood Sugar:** Millets have a low glycaemic index, which means they do not cause a rapid increase in blood sugar levels. This is beneficial for individuals with diabetes or at risk of developing the condition.
- **Reduces Cholesterol Levels:** Millets contain soluble fibre, which can help to reduce cholesterol levels in the blood. This, in turn, can reduce the risk of heart disease.
- **Gluten-Free:** Millets are naturally gluten-free, making them an excellent option for individuals with celiac disease or gluten intolerance.
- **Promotes Digestive Health:** The high fibre content in millets promotes regular bowel movements, which can help to prevent constipation and other digestive issues.
- **Boosts Immune System:** Millets contain several vitamins and minerals, such as iron, zinc, and vitamin C, which are essential for maintaining a healthy immune system.

Overall, including millets in diet can have numerous health benefits and is an excellent way to add variety to one's meals.

Environment

The millets are not only health friendly but also environment friendly food grains some of the benefits are the following

1. Less prone to diseases therefore less use of insecticides, pesticides and fungicides
2. Requirement of less chemical fertilizers
3. These crops require less water and withstand less rain fall
4. These crops require less energy during their processing
5. Millets play a crucial role in enhancing soil health by promoting better water retention, reducing soil erosion, and fostering nutrient cycling. Their deep root systems and efficient resource use contribute to improved soil structure and fertility.

Cultural

In India, millets have deep-rooted cultural significance that spans generations. These ancient grains are integral to traditional diets and rituals, reflecting the diverse cultural tapestry of the country. Millets are not only cherished for their nutritional value but also hold symbolic importance in religious rituals, festivals, and social gatherings. During religious fasts the millets are consumed by the people. In many parts of country

during local festivals the millets are offered to the deities as an offering. The cultural importance of millets within our traditional society is also emphasized through their incorporation in folk song verses, such as Punjabi folk songs like "Nikka Mota Bajra," "Kut Kut Bajra Main," and "Bajrey da Sitta.".

Social

Millets hold significant social importance by fostering nutritional diversity, empowering marginalized communities, preserving cultural heritage, enhancing food security in challenging environments, and supporting sustainable agricultural practices. Their cultivation and consumption contribute to improved health, livelihoods, and cultural identity, making millets a valuable asset for promoting equitable and resilient societies.

Economic

Millets hold significant economic importance in India due to their multifaceted contributions. They provide a cost-effective source of nutrition for both rural and urban populations, helping to address food security and reduce the economic burden of malnutrition-related health issues. Millet cultivation supports rural livelihoods by creating employment opportunities in farming, processing, and marketing. Moreover, their resilience to adverse climate conditions contributes to stable yields even in challenging environments, minimizing production risks for farmers. As India produces >170 lakh ton (80% of Asia's & 20% of global production (Source: https:// www.indiascience andtechnology.gov.in/listingpage/millets-futurefood#:~:text=India%20 produces%20170 %20lakh%20tons,to%20achieve%20%22zero%20hunger%22.) millets gain traction in domestic and international markets, millets offer potential for income generation and export bolstering India's agricultural economy and trade profile.

INTERNATIONAL YEAR OF MILLETS 2023

Spearheaded by the Prime Minister, the Government of India sponsored the proposal for International Year of Millets (IYM) 2023 which was accepted by the United Nations General Assembly (UNGA). The declaration has been instrumental for the Government of India to be at the forefront in celebrating the IYM. The PM of India, Shri Narendra Modi has also shared his vision to make IYM 2023 a 'People's Movement' alongside positioning India as the 'Global Hub for Millets'. On 6th December 2022, the Food and Agriculture Organization (FAO) of the United Nations, organized an opening ceremony for the International Year of Millets – 2023 at Rome, Italy.

The IYM 2023 and the push towards increasing millet production will contribute to the 2030 Agenda for Sustainable Development especially contribution to SDG 2(Zero Hunger),SDG 3 (Good Health and wellbeing), SDG 8(Decent work and economic growth),SDG12(Responsible consumption and production), SDG 13 (Climate action), SDG 15 (Life on Land).IYM 2023 hopes to galvanise interest in millets among various stakeholders like farmers, the youth and civil society and push governments and policy makers to priorities the production and trade in these cereals.

PRODUCTION OF MILLETS

Millet production is significant on a global scale, with several countries contributing to its cultivation. The top millet (total: Millet, Sorghum and Buckwheat)-producing countries include India, USA, Nigeria, China, Ethiopia, Niger, Mexico, Mali, Sudan and Brazil (Fig. 1). The production levels vary each year depending on factors such as weather conditions, government policies, and market demands. According to the Agricultural and Processed Food Products Export Development Authority Overall India's contributes was 17.68% in millet production in the year 2020.

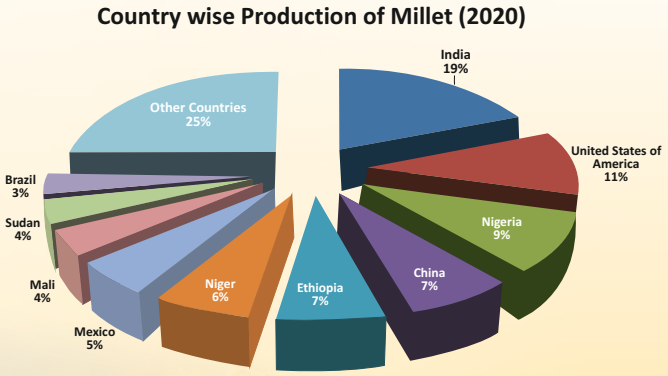

Figure 1: Country Wise Production of Millet 2020

Source: https://apeda.gov.in/milletportal/Production.html

INDIA'S MILLET PRODUCTION

India is one of the largest producers and consumers of millets in the world. Millets have been traditionally grown and consumed in different regions of the country for centuries. The major millet-producing states in India include Rajasthan, Maharashtra, Uttar Pradesh, Karnataka, Tamil Nadu, Andhra Pradesh, Telangana, and Madhya Pradesh (Fig. 2).

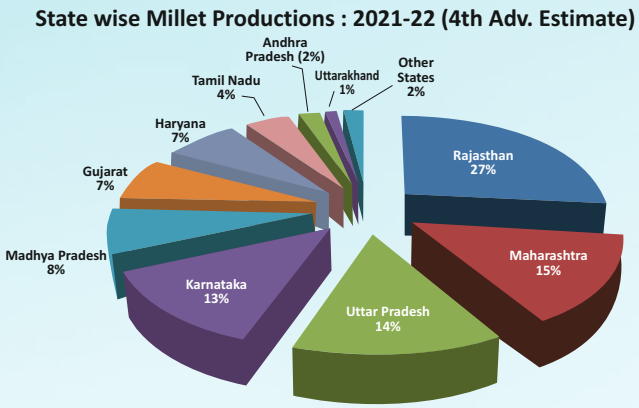

Figure 2: State Wise Millet Production:2021-22

Source: https://apeda.gov.in/milletportal/Production.html

According to the available data, India's millet production has shown a positive trend in recent years. India produces around 12 million MT of millets annually, according to Ministry of Agriculture and Farmers Welfare data (Fig. 3). Pearl millet (bajra) is the most extensively cultivated millet variety in India, followed by Sorghum (Jowar), finger millet (ragi), and small millet (Fig. 4).

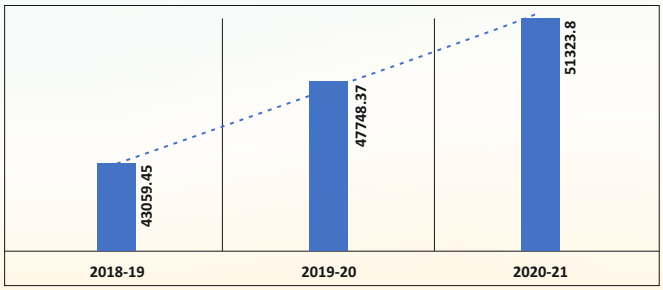

Figure 3: All India Coarse cereals including Millet production

Source: https://apeda.gov.in/milletportal/Production.html

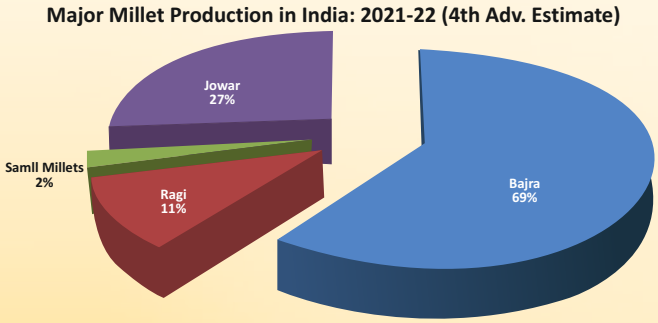

Figure 4: Major Millet Production in India 2021-22

Source: https://apeda.gov.in/milletportal/Production.html

SCAN TO LEARN A VARITY OF RECIPES FROM MILLET RECIPE BOOKS

The Indian government has been taking initiatives to promote millet cultivation and consumption through various programs, as mentioned earlier. These efforts aim to improve millet production, enhance the income of farmers, and address nutritional challenges. Indian Millets Research Center Hyderabad is being promoted as a center of excellence so that it can excel at the international level.

SCHEMES OF GOVERNMENT OF INDIA TO PROMOTE MILLETS

National Food Security Mission (NFSM): Launched in October 2007 for ensuring holistic development of agriculture and allied sectors The NFSM includes the cultivation of millets as one of its components. It aims to increase the production of millets and other crops to enhance food security and improve the income of farmers.

Rashtriya Krishi Vikas Yojana (RKVY): Launched in 2007 as an umbrella scheme for ensuring holistic development of agriculture and allied sectors. Re-structured as RKVY Cafeteria Scheme from 2022-23 onwards merging some schemes Paramparagat Krishi Vikas Yojana (PKVY), Crop Diversification Programme etc. RKVY supports the cultivation of millets and other crops by providing financial assistance to states. It promotes the adoption of improved farming practices, technologies, and infrastructure development for millet cultivation.

National Mission for Sustainable Agriculture (NMSA): National Mission for Sustainable Agriculture (NMSA) has been formulated for enhancing agricultural productivity especially in rainfed areas focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation. NMSA focuses on promoting sustainable agricultural practices, including the cultivation of millets. It aims to enhance productivity, conserve natural resources, and support farmers in adapting to climate change.

Paramparagat Krishi Vikas Yojana (PKVY): PKVY encourages organic farming practices, including the cultivation of millets. It provides financial assistance and technical support to farmers to adopt organic farming methods and obtain organic certification.

Nutri-Cereals Campaign: Sub-Mission on Nutri Cereals under NFSM started with an outlay of Rs.300.00 crores for 2018-19. It aims to Develop strategy for addressing issues concerning production, demand, and research with market-oriented approach. Increasing production of Nutri-Cereals through area expansion and productivity enhancement in a sustainable manner in the identified districts of the country. Strengthening seed supply system of Nutri-Cereals. Enhancing post-harvest value addition at farm gate for better price realization to farmers through efficient market linkages.

Millets Development Program: The Indian Council of Agricultural Research (ICAR) has initiated a Millets Development Program to support research, development, and promotion of millets. The program focuses on improving millet varieties, agronomic practices, and post-harvest technologies.

Some of the Millet Based Dishes

Millets have a wide range of culinary applications. They can be used to make traditional dishes like millet-based porridge, flatbreads, dosas, idlis, and soups. Millet flour is also used as a gluten-free alternative for baking bread, cookies, and other baked goods. In addition to their culinary uses, millets are also used as animal feed and in the production of alcoholic beverages. Some of the culinary applications of millets are given above in Table 3:

WAY FORWARD

The cultivation and promotion of millets in India offer several potential pathways for future development. Here are some key aspects that can be considered for the way forward regarding millets in India:

Awareness and Promotion: Continued efforts should be made to raise awareness about the nutritional benefits and versatility of millets among consumers, farmers, and the general public. Promotional campaigns, educational programs, and collaborations with media and celebrities can help in popularizing millets as a healthy and sustainable food option.

Research and Development: Increased investment in research and development is crucial for the improvement of millet varieties, agronomic practices, and post-harvest technologies. This includes breeding programs to develop high-yielding and climate-resilient millet varieties, enhancing pest and disease management strategies, and improving processing techniques to enhance the value addition of millet-based products.

Policy Support: The government can play a significant role by formulating and implementing policies that support the cultivation, processing, marketing, and consumption of millets. This includes providing financial incentives, subsidies, and access to credit for millet farmers, creating a favourable policy environment for millet-based enterprises, and integrating millets into government welfare programs like the public distribution system and mid-day meal schemes.

Infrastructure Development: Strengthening the agricultural infrastructure related to millets is essential. This includes the development of storage facilities, processing units, value addition centers, and market linkages to ensure fair prices for millet farmers and easy access to millet-based products for consumers.

Capacity Building: Training programs, workshops, and knowledge-sharing platforms should be established to enhance the capacity of farmers, extension workers, and entrepreneurs in millet production, processing, and marketing. This can include techniques for sustainable farming, value addition, quality control, and entrepreneurship skills to encourage the establishment of millet-based enterprises.

International Collaboration: Collaboration with international organizations, research institutions, and countries with experience in millet cultivation and promotion can provide valuable insights, technical expertise, and exchange of best practices. This can help in enhancing the knowledge base, technology transfer, and global market access for millet products.

Integration into Food Systems: Millets should be integrated into the broader food systems, including school meals, institutional catering, and the food service industry. Encouraging the use of millets in restaurants, hotels, and food outlets can create a sustained demand for millets and expand their market potential.

Overall, a comprehensive approach involving awareness, research, policy support, infrastructure development, capacity building, and collaboration can pave the way for the successful and sustainable development of millets in India.

Table 3: Culinary applications of millets

Millet	National Recipe	Properties	Name of Recipe (National)	Name of Recipe (International)
Pearl Millet	Bajra	Rich in Phosphorous, Minerals, Cooked in Winter	Kambankoozh (Porridge/Daliya), Roti	Chocolate Nutty Bar, Snickers, Condensed milk balls, Cheese crackers, Cookies
Finger Millet	Ragi	Highest Calcium Content, Anti-Diabetic Grain, Highest fibers checks constipation, cholesterol and intestinal cancer	Ragi balls, Porridge (Daliya) (*Both bajra and ragi contain goitrogens that could aggravate the thyroid gland, if taken too many times in a day.)	Candy, Energy bites, Pancakes, Crunchies
Foxtail Millet	Kangani	Healing food for postpartum and digestive health. Foxtail millet has a rich mineral content, and is especially high in iron	Idli, Upma, Payasam, Biryani. Commonly made into porridge (Daliya)	Peanut butter blossom, Cheese bread
Little Millet	Kutki	It is very easy to cook and is often simply used as rice and in fact, can be used in any recipe that demands rice. Higher iron content gives it an edge over rice specially for those with anaemia	Pulau, Payasam, Khichadi, Biryani	Mexican rice, Cream Puffs
Sorghum	Jowar	Sorghum is widely cultivated and consumed across many states in India and rotis made with johar are much easier to digest. It is rich in potassium, phosphorus, calcium, iron and zinc.	Rotis and Porridge (Daliya)	Sorghum potato tacos, Flake crackers, Vermicelli bites, Honey cake
Barnyard	Sawa	Highest fibre and iron content amongst fellow millets, it has a low carb content is a good source of B-complex vitamins.	Porridges, upma, khichdi and pulav during fasts.	Emirati khameer bread
Proso Millet	Cheena	Only rich in essential amino acids (leucine, isoleucine and methionine), it is also gluten-free.	Upma, pulav/biriyani and porridge.	Cream cheese cookies, sesame sticks
Kodo Millet	Kodo	High amount of lecithin and is excellent for strengthening the nervous system, it is also rich in B vitamins, especially niacin, B6 and folic acid, as well as the minerals such as calcium, iron, potassium, magnesium and zinc.	Upma, Idli, pulav / biriyani and porridge	Chocolate sheet buns

Sources: https://justagriculture.in/files/newsletter/2023/April/62.%20Millets%20of%20India%20and%20Traditional%20Millets%20Recipes.pdf, https://www.nutricereals.dac.gov.in/IYoM2023/Data/Millets%20International%20Recipes.pdf

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Pearl Millet/ Bajra

Sorghum/ Jowar

Finger Millet/ Ragi

Kodo Millet/Kodo

Proso Millet/Cheena

Foxtail Millet/Kangani

Barnyard Millet/Sanwa

Little Millet/Kutki

Source: https://www.mygov.in/campaigns/millets/

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