

Embracing Millets: The Key to Enhancing Food Security and Nutrition

Millets and Other Ancient Grains
International Research Initiative



वसुधैव कुटुम्बकम्

ONE EARTH • ONE FAMILY • ONE FUTURE



सत्यमेव जयते

Agriculture Working Group

Ministry of Agriculture and Farmers Welfare

Government of India

Krishi Bhawan, New Delhi-110001

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“

Millets are not new, they have been cultivated for thousands of years but markets and marketing have influenced our choices so much that we forgot the value of our traditionally grown food crops. Let us embrace ‘Shri Anna’ Millets as food of our choice.

”

Shri Narendra Modi
Hon’ble Prime Minister of India





Message



Millets, one of the most ancient crops cultivated by the humankind, has been one of the primary food sources for human civilisations. However, there has been a decline in popularity of millets in the last few decades. Despite the numerous advantages offered by millets, they have remained conspicuously absent from our staple crops. This absence can be attributed to insufficient awareness of their benefits, further exacerbated by evolving dietary preferences. Given the present challenges before the world in form of achieving food security and nutrition there is now a pressing necessity to reintroduce these nutritional powerhouses worldwide. Their exceptional nutritional value and adaptability to challenging climates make a compelling case for the revival of millets.

In order to encourage production and consumption of millets and create domestic and global demand and to provide nutritional food to the people, under the visionary leadership of the Honourable Prime Minister of India, Shri Narendra Modi ji, the Government of India has been taking a number of initiatives. After the success of National Year of Millets in 2018, it is noteworthy that the Government of India's proposal to the United Nations to designate 2023 as the International Year of Millets garnered substantial support and United Nation's General Assembly declared 2023 as the International Year of Millets. Taking this further under India's G20 Presidency the Agriculture Ministers' have endorsed the "Millets And OtHer Ancient GRains International ReSearch Initiative (MAHARISHI)."

I am confident that this publication will increase the awareness about this superfood - millets (Shree Anna) and strengthen the global efforts to make this ancient crop a food of choice once again among the masses.

A handwritten signature in blue ink, appearing to read 'N. Tomar', with a long horizontal stroke extending to the right.

Shri Narendra Singh Tomar

Hon'ble Minister of Agriculture and Farmers' Welfare
Government of India
Krishi Bhawan, New Delhi





MANOJ AHUJA
SECRETARY



सत्यमेव जयते



आज़ादी का
अमृत महोत्सव



भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
कृषि एवं किसान कल्याण विभाग
Government of India
Ministry of Agriculture & Farmers Welfare
Department of Agriculture & Farmers Welfare

FOREWORD

Millets, also referred to as nutri-cereals or superfood are among the earliest crops cultivated by humankind in Asia and Africa. These have been traditional staple food of the dry land regions of the world. In contemporary times, millets played a pivotal role in human civilisation as a primary food source, gradually yielded their prominence to other cereals like wheat and rice in the present era. Against a global context in which climate change and food security and nutrition challenges overlap, diversification towards alternative crops emerges as a win-win-win solution for farmers' incomes and resilience, the environment and food security and nutrition outcomes. Nevertheless, agricultural institutions, governments, and industries worldwide are redirecting their efforts towards millets, recognising their significance in terms of agri-diversity and food security and nutrition.

I am pleased to present the Presidency Information Note titled "Embracing Millets: The Key to Enhancing Food Security and Nutrition - Millets and other ancient grain research initiative." This comprehensive note, comprising two insightful parts, Part A: Understanding the Potential of Millets, and Part B: From Farm to Plate—India's success stories across the millet value chain, encapsulates the essence of millets as a crucial pillar in our pursuit of food security and nutrition.

Part A illuminates the profound significance of millets on the global stage. It underscores why millets deserve the world's attention and sheds light on their resilience in the face of climate challenges. The chapters within Part A meticulously dissect the world of millets, covering major and minor varieties, their role in promoting healthy diets, their contribution to small-scale farming, and their implications for trade and productivity. These grains, often overlooked re instrumental in enhancing food security and fostering livelihoods, especially for our marginalised farmers.

Part B, "From Farm to Plate," unravels inspiring case studies that spotlight successful millet journeys across the value chain in India. These stories, which traverse from the fields to our tables, exemplify how millets can transform lives communities, and regions. They underline the holistic approach that millets offer, rejuvenating local economies, enhancing nutrition, and empowering individuals and entrepreneurs alike.

The text you read in this note resonates deeply with the endeavors of the Ministry of Agriculture and Farmers' Welfare, Government of India. We recognise the immense potential of millets and the need to promote them not only for their nutritional merits but also for their role in sustainable agriculture.


[MANOJ AHUJA]

New Delhi
September 22, 2023

The background of the entire page is a photograph of a field of millet plants. The plants are in various stages of maturity, with some showing dense, golden-brown panicles. The image is overlaid with a semi-transparent yellow filter, which softens the colors and creates a warm, monochromatic aesthetic. The text is centered over this background.

Part A

Understanding the Potential of Millets

01 Millets: The Future of the World's Food Security



Sorghum Plantation

Feeding nearly 10 billion people in a sustainable manner by 2050, all while safeguarding our environment and enhancing the ability of agrifood systems to withstand unforeseen disruptions and uncertainties, presents an unparalleled task. A FAO report prior to the COVID-19 pandemic projected that by 2050, agriculture would have to increase its production of food, fibre, and biofuel by nearly 50% compared to 2012 levels to meet the rising demand attributed to population and income growth¹.

Over the course of future decades, climate change will have significant implications for agriculture and food security. By the middle of this century, higher average temperatures, changes in precipitation, rising sea levels, an increase in the frequency and intensity of extreme weather events are expected to affect crop and livestock production. Arid and semi-arid regions will be exposed to even lower precipitation and higher temperatures, consequently experiencing significant yield losses. For developing countries, climate change could exacerbate the food security challenges they already experience.²

While focusing on few high-yielding input intensive crops has increased the total food production and contributed to reducing food insecurity, it has also resulted in crop concentration. Rice, maize and wheat provide 60% of the world's food energy intake.³ Reliance on the "big three" to feed and nourish over 7.5 billion people on a warming planet will make large parts of the global population susceptible to food insecurity. In preparation for the future, global agriculture systems would need to include crops that are currently underutilised but have high production

and consumption potential to make the world food supply more resilient, stable, and nutritious.

Millets are amongst the many nutrient dense and climate resilient crops that are native to G20 countries and could be a potential game changer for global food systems. Such crops could be promoted by each country to ensure greater diversity of food supplies and reduce vulnerability to global shocks. Millets are exceptionally well-suited to dry climatic conditions and multiple cropping systems of India and semi-arid regions of Asian and African nations. To harness the potential of millets as a "super-food crop of the future", better awareness on the demand side and development of vibrant value chains on the supply side is imperative.

The Government of India had proposed to the United Nations for declaring 2023 as International Year of Millets. This proposal of India was supported by 72 countries and United Nation's General Assembly (UNGA) declared 2023 as International Year of Millets (IYoM-2023).

Did You Know

Millets may have been among the first cultivated crops that were grown in the "Hoe Age" preceding the "Plow Age".

¹ FAO. 2017. The future of food and agriculture – Trends and challenges. Rome. www.fao.org/3/i6583e/i6583e.pdf

² FAO. 2018. The future of food and agriculture – Alternative pathways to 2050. Rome. www.fao.org/3/i8429en/i8429en.pdf

³ Staple Foods: What do people Eat? <https://www.fao.org/3/u8480e/u8480e07.htm>

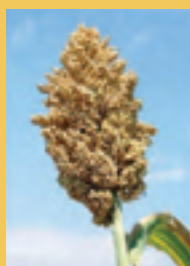
02 Why Millets Need the World's Attention

Millets are group of small grained cereal food crops which are highly nutritious. They are rainfed, hardy grains which have low requirements of water and fertility when compared to other popular cereals.

2.1. Millets are climate resilient

Millets are adaptable to a wide range of environmental conditions and demonstrate both tolerance and resistance to environmental stress. They are characterised by better growth and productivity under low nutrient and input conditions, need less irrigation, are least vulnerable to biotic and abiotic stresses, and less reliant on synthetic fertilizers. They are shorter in duration vis-à-vis core cereal crops. Key climate resilient traits of millet crops are summarised below:

Climate Resilient Traits of Important Millets



Sorghum

Duration: 100–125 days

Drought tolerant, adaptive to soils, altitudes and temperatures, excellent recovery mechanism



Proso Millet

Duration: 60–90 days

Short duration crop, adaptable to high altitude, low rainfall conditions



Pearl Millet

Duration: 80–95 days

Adaptable in hot and drought conditions, can be cultivated in poor soils, responsive to input management



Little Millet

Duration: 70–110 days

Famine food, adaptable to poor soils, low rainfall, and can also withstand waterlogging to an extent



Finger Millet

Duration: 90–130 days

Adaptable across wide altitude range, moderately resistant to drought, heat and humidity



Kodo Millet

Duration: 100–140 days

Very hardy crop with long duration, adaptable to low rainfall and poor soils, responsive to improved agronomic practices



Foxtail Millet

Duration: 70–120 days

Adaptable to high altitude and low rainfall conditions



Barnyard Millet

Duration: 45–60 days

Short duration crop, adaptable to high altitudes and low rainfall conditions

Source: KSDA, ICAR-IIMR. 2018. The Story of Millets. Karnataka State Department of Agriculture in association with ICAR-Indian Institute of Millets Research.

2.2. Millets contribute to healthy and nutritious diet

Millets thrive in challenging conditions, are nutrient-rich, and can be superior to commonly grown cereals. They contain protein similar to wheat, along with various vitamins and minerals¹. Millets provide critical supplementation to carbohydrate-rich diets with micronutrients to help combat malnutrition. They are rich reservoirs of dietary fibres, and phytochemicals of diverse therapeutic uses. The biochemical profile of millet grains is comparable to major cereals (Appendix).

2.3. Millets offer livelihood opportunities for small-scale and marginalised farmers

Millets have considerable potential to generate livelihoods, increase farmers' income and ensure food and nutritional security. The comparatively low input requirements of millet cultivation offer a key advantage to small-scale farmers, who often lack access to extensive irrigation systems and expensive agricultural inputs. Since millets can flourish in nutrient-depleted soil and under restricted irrigation, farmers have the potential to lower their production expenses while maximising their profits. By incorporating millets into their cropping systems, small-scale farmers can also build climate resilience, safeguarding their livelihoods against the uncertainties posed by climate change.

Millets also present a diverse range of market opportunities for small-holder farmers. The past decade has witnessed an increasing global demand for gluten-free and nutritious foods. Millets, with their nutrient-rich and gluten-free profile, align well with this emerging market trend for products with a millet flour base. This opens up new avenues for small-scale farmers to diversify their income streams by participating in value-added activities such as processing, packaging, and marketing of millet-based products. By promoting millet cultivation and facilitating access to markets, policymakers and agricultural organisations can empower small-scale farmers, enhance food security, and foster rural development.

Did You Know

Average glycemic index of millet is about 52.7 - lower than that of maize, refined wheat flour and rice. Millets are good for people who are gluten-intolerant².

Did You Know

The wide variety of millets ensure greater biodiversity on-farm, reduces pests and climate risks, improving farmers' overall resilience.



¹ Li, X and Siddique, KHM. 2018. Future smart food-rediscovering hidden treasures of neglected and underutilised species for Zero Hunger in Asia. FAO, Bangkok. 242 pp.

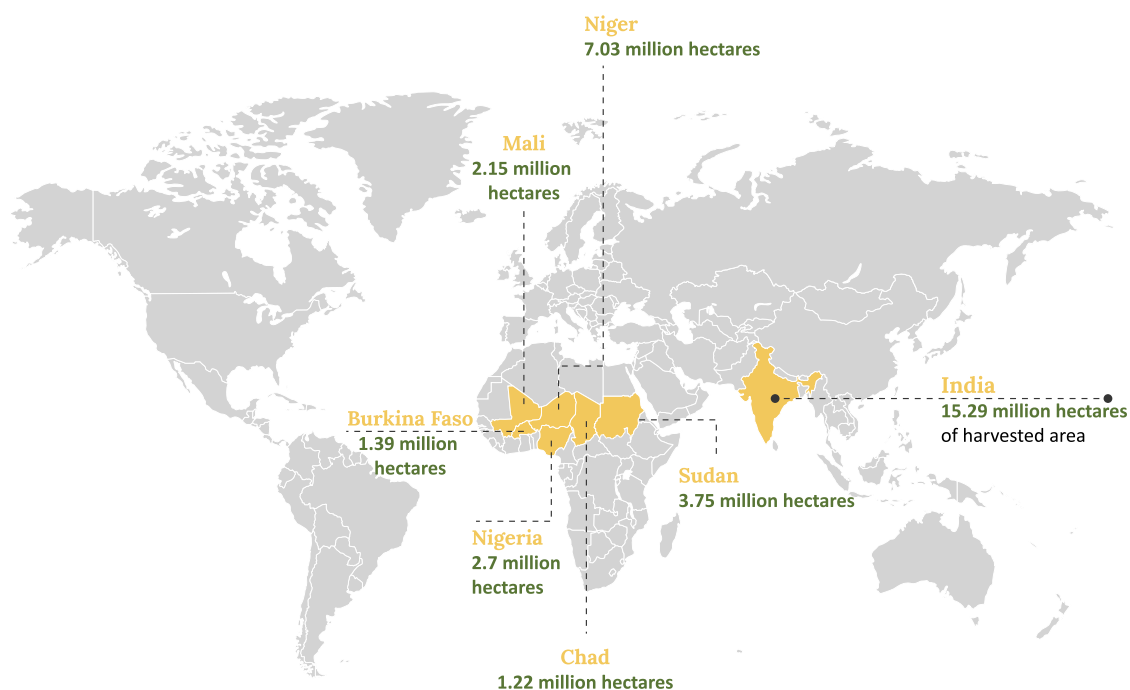
² Rao Dayakar, B; Bhaskarachary, K; Christina, GDA; Devi Sudha, G and Tonapi, VA. 2017. Nutritional and health benefits of millets. ICAR-Indian Institute of Millets Research, Rajendranagar, Hyderabad, pp. 23-54.

03 Global Trends in Millets

Area

Millets (excluding sorghum) are grown on approximately 34.1 million hectares globally, and they are predominantly consumed in the regions where they are cultivated. Remarkably, 97% of millet cultivation is carried out by developing nations, notably by resource-poor and marginal farmers. Among the 93 countries worldwide that cultivate millets, seven nations stand out with over 1 million hectares of harvested area each. Furthermore, around 25 countries report cultivated areas exceeding 0.1 million hectares.

Top Seven Millet (excluding sorghum) Producing Countries in the World



Millets* Area, Production and Productivity across the Globe in 2021

Regions	Area (million ha)	Production (million tonnes)	Yield (tonnes/ha)
Africa	46.7	38.4	0.8
Americas	6.6	24.0	3.6
Asia	17.3	25.7	1.5
Europe	0.7	1.7	2.7
Oceania	0.6	1.7	2.8
World	71.9	91.5	1.3

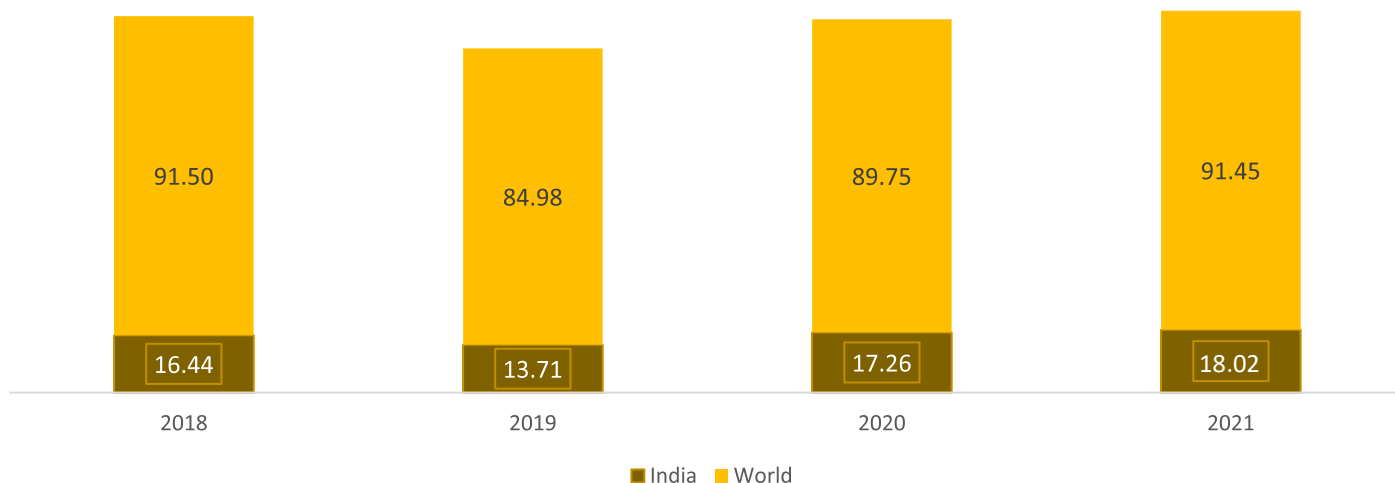
Note: *includes Sorghum

Source: FAOSTAT. <https://www.fao.org/faostat/en/#data/QCL> (accessed on 9 Sept. 2023)

Production

In 2021, Africa had 65% of the world's total millet (including sorghum) cultivated area. However, Africa's share in global production was only 42% due to a relatively low average yield of 0.8 tonnes per hectare, reflecting the challenges faced by resource-poor and marginal farmers in the region. In contrast, the Americas, with only 9% of the global cultivation area, contributed 26% to the world's millet and sorghum production, primarily from sorghum cultivation. In Asia, production exceeded that of the Americas by approximately 1.7 million tonnes, with 70% of the output originating from India.

Millet Production (in million tonnes), 2018–2021

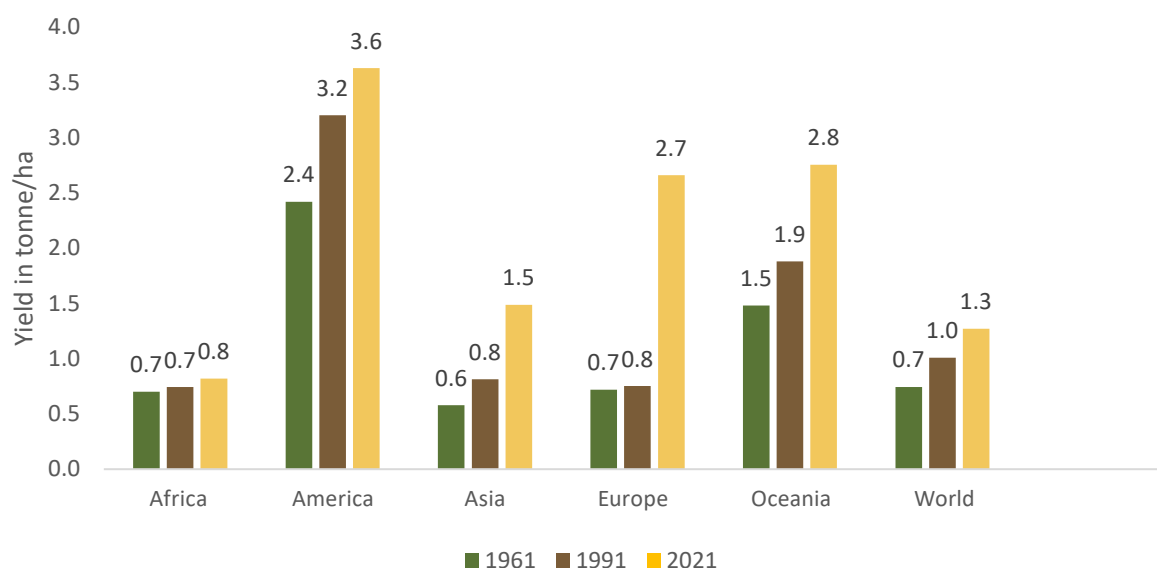


Source: FAOSTAT. <https://www.fao.org/faostat/en/#data/QCL> (accessed on 9 Sept. 2023)

Productivity

The trends in productivity vary significantly across different regions. In Africa, there has been stagnation in yield even after six decades. In contrast, all other regions have experienced an increase in productivity, particularly since 1991. However, in the Americas, the yield gains were more pronounced during the period from 1961 to 1991 than in the last three decades. These differences in yield across regions, especially in Asia, can be attributed to the different types of millets grown here compared to other regions where sorghum production is more dominant.

Changes in the Productivity of Millets in the World



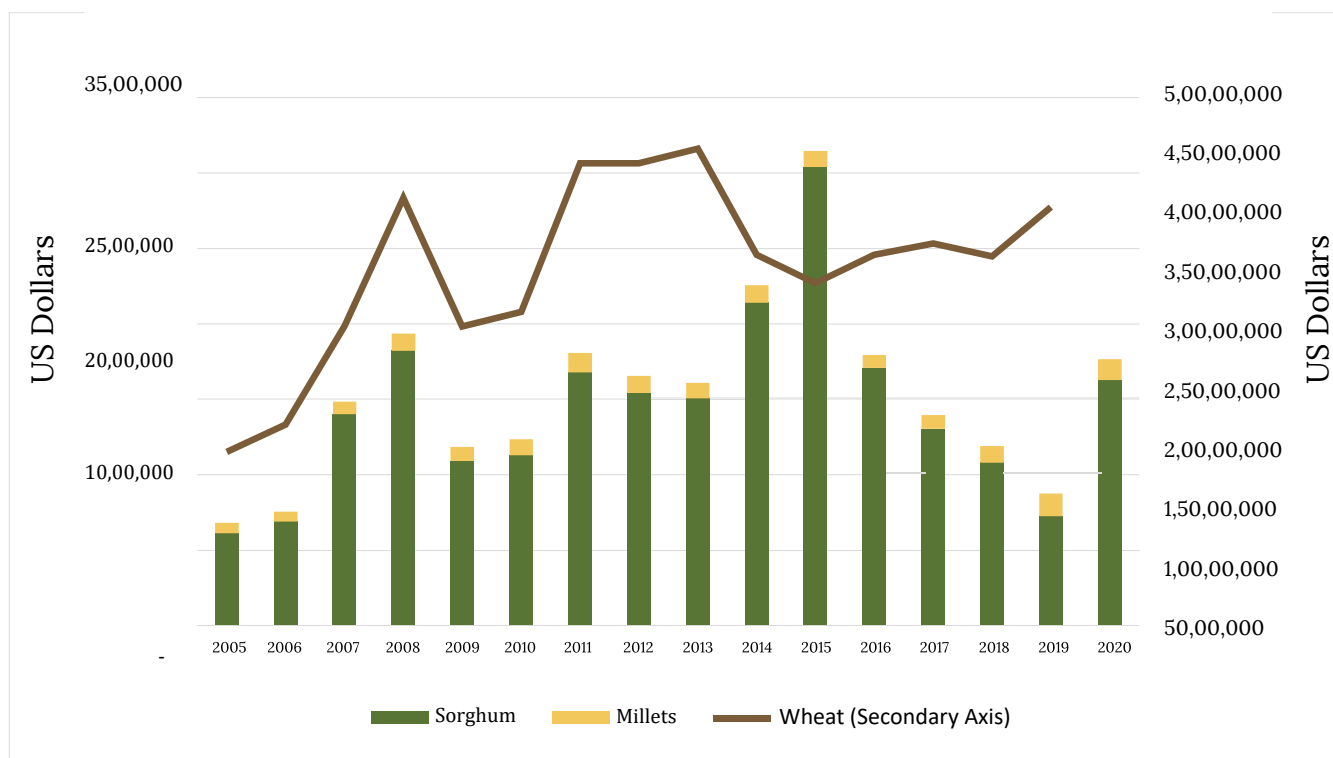
Source: FAOSTAT. <https://www.fao.org/faostat/en/#data/QCL> (accessed on 9 Sept. 2023)

Trade

Global sorghum and millet production and trade is small, and production varies greatly between countries and over the years. Sorghum and millet exports from G20 countries amounted to USD 1.76 billion in 2020. In contrast, wheat exports from G20 countries amounted to just under USD 40 billion in 2020.

With the increasing international appetite for millets, the millet trade is poised for significant growth in the coming years. To tap this latent global millet demand, the Indian Government is proactively encouraging millet exports. One notable initiative in this regard is a series of programmes designed by the Agriculture and Processed Products Export Development Authority (APEDA) to promote millets and millet-based products in various countries, including the UAE, Indonesia, the United States, Japan, the United Kingdom, Germany, South Africa, Australia, Saudi Arabia, and more.

Sorghum, Millets and Wheat Trade for G20 Countries, 2005-2020

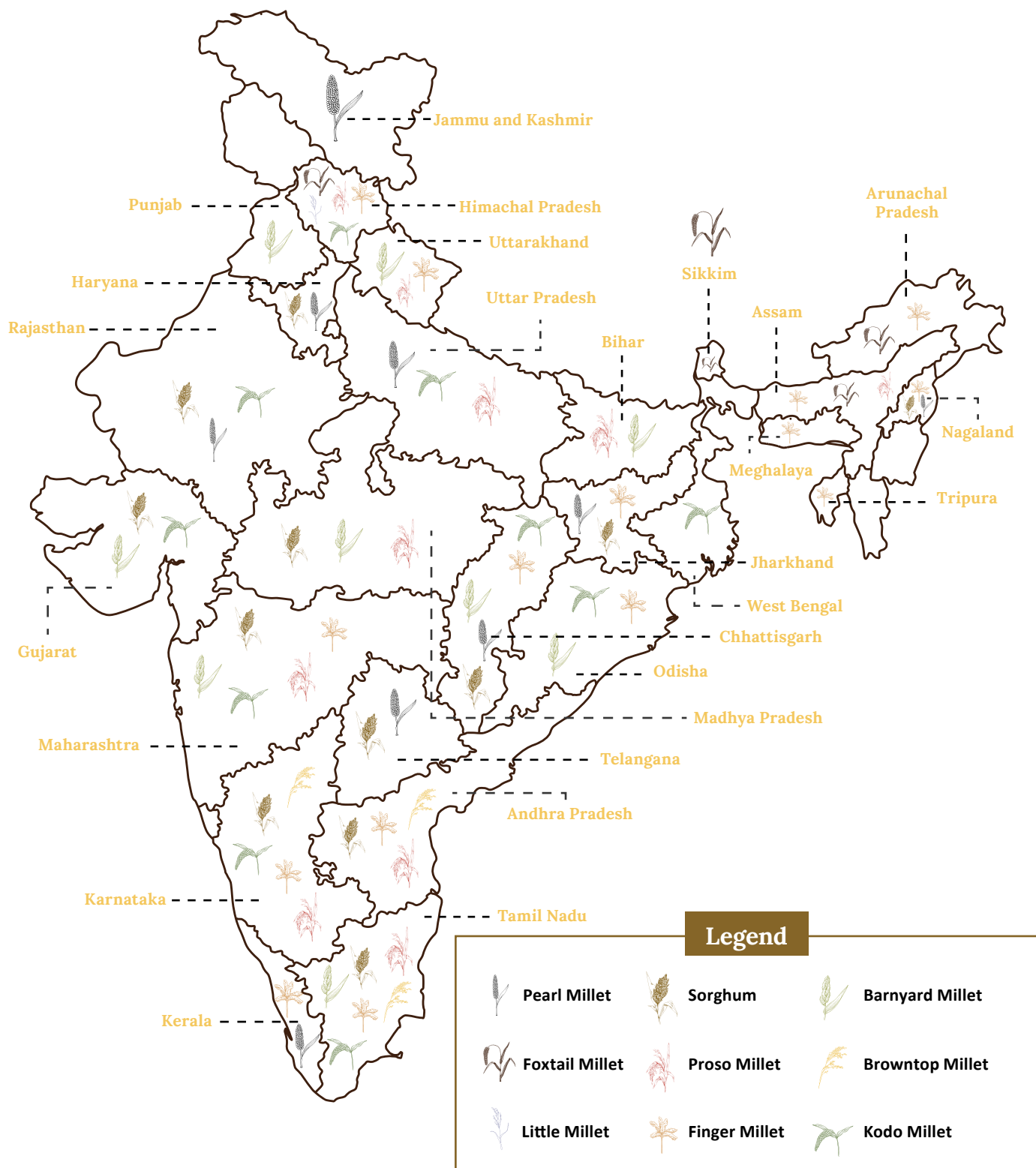


Source: FAOSTAT. <https://www.fao.org/faostat/en/#data/QCL> (accessed on 6 Feb. 2023)



04 Characteristics of Millets and Other Ancient Grains

Millet Growing Regions in India



Sources:

KSDA, ICAR-IIMR. 2018. The Story of Millets. Karnataka State Department of Agriculture in association with ICAR-Indian Institute of Millets Research.

APEDA. Millet Portal. Agricultural and Processed Products Export Development Authority, Govt. of India. <https://apeda.gov.in/milletportal/> (accessed on 6th September 2023)

Major Millets*

Sorghum



Nutritional and health importance:

Sorghum grains contain a varying energy value between 296.1 to 356.0 kcal per 100 grams, and they primarily consist of polysaccharides, such as starch and non-starch components, proteins, and lipids, while wheat and maize are also common grains.

Pearl Millet



Nutritional and health importance:

Pearl millet contains a range of free lipids between 5.6% and 7.1%, along with bound lipids ranging from 0.6% to 0.9%. The significant presence of phospholipids, including lecithins and cephalins, provides numerous health benefits. These compounds play a vital role in overall metabolism, contributing to brain function, managing behavioral disorders, and alleviating stress. They also aid in membrane regeneration and provide protection to vital organs such as the liver, lungs, kidneys, and gastrointestinal tract. Additionally, these compounds are recognised for their ability to improve the bioavailability of other nutrients and medications.

Sorghum is the most widely grown crop among millets, as a main staple crop by marginalised farmers across the semi-arid tropics. It is used for a variety of purposes including food, feed, fodder, and biofuel.

Origin and distribution:

Sorghum, originated in northeastern Africa, was first domesticated around 5,000–8,000 years ago. This region of Africa boasts the most diverse array of both cultivated and wild sorghum varieties. The crop also has a historical presence in the Indian Subcontinent, with evidence of early cereal cultivation dating back 4,500 years. The primary regions for sorghum cultivation are Africa, followed by Asia and the Americas.

Area and production in India:

- Sorghum is cultivated in 3.7 million hectares producing 4.0 million tonnes at an average productivity around 1.1 tonnes per hectare.

Pearl millet, is the sixth most important cereal crop in terms of area and production in the world. It is typically cultivated for food consumption in Asia and Africa, but it serves primarily as livestock fodder in the Americas.

Origin and distribution:

Pearl millet was first domesticated approximately in 4500 BC in the northern-central Sahelian region of Africa. Today, it remains a prominent cereal crop in West Africa and is cultivated extensively in eastern and southern Africa, as well as in semi-arid to arid regions of India. It is mostly grown on marginal lands with an annual average rainfall of 250 mm. Even in areas of severe drought, it can produce large quantity of grains.

Area and production in India:

- Pearl millet is grown about 7.5 million hectare with current grain production of 11.2 million tonnes and productivity of 1.5 tonnes per hectare.

Finger Millet



Finger millet is widely cultivated in Africa and Asia as a staple food grain. This millet gets its name due to its “finger-like” panicle branching.

Origin and distribution:

The domestication of finger millet occurred around 5,000 years ago in Western Uganda and Ethiopian highlands. It was introduced in India more than 4,000 years ago. Finger millet, predominantly produced in Asian and African nations, notably led by India, is extensively cultivated across regions spanning from eastern and central Africa to Sri Lanka, stretching eastwards through the Himalayas into Southeast Asia’s hills, including Taiwan, and reaching parts of Indonesia and Guam.

Nutritional and health importance:

Finger millet is considered highly nutritious as it provides substantial quantities of proteins, minerals, calcium, and vitamins. Products made out of finger millet are beneficial for the growth of bone mass in growing children, as well as for the prevention of osteoporosis and other bone disorders in adults, specially the elderly. The germinated seeds help in improvement of haemoglobin level in infants. The seed can be used to treat fever, biliousness, and hepatitis. The seed coat of the finger millet has anti-ulcerative properties and can help lower blood sugar level, manage diabetes and cholesterol.

Area and production in India:

- Finger millet is cultivated in an area of 1.1 million hectares with a production of 1.6 million tonnes giving an average productivity of 1.5 tonnes per hectare.

Mineral Composition of Major Millets (in mg/100g)

Millet	Iron	Calcium	Zinc	Phosphorus	Magnesium
Sorghum	3.9	27.6	1.9	274	133
Pearl Millet	6.4	27.4	2.8	289	124
Finger Millet	4.6	364	2.5	210	146

Source: DoA&FW. 2023. Brief notes on millets. Department of Agriculture and Farmers’ Welfare, Ministry of Agriculture and Farmers Welfare, India. 20 pp.

*The information has been compiled from

Sources:

Kumar, A; Tripathi, MK; Joshi, D and Kumar, V. (Eds.). 2021. Millets and millet technology. Springer, Singapore. 438 pp.

KSDA, ICAR-IIMR. 2018. The story of millets. Karnataka State Department of Agriculture in association with ICAR Indian Institute of Millets Research.

UPAg. Unified Portal for Agricultural Statistics. Department of Agriculture and Farmers’ Welfare, Govt. of India. <https://upag.gov.in/> (accessed on 9 Sept. 2023)

Minor Millets**

Foxtail Millet

Among other millets, foxtail millets are the third largest millets which is mainly grown for food in the semi-arid tropic region of Asia and as forage crop in Europe, North America, Australia, and North Africa.

Origin and distribution:

One of the oldest cultivated millet crops is foxtail millet. In global millet production, it comes second after pearl millet. The cultivated form of *Setaria italica* is its wild ancestor *S. viridis*.

The most primitive archeological remnants of foxtail millet have been discovered in the ruins of Cishan and Peiligang in Northern China's Yellow River Valley, almost 7,400 and 7,935 years ago, respectively. Its domestication may have taken place anywhere in the area that stretches from Europe to Japan.

Proso Millet



Area and production in India:

- Proso millet is cultivated in an area of 0.04 million hectare with total production of about 0.02 million tonnes and productivity of 0.5 tonnes per hectare.



Nutritional and health importance:

Foxtail millet is rich in Vitamin B12, which is essential for maintaining a healthy heart, smooth functioning of the nervous system, and in general good for skin and hair growth. Foxtail millet's nutritious content has made it a vital ingredient in Chinese noodle preparation, nourishing gruel or soup, manufacturing alcoholic beverages, cereal porridges, and pancakes. Foxtail millet grain is typically cooked whole like rice (millet rice) or ground into a meal. After the dehulled grain is milled into flour, it is consumed in India as a stiff porridge known as sargati or as leavened bread known as roti. It is also possible to sprout the seed until it is ready to use, which makes it sweeter.

Proso millet is the third most important millet crop cultivated after pearl millet and foxtail millet and is highly tolerant to heat and drought. Proso millet with low moisture requirements, is a relatively short-term emergency or fast-season irrigated crop.

Origin and distribution:

Proso millet domestication started in beginning of the Holocene when global temperatures were warmer and new plants and habitats were introduced to hunter-gatherers. It might have originated from *Panicum psilopodium*, which is found in its wild state in Myanmar, India and Malaysia. Historically this millet has been grown in Russia, China, the Balkans countries and Northern India. Major countries of its production are Russia, China, USA, Ukraine, South Korea, Kazakhstan, France, Poland, Belarus, India, Iran, Nepal, Western Myanmar, Sri Lanka, Pakistan and Australia.

Nutritional and health importance:

The intake of proso millet is associated with a decreased risk of type 2 diabetes mellitus because whole grains are a rich source of magnesium. People with atherosclerosis and heart disease benefit from the magnesium content of proso millet as it can reduce the frequency of migraine headaches and heart attacks. It also lowers blood pressure and supplies sufficient amounts of zinc, vitamin B6, and iron for daily needs.

Barnyard Millet



Origin and distribution:

Indian barnyard millet, is one of the oldest crops to be have been cultivated since around 5000 BC in India and 3000 BC in China. This millet species, which originated from wild Jungle rice, shares a similar evolutionary path in both India and Africa. In various regions like Central Africa, India, China, Malawi, Nepal, and Tanzania, *E. frumentacea* has four distinct races characterised by differences in inflorescence morphology, and they are extensively grown.

Little Millet



Barnyard millet is a multipurpose crop grown for grain and fodder. It is the oldest domesticated small millet. Barnyard millet has two main species, one is *Echinochloa esculenta* which is Japanese Barnyard millet or Japanese millet and the other is *Echinochloa frumentacea* that is Indian Barnyard millet. Barnyard millet is adapted to temperate climatic regions as well as tropics. It is grown in shallow soils with low moisture holding capacity.

Did You Know

The Indian barnyard millet is also known as “Billion Dollar Grass”.

Nutritional and health importance:

The germinated seeds of barnyard millet possess qualities such as astringency, acidity, soothing properties, and the ability to aid digestion. Barnyard millet is employed in managing conditions like abdominal dyspepsia, this millet is the richest source of iron among other millets digestive issues, and nutritional deficiencies. Additionally, the pale seeds of barnyard millet have a cooling effect and are utilised in the treatment of cholera and fever.

Area and production in India:

- Barnyard millet is cultivated over an area of 0.1 million hectare with total production of about 0.07 million tonnes with productivity of 0.7 tonnes per hectare.

Little millet is another type of millet which is almost similar to proso millet except for the fact that the grains are small. This millet is native to India and is also known as Indian millets.

Origin and distribution:

The species was named after a specimen obtained in Sumatra, Indonesia. It is primarily grown in India, China, eastern Asia, and Malaysia. Little millet grows well in both tropical and temperate settings. Currently, the crop is nearly exclusively grown in mountainous areas of India. It is a significant catch crop grown by Indian tribals.

Nutritional and health importance:

Little millet is a good food alternative for diabetic individuals and individuals suffering from cardio-vascular disorder as it helps to maintain blood glucose response. Little millet is also a good source of nutraceuticals like phenolics, butyric gamma-amino acid (GABA), lignans, starch resistant, sterols, and phytats.

Several common small millet meals are created with popped flour, sugar or jaggery or ghee and salt. In many rural households in India, little millet is used to make a wide range of traditional foods such as bhat, kheer, dosa, upma, paddu, masala idli, and halwa.

Kodo Millet



Kodo millets are mostly drought tolerant cereals and can be grown easily in areas with scanty and erratic rainfall. Kodo millet is extensively grown in poor soil conditions like stony or gravelly soils which in general is not good for growing any crops.

Origin and distribution:

Native to tropical Africa, this cereal is thought to have domesticated in India around 3,000 years ago. Cow grass, rice grass, ditch millet, Native Paspalum, or Indian crown grass are also known as kodo millet. It is grown in India, Philippines, Indonesia, Vietnam, Thailand, and West African countries.

Nutritional and health importance:

The grains of Kodo millet contains 8.3% protein, 1.4% fat and 2.9% ash. The dietary fibre content is very high. Kodo's anti-oxidant potential is also higher than other major cereals and millets. Water soluble fibre in kodo can be used to maintain or lower the blood glucose response in diabetic patients and people suffering from cardio-vascular problems. Kodo millet has a low glycemic index which makes it suitable for diabetic patients.

Did You Know

Little millet grows well in both tropical and temperate settings. Currently, the crop is nearly exclusively grown in mountainous areas of India.



Browntop Millet

Browntop millet is another type of millet with limited cultivation that is largely confined to Southern India. Its wild or domestic varieties are sometimes found within the same field. It is both used as food and fodder crop. Browntop millet is drought-resistant and heat tolerant but also can be grown in low flooding areas. The browntop millet seed is cultivated in a number of soils and climates. Its hardy nature makes it well suited for dry lands.



Origin and distribution:

Brown top millet was domesticated in South Asia during the 3000 BC, and by the end of the second millennium BC it spread out from the Deccan to Tamil Nadu in the south and Gujarat in the north. This minor millet was introduced in the USA from India around 1915.

Nutritional and health importance:

Browntop millet is nutritional rich and has high energy content. With a high fibre content of 12.5%, it can be used to alleviate ailments caused by sedentary lifestyles. Its consumption can reduce diabetes and duodenal ulcers. It is regarded as a remedy for common health problems like arthritis, and heart disease.

Mineral Composition of Minor Millets (in mg/100g)

Millet	Iron	Calcium	Zinc	Phosphorus	Magnesium
Proso Millet	2	30	1.4	-	153
Foxtail Millet	2.8	31	2.4	290	81
Barnyard Millet	5	20	3.3	280	82
Little Millet	1.3	16.1	1.8	130	91
Kodo Millet	2.3	15.3	1.6	101	122
Browntop Millet	0.7	0.01	-	-	-

Source: DoA&FW. 2023. Brief notes on millets. Department of Agriculture and Farmers' Welfare, Ministry of Agriculture and Farmers Welfare, India. 20 pp.

**The information has been compiled from-

Sources:

Kumar, A; Tripathi, MK; Joshi, D and Kumar, V. (Eds.). 2021. Millets and millet technology. Springer, Singapore. p 438.

KSDA, ICAR-IIMR. 2018. The story of millets. Karnataka State Department of Agriculture in association with ICAR Indian Institute of Millets Research.

Other Ancient Grains

Barley

Barley possesses extraordinary resilience that distinguishes it from fellow cereal crops such as wheat, rice, and maize. It possesses a superior ability to endure infertile soil, salt, and drought, affording it the capacity to acclimate to various ecosystems and prosper worldwide. Exhibiting remarkable adaptability, barley excels even in challenging settings, including cold climates, drought-prone regions, and soils with low fertility, thus establishing itself as a hardier crop when compared to wheat under adverse growth conditions.

Origin and distribution:

Barley, a significant cereal grain, holds a storied heritage spanning millennia and tracing back to our ancient forebears. Notably, Europe takes the lead, contributing approximately 68% of the global barley production, while Asia and the USA follow with 15% and 13%, respectively¹.

Nutritional and health importance:

Barley, a versatile cereal grain, finds its versatile application in a wide array of culinary creations, including bread, beverages, stews, and an assortment of dishes. As a whole grain, barley stands as a bountiful reservoir of dietary fibre, vitamins, and minerals. These vital nutrients not only contribute to heart health but also hold potential in cancer prevention, reducing inflammation, and various other health advantages.



Furthermore, barley emerges as a rich source of B vitamins, encompassing niacin, thiamin, and pyridoxine (vitamin B-6). Additionally, it contains beta-glucans, a specific type of dietary fibre linked to an array of health benefits. The table below provides an in-depth breakdown of barley's nutrient content:

Nutritional and Mineral Composition of Barley		
Nutrient	Hulled Barley	Pearl Barley
Calcium (mg)	33	29
Iron (mg)	3.6	2.5
Magnesium (mg)	133	79
Phosphorus (mg)	264	221
Potassium (mg)	452	280
Sodium (mg)	12	9
Manganese (mg)	1.9	1.32
Selenium (mcg)	37.7	37.7
Folate (mcg)	19	23

Source: USDA. Food Data Central. <https://fdc.nal.usda.gov/fdc-app.html#/food-details/1580033/nutrients> (accessed on 10 Aug. 2023)

¹ FAOSTAT. <https://www.fao.org/faostat/en/#data/QCL> (accessed on 9 Sept. 2023)

Farro

Farro, encompassing hulled wheats such as einkorn, emmer, and spelt, holds a historical significance as one of the oldest cereal crops in the Mediterranean region. While it experienced a period of decline in usage, Farro is currently enjoying a resurgence in popularity. The industrial sector has recognised the value of Farro in the production of pasta, biscuits, and various other food products. It serves as a dietary staple for ancient civilisations such as the Assyrians, Egyptians, and diverse communities in the Middle East and North Africa. With a substantial supply and a growing demand for plant-based foods, Europe has emerged as the dominant force in the global farro market.

Origin and distribution:

Recent studies suggest that the origin of Farro can be traced to Palestine, where it continues to thrive as a wild species known as *Triticum Dicoccoides*.

Nutritional and health importance:

The farro grains are generally rich in vitamins (vitamin B3), minerals (zinc, magnesium, and iron), and antioxidants. The grain is naturally high in fibre and contains significantly more protein than wheat. Farro is



also higher in B-complex vitamins, and both simple and complex carbohydrates. Another important benefit is that some gluten-sensitive people have been able to include farro-based foods in their diets².

Teff



Teff, originating from Ethiopia, stands out as a remarkably nutritious and gluten-free staple food renowned for its versatility and distinctive flavor. Its remarkable adaptability to diverse agro-climatic conditions has facilitated its widespread cultivation. With the growing prevalence of gluten-related disorders in Western markets, the demand for teff has surged significantly.

Nutritional and health importance:

Teff, a gluten-free grain, is a nutritional powerhouse, particularly well-suited for individuals with celiac disease. It distinguishes itself among cereals by boasting higher levels of minerals and amino acids³. Additionally, it is rich in essential fatty acids, dietary fibre, minerals, and phytochemicals, all of which contribute to various health benefits. These benefits encompass preventing anemia during pregnancy and assisting in the prevention and management of conditions such as celiac disease, diabetes, and anemia.

² Buerli, M. 2007. Farro in Italy. Global Facilitation Unit for Underutilized Species. https://cgspace.cgiar.org/bitstream/handle/10568/104070/Farro_in_Italy_1266.pdf?sequen

³ Zhu, F. 2018. Chemical composition and food uses of teff (*Eragrostis tef*). *Food Chemistry*, 239: 402-415.

Nutritional and Mineral Composition of Teff³

Nutrient	Value per 100g
Calcium (mg)	180
Iron (mg)	7.63
Magnesium (mg)	184
Phosphorus (mg)	429
Potassium (mg)	427
Sodium (mg)	12
Zinc (mg)	3.63

Source: USDA. Food Data Central. <https://fdc.nal.usda.gov/fdc-app.html#/food-details/169747/nutrients> (accessed on 9 Sept. 2023)

Quinoa

Quinoa presents a valuable solution for nations grappling with the challenge of hidden hunger.

Origin and distribution:

Originating in the Andean region of South America, quinoa has served as a staple crop for countless generations.

Originally cultivated for centuries in Peru and Bolivia, quinoa's primary production hubs, it has now spread to numerous countries worldwide, including the United States, Canada, Italy, Sweden, and India⁴.

Nutritional and health importance:

Quinoa's exceptional nutritional profile arises from its well-balanced composition, featuring significant protein content, a wide range of amino acids, essential minerals, dietary fibres, as well as valuable minor components such as antioxidants and vitamins⁵. Furthermore, its gluten-free characteristic renders quinoa an excellent option for individuals managing celiac disease or gluten-related disorders.

Quinoa is recognised as a valuable reservoir of various micronutrients, including zinc, magnesium, folate, and iron. Its potential for sustaining long-duration human-occupied space flights is evident in its selection as an experimental crop within NASA's Controlled Ecological Life Support System.



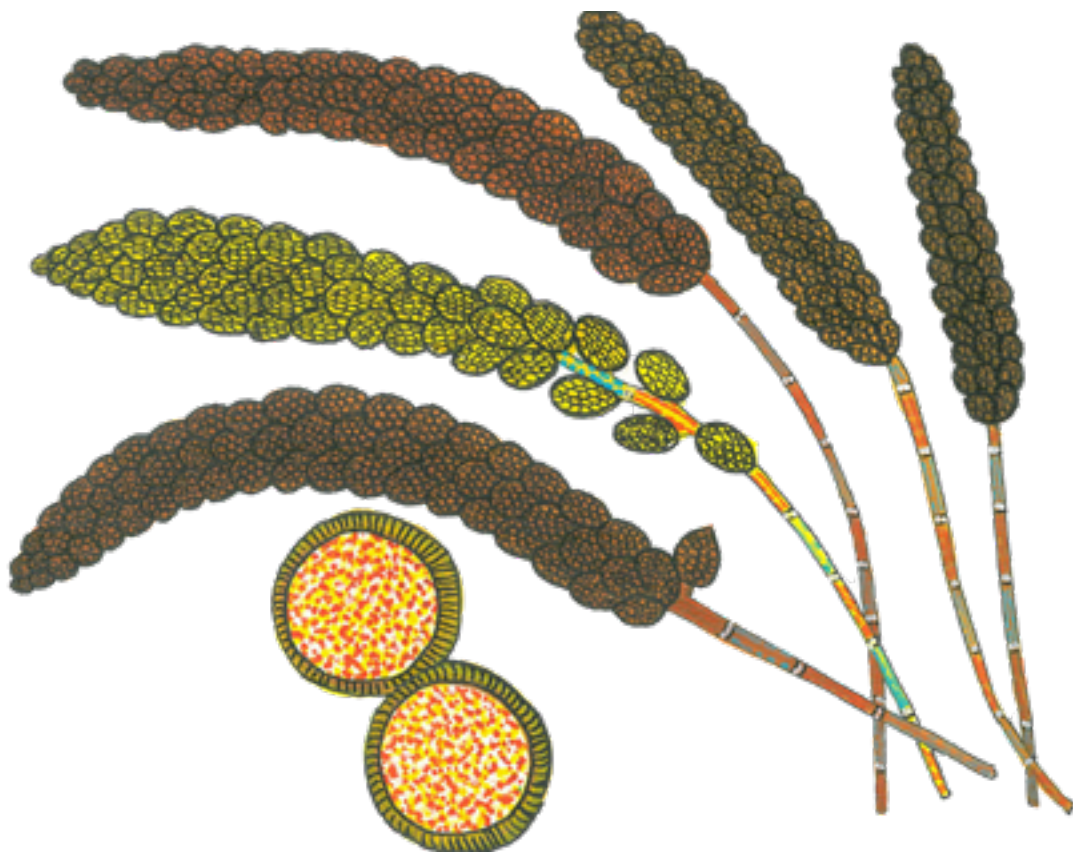
⁴Angeli, V; Silva MP; Massuela, CD; Khan, MW; Hamar, A; Khajehei, F; Hönninger,GS and Piatti, C. 2020. Quinoa (*Chenopodium quinoa* Willd.): An overview of the potentials of the "golden grain" and socio-economic and environmental aspects of its cultivation and marketisation. *Foods*, 9(2) 216

⁵Vidueiros, SM; Curti, RN; Dyer, LM; Binaghi, MJ; Peterson, G; Bertero, HD and Pallaro, AN. 2015. Diversity and interrelationships in nutritional traits in cultivated quinoa (*Chenopodium quinoa* Willd.) from Northwest Argentina. *Journal of Cereal Science*, 62: 87-93.

Nutritional and Mineral Composition of Quinoa⁷

Nutrient	Composition (mg/100g)
Calcium (mg)	148.7
Iron (mg)	13.2
Zinc (mg)	4.4
Magnesium (mg)	249.6
Potassium (mg)	926.7
Phosphorus (mg)	383.7

Source: Gálvez, VA; Miranda, M; Vergara, J; Uribe, E; Puente, L and Martínez, EA. 2010. Nutrition facts and functional potential of quinoa (*Chenopodium quinoa* Willd.), an ancient Andean grain: a review. *Journal of the Science of Food and Agriculture*, 90(15): 2541-2547.



05 Value Added Products of Millets



...and many more

06 Intensifying Research Efforts: Leveraging the G20 Strength

The research landscape in the field of millets and other ancient grains has been characterised by significant disparities in terms of investment and human resources allocation. While substantial efforts have been directed towards achieving self-sufficiency in staple cereals like wheat, rice, and maize, millets have received comparatively limited support in terms of infrastructure and workforce development¹.

For agriculture as a whole to achieve sustained productivity growth, continuous technological advancements, as well as social and institutional innovations, are essential. Research and Development (R&D) play a pivotal role in driving such productivity growth and are integral to the transition towards a more sustainable agricultural future. Public R&D initiatives, coupled with supportive policy environments, have been instrumental in the development of improved crop varieties, increased yields, and enhanced production for major cereal crops worldwide. The stagnation or slow productivity growth observed in major millet-producing regions in Africa and Asia underscores the urgency of dedicating greater resources to basic, strategic, and applied research aimed at enhancing productivity. To comprehensively understand the role of millets and ancient grains in agricultural and economic development, fostering collaborative research networks among academic and research institutions is imperative.

Genetic enhancement of millets is a pressing need, necessitating the development of new cultivars utilising cutting-edge tools and technologies to ensure high production potential and optimal environmental adaptation, ultimately making millets competitive with other crops. Leveraging the rich genetic diversity available in millets germplasm for traits such as stress tolerance, environmental adaptability, and increased yields is vital. The establishment of seed hubs is crucial to increase the adoption of new cultivars and elevate the seed replacement rate, thereby enhancing overall productivity.

The labor-intensive nature of millet cultivation and processing, particularly in rural areas, poses challenges, particularly for women. Developing modern production and processing methods and technologies can alleviate these challenges, freeing up women's time for other productive activities.

To broaden the appeal of millets and encourage consumption, extending shelf life and developing millet-based health foods are essential. Investments in genetic enhancement to enrich micronutrient content, improve stress tolerance,

and extend shelf life are imperative. Encouraging farmers to cultivate millets through incentives is crucial for building a sustainable millet value chain.

In response to contemporary lifestyles and preferences, innovations can lead to the creation of a diverse range of millet-based food products, catering to traditional and modern consumers alike. Promotional campaigns, public endorsements, and awareness-raising efforts can further boost the adoption of millet-based foods.

Stakeholders involved in millets research and development should invest in innovation to improve production, marketing, and distribution. Collaborations with governmental and non-governmental organisations are critical for success. Initiatives such as the formation of millet-based Farmer Producer Organisations (FPOs), startups, incubation centers, and Nutri-Hubs are crucial steps towards achieving this goal.


Governments will continue to play a pivotal role in driving the development and adoption of new technologies. Through their role in setting incentives, regulations and funding, G20 governments can influence the global research agenda and shape private sector actions.

Building upon the momentum of the International Years of Millets 2023 and the successful Wheat Initiative, endorsed by G20 nations in 2011 during France's presidency, G20 agricultural research scientists launched a dedicated initiative focused on research and awareness regarding millets and other ancient grains. This initiative, named the "**Millets And OtHer Ancient GRains International ReSearch Initiative (MAHARISHI)**," was formally agreed upon during the 12th G20 Meeting of Chief Scientists hosted in Varanasi, India. Subsequently, it garnered support from Agriculture Ministers representing G20 nations and received recognition by the Heads of States in the G20 New Delhi Leaders' Declaration.

MAHARISHI serves as a collaborative platform uniting researchers and institutions dedicated to millets and other underutilised grains worldwide. The primary objective of this initiative is to nurture the growth of a vibrant global research community committed to advancing the understanding and cultivation of millets and other ancient grains. This community will facilitate the seamless exchange of resources, capabilities, data, knowledge, and innovative ideas within the research network, all with the shared aim of elevating productivity, quality, and sustainable cultivation practices on a global scale.

¹ NAAS. 2022. Promoting millet production, value addition and consumption. Policy Paper No. 114, National Academy of Agricultural Sciences, New Delhi. 24 pp.

**G20 Meeting of Agricultural Chief Scientists (MACS) Varanasi, India; 17-19 April 2023
Chair's Summary and Outcome Document**



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We highlight the importance of locally adapted crops for the transition towards resilient agriculture and food systems, enhancing agricultural diversity, and improving food security and nutrition. Recognizing the achievements of the Wheat Initiative, we intend to continue the R&D efforts to provide inclusive solutions for climate-resilient, nutritious, locally adapted, indigenous and underutilized grains. To strengthen the research collaboration and public awareness of these grain crops, we support the launch of the "Millets And Other Ancient Grains International ReSearch Initiative (MAHARISHI)" with voluntary membership from G20 member countries, non-member countries, International Organizations and the private sector. The objectives and modalities of this initiative are placed at Annexure-I.



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Annexure I

Millets and other Ancient Grains International Research Initiative (MAHARISHI)

We, under the auspices of a G20 MACS Global Research Collaboration Priority (GACP), support the launch of the "Millets And Other Ancient Grains International Research Initiative (MAHARISHI)" to facilitate research collaboration on climate resilient and nutritious grains including Millets and other underutilized grains. This will supplement the efforts undertaken under the International Year of Millets 2023 (IYM 2023) program initiated by the United Nations General Assembly (UNGA).

Achieving impact across multiple grains is difficult due to dispersed efforts. To address this problem, a framework must be developed that can be applied to the grains under this initiative.

We understand that any G20 member may voluntarily contribute funds, scientific expertise, and/or other resources to the initiative. The MAHARISHI intends to cooperate with public and private organizations, making efforts to advance research on these grains. In alignment with the G20 MACS guiding principles, this GACP will be limited to two years, and a written report will be provided during the 2025 G20 MACS.

The activities of this effort may continue after 2025, but at this point, the activity should no longer be discussed, presented, or reported at the G20 MACS, except for any future stocktaking report.

Drawing upon the learnings from the Wheat Initiative, the MAHARISHI intends to pursue the following cost-effective activities, while striving to avoid duplication of existing efforts:

- Establish mechanisms to connect researchers and institutions working on identified grain crops to enhance the dissemination of research findings, and identify research gaps and needs. This will also include supporting open access publication of research results.
- Establish web platforms to connect researchers, exchange data, share communication products and thematic briefs to encourage research and information sharing in an open and accessible manner.
- Organize knowledge transfers, on voluntary and mutually agreed terms, capacity-building activities and international research workshops and conferences. These activities would endeavor to encourage researchers to work on these grains.
- Provide research and innovation prizes and/or awards to scientists to support and promote their research interests.

Implementation

The MAHARISHI secretariat will be based in the Indian Institute of Millets Research (IIMR), Hyderabad with technical support from International Crops Research Institute for Semi-Arid Tropics (ICRISAT), One CGIAR, international organizations (IOs) and research institutions.

Varanasi, 29 April 2023



**G20 Agriculture Ministers' Meeting Hyderabad, India; 16-17 June 2023
Chair's Summary and Outcome Document**



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We stress the importance of diverse, safe, and sustainably produced nutritious food to improve food security and nutrition. We encourage initiatives to promote innovations in crop development, production and consumption patterns including climate-resilient, nutritious, locally adapted, indigenous and underutilized grains. Emphasizing the significance of research and development to increase agricultural productivity in a sustainable manner, we encourage efforts to strengthen research cooperation on climate-resilient and nutritious grains such as millets, quinoa, sorghum and other traditional crops including rice, wheat and maize. In this context and building on the "International Research Initiative for Wheat Improvement (IRIWI)" endorsed by the G20 in 2011, we welcome the launch of the 12th G20 MACS international initiative for research on millets and other ancient grains.

G20 New Delhi Leaders' Declaration Delhi, India; 09-10 September 2023



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Eliminating Hunger and Malnutrition

We commit to enhance global food security and nutrition for all in line with the G20 Deccan High-Level Principles on Food Security and Nutrition 2023. To achieve this, we:

1. We encourage efforts to strengthen research cooperation on climate-resilient and nutritious grains such as millets, quinoa, sorghum, and other traditional crops including rice, wheat and maize. We welcome the outcomes from the G20 members engagement in the 12th G20 Meeting of Agriculture Chief Scientists (MACS).

Appendix

Biochemical Composition of Foodgrains

Crops	Scientific Name	Carbohydrates (%)	Proteins (%)	Fat (%)	Ash (%)	Dietary Fibre	Energy (kCal)
Sorghum	<i>Sorghum bicolor</i> (L.) Moench	67.7	9.9	1.7	1.4	10.2	334
Pearl Millet	<i>Pennisetum glaucum</i> (L.) R. Br. Syn. <i>Cenchrus americanus</i> (L.) Morrone	61.8	10.9	5.4	1.4	11.5	347
Finger Millet	<i>Eleusine coracana</i> (L.) Gaertn.	66.8	7.2	1.9	2.0	11.2	320
Proso Millet	<i>Panicum miliaceum</i>	64.5	11.5	3.5	2.7	9.6	341
Foxtail Millet	<i>Setaria italica</i>	60.1	12.3	4.3	2.6	10.7	331
Barnyard Millet	<i>Echinochloa frumentacea</i>	65.5	6.2	2.2	1.3	12.6	307
Little Millet	<i>Paspalum sumatrense</i>	65.5	10.1	3.8	1.3	7.7	346
Kodo Millet	<i>Paspalum scrobiculatum</i>	66.2	8.9	2.5	1.7	6.4	331
Browntop Millet	<i>Brachiaria ramosa</i>	61.4	11.5	-	-	12.5	-
Rice	<i>Oryza sativa</i>	78.2	6.8	0.5	0.6	0.2	345
Wheat	<i>Triticum aestivum</i>	71.2	11.8	1.5	1.5	1.2	346
Maize	<i>Zea mays</i> L.	62.3	12.1	4.6	1.8	2.3	-
Oats	<i>Avena sativa</i>	52.8	17.1	6.4	3.2	11.3	-

Source: DoA&FW. 2023. Brief notes on millets. Department of Agriculture and Farmers' Welfare, Ministry of Agriculture and Farmers Welfare, India. 20 pp.





Part B

From Farm to Plate – India's success stories across the millet value chain

01 Nekram Sharma, a Seed Conservationist, Inspires a Movement for Millets in Himachal Pradesh



Nekram Sharma encourages farmers to begin growing millets on small parcels of land as part of a mixed cropping system

Small millet cultivation was once popular in Himachal Pradesh. Finger millet, proso millet, foxtail millet and *kodo* millet were historically grown in the state. The cultivation of millets declined as farmers shifted to monocropping of high-yielding wheat and maize ushered in by the Green Revolution. The decline in cultivation led to loss of seeds of several varieties. Interestingly, cultural practices including folk songs on millets and festival foods have kept some millet traditions alive. *Pidari* – a dish made with finger millet, prepared during *Bashoa* (Baisakhi) is one such example.

For over 15 years, a network of community-based organisations, farmer groups, Self Help Groups (SHGs) and the Himachal Revitalising Rainfed Agriculture Network (HimRRA) have been actively mobilising the community to revive millet cultivation, adopt millet-based regenerative farming practices and encourage consumption at the household level. A key figure leading this movement is Nekram Sharma from Mandi district.

One farmer's efforts to save seeds started a movement

Natural farmer and seed conservationist Nekram Sharma of Karsog village in Mandi district has made pioneering efforts in preserving indigenous seeds and the food diversity of Himachal Pradesh. Back in the 1990s, he participated in local forest conservation efforts and realised the loss of native seeds and plants, and its impact on food diversity. He travelled across the state visiting homes of elderly farmers in remote villages to collect indigenous seeds of millets, legumes, vegetables and other crops that were on the verge of being lost.

Sharma began promoting traditional farming practices such as – *Nau-Anaaj* – a cropping system of growing 9 crops in each season, which was once prevalent in the region. In this system, millets, pulses, oilseeds and other food crops are grown together, providing food security and improving soil fertility. In the early 2000s, the growing movement to adopt these regenerative, millet-based farming systems was informally called *Prakritik Tikau Kheti Abhiyaan* (Natural sustainable farming campaign).

Around this time, Sharma turned his 22 *bigha* land into a natural regenerative farm and began cultivating millets, alongside other crops. He connected with civil society organisations working on reviving millets in the rest of the country to adopt best practices in the state. Lack of seed was one of the challenges for farmers adopting millet-based cropping systems in Himachal. Sharma began distributing a 'fistful' (*ek mutthi*) of seed to farmers, with the promise that they would return double the amount to the seed bank the next year, and distribute to 5 other farmers in the village.

The hill state has difficult topography and small land holdings, which makes large scale production unviable. He encouraged farmers to start growing millets on small plots of land, as part of a mixed cropping system. Today, farmers are growing millets, legumes and other crops in fruit orchards.

A growing number of farmers have formed informal seed banks and are involved in seed production. Several farmer groups, SHGs, community-based organisations and millet entrepreneurs have joined hands to promote natural farming and millet-based multi-cropping in the

state. This community effort got a boost with the State government's *Prakritik Kheti Khushhal Kissan Yojana* (PK3 Yojana) launched in 2018. The natural farming programme sensitised farmers about the adverse effects of chemical inputs to the ecology and human health. A substantial number of Himachal's farmers are women¹.

Today, the Himachal Pradesh State Government recognises Sharma as a key resource person and technical advisor to provide training and capacity building on the package of practices for millet farming. He also conducts programmes promoting health and nutritional awareness through millet recipes at the state and district level, and at academic institutions. Recognising his contribution to natural farming in Himachal Pradesh, he was conferred the Padma Shri in January this year.

Growing awareness driving a return to local millet traditions

Women SHGs in Himachal have revived traditional millet recipes and created new and contemporary dishes that are now served at village fairs and food festivals. SHG members from Mandi, Kullu, Kangra and Chamba districts share that millet kiosks at community events such as Kullu Dussehra, Lavi mela at Rampur and Mandi Shivratri, have shifted people's perception of the cereal. A millet canteen near Civil Hospital Karsog was set up in May 2023. It serves millet tea, *dalia*, momos, pulao and biscuits, among other products. The state government organised a four-day millet food festival in Dharamshala, Kangra district, in June 2023. The festival provided farmers and entrepreneurs a forum to display the millet diversity of the hill state. Value-added products such as millet momos, Ragi tea, noodles and pasta, and millet alternatives for traditional dishes and local delicacies such as *Siddu* were popular among visitors.



SHG members participating in the Millet Food Festival, at Dharamshala in June 2023

Key outcomes

- Recognising the synergies between natural farming methods and millet-based multi-cropping systems, the state Agriculture Secretary has asked the department to reach out to farmers with millet seeds and production plans in 2023–24. Currently in the state, 1.6 lakh farmers are practising natural farming on 50,000 acres of land. The state has set a target to bring an additional 30,000 acres of land under natural farming and to convert 11,000 acres (4,500 hectares) for millet cultivation in 2023–24². What started as one individual's conservation efforts has now become an ambitious goal for the state.

Key learnings

- Developing seed catalogues for the four agro-climatic zones of Himachal Pradesh by academic institutions of the State can give a significant boost to millet cultivation in the state. Involving farmers and community seed banks in Participatory Varietal Selection may help identify the most suited millet crops for specific regions.
- Support to community seed banks at the Gram Panchayat and cluster level to preserve and propagate native and indigenous seeds can be a significant intervention for millet revival in the state.
- Appropriate post-harvest processing equipment can be a significant enabler for women farmers: The introduction of affordable tools and equipment can reduce drudgery involved in post-harvest activities and improve productivity for women millet farmers.
- Periodic millet festivals featuring culturally relevant recipes as well as innovative dishes play an important role in engaging consumer interest in millets³.



¹ <https://www.thehindu.com/news/national/other-states/himachals-women-farmers-are-expanding-their-horizons-naturally/article37141852.ece>

² <http://himachalpr.gov.in/PressReleaseByYear.aspx?Language=1&ID=27486&Type=2&Date=04/06/2023>

³ This case study has been prepared with inputs provided by Nekram Sharma, State and district offices of the Department of Agriculture, Himachal Pradesh, natural farmers and SHG members.



On his farm, Nekram Sharma follows the practice of Nau Anaj multi-cropping system

“

Himachal had a rich tradition of small millets. Millet-based multi-cropping offers farmers an opportunity to diversify incomes. Bringing millets back on our plates will improve diet diversity and nutrition indicators of the community. To promote millet production, Himachal farmers need good seeds, and village and household level processing technology. It will go a long way in incentivising farmers, especially women farmers who do the tedious tasks in agriculture – to grow more millets.

Nekram Sharma

Millet farmer and seed conservationist
Mandi, Himachal Pradesh

”

“

Under the state government’s flagship programme *Him Unnati* we have taken a cluster-level approach to help farmers adopt millet cultivation. Eighteen millet-based clusters have been formed in Kangra. Bajra as fodder is cultivated on 1,100 hectares in the district, this year we have added an additional 350 hectares of small millet cultivation. Seeds were collected from elderly farmers from ‘millet pockets’ in remote regions of the district. We are trying market-led interventions. Events like the Millet Food Festival that our department organised in Dharamshala have created awareness and curiosity about millets among people.

Rahul Katoch

Deputy director,
Agriculture Dept, Kangra

”

1990s

Nekram Sharma began conserving indigenous seeds for millets, legumes, vegetables and other native crops

2000s

Prakritik Tikau Kheti Abhiyaan, an informal, community movement towards sustainable, millet-based farming systems took shape

2018–23

Sharma conducted training on natural farming including millet-based multi-cropping on the invitation of State and District government bodies

May 2023

The State Government launched *Him Unnati* for convergence of agriculture-related schemes to develop clusters for millets, fruits, vegetables, dairy production for targeted agricultural growth

Early 2000s

Sharma turned his 22 *bigha* landholding into a natural, regenerative farm and practised millet-based multi-cropping

2018

The State Government launched the *Prakritik Kheti Khushhal Kissan Yojana* to promote natural regenerative farming in the state

Jan 2023

Sharma conferred the Padma Shri for his contribution to natural regenerative farming and saving indigenous seeds of Himachal Pradesh

02 Community-led Seed Initiatives at the Heart of Small Millet Revival in Mandla, Madhya Pradesh

For tribal communities and small farmers of Mandla district in eastern Madhya Pradesh, small millets like *kodo* and *kutki* had been an integral part of their rainfed cropping systems and cultural heritage. These small millets thrived in the semi-arid soil and undulating, rocky landscape of the region prior to the Green Revolution. Since the 1970s, the advent of input intensive agriculture, enabled by programmes for soil improvement, land levelling and watershed management paved the way for widespread paddy, maize, and wheat cultivation, and fundamentally altered the conditions under which small millet cultivation took place. In the last decade, Madhya Pradesh has nearly tripled its wheat production. Availability of paddy and wheat in the Public Distribution System has also altered consumption patterns over decades, impacting awareness among communities about the nutritional value of millets. Meanwhile, the area under millet cultivation had been on a steady decline.



Diversifying to newer seed varieties helped farmers to enhance yield

Seed development to address loss of varietal diversity

The declining trend of millet cultivation in the district is gradually being reversed by a local grassroots organisation – Action for Social Advancement (ASA). With funding support from CGIAR-affiliated Bioversity International and technical advice from the MS Swaminathan Research Foundation, ASA has been supporting local communities to preserve and expand availability of high-quality seed varieties. It has been the most crucial step to address the loss of varietal diversity of *kodo* and *kutki* (little millet) over the years.

Seeds developed in the Jawaharlal Nehru Krishi Vishwavidyalaya (JNKVV), Jabalpur, were brought to Mandla by ASA for testing. Through four-cell analysis and Participatory Varietal Selection and Promotion (PVSP), ASA has been working with farmers since 2010 to determine the top four crops grown in the region, as well as the most widely used traditional seed varieties. JNKVV,

along with the Indira Gandhi Krishi Vishwavidyalaya, Raipur, and the Indian Institute of Millets Research (IIMR) then provided the most proximate new varieties for a phased trial and testing.

Demonstrating yields to farmers to encourage adoption

Developed in a similar agro-climatic zone, 5 newer varieties of small millets have seen significant success in yield. Predictably, it has been difficult to convince farmers to diversify away from indigenous small millet seed varieties. However, an evidence-based approach and small-scale testing is mitigating fears around risk. The first trials are done only on 1/10th of a farmer's plot, and increase in yield has been consistent due to higher germination rates of university-developed varieties. Training from Krishi Vigyan Kendra, in Dindori equips farmers with the technical know-how. An endline survey in 2020 showed that production of *kodo* and *kutki* had surged by 20% over a period of five years in the 35 villages of Mandla where the intervention has been intensive.

Gond farmers Ratan Singh Marko and Shiv Prashad Kushram shared that diversifying to JK 41 and JK 449 seed varieties of *kodo* has enabled them to enhance yield by nearly 20%. The surplus is enabling them to earn profits. When put in context of the fact that the maximum that small millets can yield per acre in this area is between 6-8 quintals, a 20% increase in yield is significant.

Facilitating market linkages as cultivation increased

As production of millets increased, improving price realisation for farmers became a critical need. ASA promoted 7 Farmer Producer Companies (FPCs) to procure millets from small farmers in the region, in an attempt to overcome intermediation barriers. These FPCs aggregate, grade and sort unprocessed produce for onward selling to large buyers in Bhopal, Jabalpur and Nashik. ASA and its FPCs are actively engaged in negotiating the best possible prices for shareholding farmers.



Key outcomes

- Farmers have embraced small millets as a viable alternative in rainfed and low-quality soil areas, leading to improved crop diversification and increased resilience to climate risks. An endline survey conducted showed that in just three years (2015–18), area under *kodo* cultivation rose from 52% to 66%. The percentage of households that sold *kodo* commercially rose from 10% to 35% in the same period.
- Millet cultivation has helped tribal farmers address food security challenges, especially during the winter months. Grown as a Kharif crop, the small millet harvest is rich in protein and minerals, enabling communities to fulfill nutritional needs in the colder months.
- As of 2022, producer companies procured 5,600 quintals of small millets from farmers in the region, a 51% increase compared to their procurement volume 5 years ago.
- Price realisation has also seen an upward trend – between 2017–22, *kodo* prices in the area have increased by 100% (from Rs 13/kg to Rs 26/kg) and *kutki* prices have increased by 68% (from Rs 22/kg to Rs 37/kg).
- Alongside procurement, aggregation and marketing, FPCs have played a key role in registering newer seed varieties, seed production and distribution, branding and marketing, as well as building trust among farmers to enable wider use of newer seed varieties.
- The integrated interventions, from seed to processing to markets, have catalysed local enterprises, making millets commercially viable for local farmers. Value-added products like *kodo* rice are the most popular, with local brands finding their way into grocery stores and thus into the kitchens of non-tribal consumers as well.

Key learnings

- While there are shared challenges for millet revival across India, each regional context has a key bottleneck – in this case, it was availability of high quality seeds. Addressing the key challenge often has a positive spillover effect on other related challenges.
- Behaviour change is an important, and perhaps more difficult aspect of millet cultivation. Intergenerational efforts and evidence-based interventions over a long period of time are critical.
- This case is a testament to the effectiveness of long-term partnerships between farmers, FPCs, government agricultural universities, KVKs, technical experts like MSSRF and Biodiversity International, and grassroots organisation like ASA. Their joint efforts have delivered an integrated approach from seeds to markets to plates that has secured both nutritional and economic well-being for the region's farmers.¹



ASA has been working with farmers to determine the top four crops grown in the region



¹This case study has been prepared based on inputs provided by Action for Social Advancement's programme implementation team.

03 Preservation of Ram-mol, a Local Millet-based Mixed Cropping System in Rainfed Regions of Kachchh, Gujarat

India's westernmost district of Kachchh receives an average rainfall of 330 mm with 13 rainy days in a year and long dry spells during monsoon. Around 73% of the land under cultivation in Kachchh comes under rainfed area¹. Climate change and altered monsoon patterns have increased average annual rainfall in the region, but longer dry spells continue to adversely impact the predominantly rainfed agriculture in the district. Kachchh is topographically unique surrounded by salt plains, a large area of salt marshes and the sea on its west. The soil in the region is low in organic carbon and moisture; has a high pH and low macro and micronutrients, making it less fertile with lower yields.

Millets are a dominant crop in Kachchh, even as commercial crops are growing in acreage

Pearl millet (Bajra) is the main cereal of Kachchh. Bajra is one of the major crops of the district, even though its area under cultivation has declined in the last 20 years (from 72,800² hectares in 2004, to 18,000 hectares as per figures shared by the District Agriculture Officer, Agriculture Department, Bhuj, in July 2023). The district Agriculture Department reports that the bajra variety grown on Khadir Bet, a small island situated within the salt plains of Rann of Kachchh, has unique premium value. Over the years farmers have shifted to commercial crops, for example, castor is grown extensively in Kachchh today (over 1 lakh hectares, figure shared by district Agriculture Department). Cluster beans (for gum production), green gram, cotton and sesame are other major kharif crops. Horticulture is also a growing trend.

The millet-based traditional practice of Ram-mol

The agro-climatic conditions of Kachchh are suited for coarse millets like bajra and jowar, which are not water intensive crops. Bajra is cultivated in all 10 *talukas* of the district, and is a rainfed crop. Farmers in the region practise a traditional agroecological practice known as *Ram-mol* (translated as God's crop). It is a multi-cropping system practice for the rainfed kharif crop including a combination of millets, lentils and oilseeds. Farmers use 3 to 4 seeds of 7 traditional rainfed crops, namely, pearl millet (bajra), sorghum (jowar), cluster bean (*guar*), castor, sesame, green gram and dew bean (*moth*). This system relies on a combination of appropriate crop choices that nourish the soil without the need for external inputs. A combination of deep and shallow rooted crops grow in



Ram-mol cropping system provides multiple harvests

conditions of varying rainfall and offer protection from droughts. Legumes have nitrogen fixing properties and contribute to soil health, and protein security. Millets (bajra, jowar) are climate resilient and grown mainly for consumption (bajra) and cattle fodder (jowar). Castor has commercial value.

Intuitive role played by women farmers in preparing seed-mix

The proportion of various seeds to be sowed is not standardised, and women farmers prepare the seeds based on their assessment of productivity of the land, prevalent climatic conditions, and food and nutritional needs of the family and community. Given their history of responding to difficult climatic patterns, women farmers have deep insights on seed conservation and seed varieties.

One crop, multiple harvests

Sowing with *Ram-mol* principles is done after the first rainfall in Kharif season. There are multiple harvests. Sesame is harvested in approximately 100 days. Millets and legumes are harvested in 4 months, around November. Until it is harvested in October–November, Moth bean provides live mulching. Castor, which until this time is a short statured plant, shoots up and is the last crop standing on the field. It is harvested 3 to 4 times, and provides crop cover to the farm until the final harvest in April–May the following year. In this multi-cropping system, castor offers an income as well as retains soil moisture and fertility.

While *Ram-mol* has traditionally been a part of local community practices, grassroots organisations such as Satvik that partner with the State as technical experts on natural farming practices, have observed the decline

¹ <https://agricoop.nic.in/sites/default/files/GUJ%208-Kutch%2030.04.2011.pdf>

² <https://agricoop.nic.in/sites/default/files/GUJ%208-Kutch%2030.04.2011.pdf>

in the acreage under the practice, as more farmers shift to cash crops. Since 2006, Satvik has been working on a seed conservation programme in an attempt to keep seed variability of *Ram-mol* crops alive. The organisation has identified 17 varieties of pearl millets; 11 varieties of jowar, 17 varieties of green gram; 7 varieties of cluster bean; 5 varieties of Moth bean; 5 varieties of sesame and 4 varieties of castor that can form the foundation of the *Ram-mol* mix.

Integration of traditional agroecological practices with the State government’s Natural Farming Programmes can be the way forward to conserve the climate-resilient farming practices and seed diversity of Kachchh. The region’s unique topography offers the district an opportunity to develop a distinctive brand for Kachchh origin millets.

Key learnings

- Rainfed regions of the country can benefit from revival and scaling-up of traditional community wisdom on multi-cropping and seed diversity practices such as *Ram-mol*.
- Practical experience and community engagement strengths of grassroots organisations like Satvik can provide strategic partnerships with district administrations on initiatives by state governments on natural and organic farming programmes. These partnerships can harness the effectiveness of community farming practices and seed conservation.
- Integrating community wisdom on heritage seed practices in policy interventions for dryland agriculture in India will enable large scale adoption of millet cultivation as part of mixed cropping practices that benefit the farmer, the soil and overall ecology of rainfed and dry regions of the country³.



Women farmers prepare the seed mix based on their assessment of productivity of the land and food security of the family

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Its agro-climatic conditions make Kachchh ideal for cultivation of coarse millets such as bajra. Bajra and jowar have been traditionally grown here, though currently there is a trend towards horticulture and Kachchh is moving from brown to colourful crops. The government has been promoting natural farming in Kachchh – a sustainable way would be to promote crops that are not water intensive. Investments in local-level value addition to millets will provide an incentive to millet farmers.

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Dr Manish Kanwat

Principal Scientist and Head,
Central Arid Zone Research
Institute (CAZRI) KVK, Bhuj



³This case study has been prepared based on inputs provided by District Agriculture Officer, Agriculture Department, Bhuj, Kachchh; Principal Scientist and Head, Central Arid Zone Research Institute (CAZRI) KVK, Bhuj, Satvik-Promoting ecological farming, a CSO working with rainfed cultivators in Kachchh

04 Self-Help Group Graduates from a Seed Bank to a Thriving Millet Processing Enterprise in Karnataka

Dharwad district, North Karnataka, is located in what has historically been a major production centre of small millets, with the ideal soil and agroecological conditions for millet cultivation. The region is popular for native varieties of the little millet (*bili saame*) and black foxtail millet (*kari navane*).



Members of the Bibi Fathima Swasahaya Samuh run and manage the millet processing unit

Despite millets being a significant part of food systems and local diets, small millet cultivation declined over the last few decades. Several reasons contributed to this trend. As processing and marketing systems for other crops like cotton and soyabean improved, farmers shifted away from millets. Wheat and white rice became aspirational and small millets came to be seen as the poor person's food. Another factor was the lack of processing units for small millets. In the absence of mechanised facilities, processing millets was labour-intensive and often fell upon women. As farmers moved away from both millet production and consumption, local seed varieties also began to dwindle.

Revival of small millets in response to poor rainfall and crop failure risks

Between 2010 and 2016, Kundgol *taluka* in Dharwad district had been experiencing low and erratic rainfall, impacting crop harvests. Sahaja Samruddha, a local grassroots organisation, conducted a survey and seed mapping exercise in 2016–17 and found that foxtail and little millets, once an important crop of Kundgol, had nearly disappeared. As climate risk mitigation measures, the organisation introduced little and brown top millets in 2017–18 as alternatives that grow in dry, wet or drought-prone landscapes. Both crops fared very well and their resilience piqued farmer interest in millet cultivation.

A 'seeds first' approach to small millet revival

In 2019, Sahaja Samruddha identified a group of women who had knowledge of indigenous seeds, in Teertha village in Kundgol *taluka*, and helped them form a Self Help Group called Bibi Fathima Swasahaya Sangha. Sahaja Samruddha supported the SHG to establish a Community Seed Bank. Led by Bibi Jan Halemani, the seed bank was set up to preserve indigenous millet seed varieties and establish economic opportunities from the sale of successful varieties. In each season, the SHG would take stock of demand and distribute seeds free of cost to farmers within the *taluka*. Post harvest, double the quantity of seed would be collected to replenish the seed bank stock. The seed bank started identifying producers from within the community who were producing high quality seeds, to procure and sell to other farmers in the region. As a result, the community seed bank today has close to 100 varieties of millets and has also been providing seed varieties to agriculture universities and programmes in Dharwad, Gadad and Hulikoti.



The SHG is involved in all aspects of the millet value chain

Processing millets as an opportunity for the Self Help Group

The community seed bank's efforts improved seed availability, and millet production increased in the region. However, the absence of a processing unit in the *taluka* meant that farmers had to sell raw grain at unremunerative prices, usually to local traders who sold onward to buyers in Nashik. Members of the Bibi Fathima SHG came forward with a proposal to Sahaja Samruddha to start a processing unit. Such a unit could increase profitability through value-added products, create entrepreneurial possibilities, open new marketing channels, and service farmers' household consumption needs as well. Setting up the unit was a true collaboration – the Indian Institute of Millet Research funded the machinery; Krishi Vigyan Kendra, Halkoti

helped in setting it up; the SELCO Foundation supported with solar powering; Swiss Aid supported electrification of the unit; Sahaja Samrudha and the Indian Millet Foundation trained the SHG members.

The SHG-managed community millet processing unit began operations in 2020-21. The women run six machines – aspirators, destoners and dehullers – and the unit has a capacity to clean and process 3 quintals of grain a day. The SHG buys millets from farmers, and further sells grain, flour, millet rava to the Dharwad-based Devadanya Farmer Producer Company as well as in the local retail market. The unit has an annual turnover of Rs 12–15 lakhs and also provides processing services for small consignments meant for household consumption.

Key outcomes

- Today the 14-member Bibi Fathima Swasahaya Sangha is involved in all aspects of the millet value chain – from seed conservation, seed distribution to processing and marketing. They train other women to make value-added products and build enterprises. The SHG members keep themselves informed on market trends and customer preferences, and are regulars at local festivals, Krishi melas and agriculture department events. They've visited millet forums and exhibitions across the state and country, where they operate millet kiosks and cafes to promote the nutri cereals and the work of their community.

In 4 years since it began its operations, the Bibi Fathima Swasahaya Sangha SHG in Theertha village of Dharwad district in Karnataka, has built a millet-based entrepreneurial model that provides a blueprint for for women's collectives to scale their operations¹.



Members of the Bibi Fathima SHG participate in food exhibitions across the state

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Post harvest, our processing unit helps farmers bypass middlemen who usually pay a lower price for the grains. We offer better value for the grain, visit the farms during harvest and help cultivators in transporting the produce to the processing unit. To encourage household consumption of millets we process small quantities for a fee. We want millets to be accessible to all households in our community, and our processing unit serves that purpose.

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Bibi Jan Halemani

Convenor of the Bibi Fathima Swasahaya Sangha, Teertha

Key learnings

- Strengthening the processing infrastructure for millets is a key component of reviving millet cultivation. It is also an important enabler to encourage local household consumption.
- By distributing high quality and demo-tested seeds free of cost, community-owned seed banks provide a vital input to farmers. This goes a long way to support farmers during the sowing season, when they often experience a cash crunch.
- Given the wide variety of small millets and their bespoke processing requirements, decentralised processing units provide a viable solution and offer the community an asset to expand the remunerative potential of millets.
- SHGs willing to undertake entrepreneurial activities can be the ideal community institutions to demonstrate and scale best practices – from seed conservation to value addition, marketing and consumption.
- A collaborative approach among government and non-government stakeholders ensures that all aspects of setting up and running the processing unit are secured sustainably, without putting a high resource burden on the community. Such an approach also offers high-impact opportunities for Corporate Social Responsibility and philanthropic investments to be made in the millet value chain.



¹ This case study has been prepared based on inputs provided by Sahaja Samrudha - Organic Farmers Association of Karnataka, and members of the Bibi Fathima Swasahaya Samuh

05 A Women-led Farmer Producer Company in Odisha Breaks Millet Procurement Records

Launched in 2017, the Odisha Millets Mission (OMM) is a flagship programme of the Odisha state government to revive millets on farms and plates. Core to its strategy is procurement of millets at a Minimum Support Price – the price guarantee would encourage more farmers to grow millets and state procurement would meet the twin goal of making millets remunerative as well as introducing them in the public distribution system to enhance household nutrition.

In Boipariguda block of Odisha’s Koraput district, OMM was faced with two key challenges - a lack of awareness among tribal farmers about MSP procurement, and high transport costs for farmers to access agricultural market sites. Involvement of local traders and intermediaries in millet procurement had historically kept farmers’ price realisation low, discouraging several farmers from growing millets. In this context, it is remarkable that a women-led Farmer Producer Company (FPC) from the same block won the award for highest MSP procurement in 2021–22.

Farmer Producer Companies engaged in millet procurement

It all began in 2020, when OMM recognised the need for decentralising the procurement process for millets by directly involving farmers. As a result, FPCs were incorporated into the design of the procurement model for millets. They were made key stakeholders in the process, alongside the Tribal Development Co-operative Corporation (TDCC) and the Department of Agriculture. Depending on the volumes procured, FPCs would earn commissions as part of this design. For women-led Sabujima FPC which had been set up in 2017, this was a unique opportunity for financial sustainability.

Sabujima FPC’s strategy to engage farmers, secure procurement, ensure payments

To start with, women farmer shareholders of Sabujima organised awareness campaigns, with resources from the district Agricultural Training and Management Agency and support from a grassroots organisation Centre for Youth and Social Development (CYSO). The awareness *rath*, led by Sabujima shareholders, travels across all gram panchayats covered by Sabujima at key moments – before the procurement season, when the surplus list is released by the state (based on which procurement quantities per farmer are determined), and if procurement slows down.

Sabujima’s all-women shareholders and Board of Directors (BoDs) were also trained by CYSD to monitor and facilitate the procurement process – from registration to quality control to payments. Many of these are functions that all FPCs in Odisha are required to handle as part of the decentralised procurement process of OMM. However, there are some unique interventions by Sabujima that give it an edge. All decentralised procurement sites (referred to as *mandi* points) have 3–4 Sabujima BoDs present to monitor quality checks and weighment – this plays a key role in trust building and accountability. Sabujima also supports shareholders and BoDs to safeguard produce kept in storage in the event that transfer of procured produce is delayed – the FPC covers transport and food costs for shareholders who monitor the *mandi* and local storage site on a rotational basis. Sabujima shareholders have been trained to monitor the process of timely payment – they keep tabs on generation of transit passes, a key evidence for the state to release payments to farmers once the produce is lifted and sent to TDCC godowns.



Board members of Sabujima FPC inspecting produce for procurement

Furthermore, Sabujima also assists farmers with grading, sorting and post harvest processing at *mandi* points where procurement volumes can be as high as 2,800 quintals a day. The FPC hires hullers for use by farmers at these sites.



Key outcomes

- Sabujima has been involved in millet procurement since 2020. Between 2020–23, procurement volume has increased by 117%, and nearly 2,700 farmers sold their produce via Sabujima. In the last three years, the FPC has been able to generate nearly Rs 40 lakhs as commission from millet procurement alone. This has accounted for 45% of Sabujima's turnover during this period. Sabujima aims to sell over 50% of millet produced by farmers in the block to MSP channels as it offers the highest price realisation. It encourages farmers to keep about 20–30% of the produce for household consumption, emphasising nutritional security. The remaining is sold to other market channels.

Key learnings

- MSP procurement has played a key role in encouraging farmers to see millets as remunerative in Odisha.
- Farmer Producer Companies are uniquely positioned in the agricultural marketing ecosystem to provide customised and value-added services to farmers cultivating millets. Their role and function can be tailored for state procurement programme as well as for non-state marketing channels.
- Women-led FPCs can combine the two key objectives of millet revival initiatives: income generation and consumption for household nutrition.
- Resourcing support from state agencies like ATMA and TDCC has been crucial to support allied activities like grading, sorting, value addition and awareness generation.
- Civil society partners like CYSD are an integral part of OMM's design – their technical expertise and contextual community mobilisation skills has enhanced the capacities of the FPC members.



In villages across Boipariguda, folk songs nowadays are about MSP and *mandi* points for millets – a compelling indicator of Sabujima's success in raising awareness and enhancing MSP procurement.

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All the credit for the success of Sabujima FPC goes to the FPC shareholders and CYSD staff. From the field preparation to selling of farmers' produce in *mandis*, the FPC have provided hand-holding support to the farmers. As the procurement agency, TDCC provided all the necessary support like providing gunny bags, lifting the produce after procurement & transferring incentives to farmers' account along with buying the produce at the right time, but all that couldn't be possible without the FPC's support.

There is a saying in Odia '*Dekha Sikha Odisha*', meaning seeing is believing; each year the number of farmers is increasing all thanks to the efforts of the FPC members and CYSD staff. This year we are planning to surpass last year's procurement of 34,145 quintals to 40,000 quintals.

Suresh Chandra Mallik
Branch Manager, TDCC
Sunabeda, Koraput

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After the decision in our Board of Directors meeting, each member was tasked with spreading awareness in their native & neighbouring GPs along with the '*Awareness Rath*'. It was a challenge at first to convince the people regarding government schemes because they used to get cash in hand for all their produce from the middlemen and this process of selling their produce at *mandi* takes time, but eventually, they learnt and started cooperating by joining the campaign.

We're planning to add more and more left out farmers to get benefits of this programme.

Alladin Khila
Board member, Sabujima FPC
Kollar, Koraput¹

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¹ This case study has been prepared based on inputs provided by the Centre for Youth and Social Development's programme implementation team.

06 Dibyajyoti SHG's Journey to Creating a Millet MSME in Rourkela, Odisha

In March 2022, the Odisha Millet Mission (OMM) launched a *Millet Shakti* cafe in Rourkela City. *Millet Shakti* is a brand created by the Odisha Millet Mission, to promote value-added products in urban, peri-urban, and rural areas of the state through millet cafes, outlets, and tiffin centres. So far, OMM has set up 8 *Millet Shakti* cafes, 152 village-level tiffin centres (kiosks), and 4 food trucks under the brand – all of which are run by women's self-help groups.



The Millet Shakti Café brand logo

The compact little cafe in Rourkela run by the Dibyajyoti SHG of Bisra block, is a conversation starter. The SHG members actively engage with customers, sharing health benefits and recipes. They prepare over 80 different value-added products from millets in their mother kitchen, many of these are displayed and served at the cafe. Some visitors are struck by the variety of sweet and savoury millet-based snacks, dispelling the commonly held belief that the grains are difficult to cook with. Others, like the staff of a nearby hospital, are just glad to have healthy alternatives to snack on after long shifts.

From a group making small savings of a few hundred rupees, the SHG has evolved into a successful millet enterprise with an annual turnover of Rs 1.5 Cr. It has tapped into diverse markets for millets and supplies products to stores and tiffin centres in 22 districts of the state. Millet-based items are supplied to kiosks at 5 railway stations under an Odisha State Government collaboration to promote millets. The daily sales at the cafe are approximately Rs 30,000. In December 2022, Dibyajyoti SHG was felicitated by the Chief Minister of Odisha for being the best-performing SHG in the state.

Growth story started with small steps and timely government support

The 12-member Dibyajyoti SHG has built a successful microenterprise that provides an exemplary model for millet-based businesses. Training and access to credit at critical growth points have been catalytic in its expansion.

For several years since it was set up in 2009, the Dibyajyoti SHG operations remained low-key. In 2011, it was empanelled by the WCD department to prepare *Chhatua* – a multigrain mix provided as Take-Home Ration (THR) to children in Odisha for 215 Anganwadi centres. In 2014, the SHG took a small loan of Rs 50,000 from Mission Shakti – the Odisha State Government department for the economic empowerment of women through SHGs. They set up a bakery unit, making biscuits to sell at local markets and exhibitions. (Mission Shakti facilitates bank linkage and interest subvention for women's groups).

The turning point for the SHG was the collaboration with the Odisha Millet Mission (OMM) in 2017. The OMM is a programme of the State Agriculture Department, launched with the objective of encouraging the cultivation and consumption of millets. It aimed to build capacity for processing, production of value-added products, and market linkages, through SHGs. Through the convergence of the Agriculture Department and Mission Shakti Department, Dibyajyoti SHG received training and credit support to scale operations. OMM also trained them to develop new recipes with 7 kinds of millet.

Soon, Dibyajyoti's whole product portfolio changed. The SHG members tapped into the market for value-added millet products armed with the expertise to turn grains into tasty, convenient (to carry and store) products, and built effective collaborations to diversify their markets.

Developing millet-based products to suit consumer tastes and preferences

Members of the Dibyajyoti SHG won several awards and travelled across the state to participate in state-sponsored food exhibitions and events. Growth brought confidence, and the ambition to scale operations further. Through loans from Mission Shakti in 2021 and 2022, they invested in biscuit manufacturing machinery to process large orders. Depending on the volume of orders, the group employs members from the block-level SHG federation, providing employment opportunities to more women.

Cafe and connections: Building partnerships for success

In 2021, when OMM was planning to set up a cafe in the industrial town of Rourkela – Dibyajyoti SHG emerged as a strong contender. They had experience in food processing and the capability to arrange working capital and run a business.

The Institute of Hotel Management, Bhubaneswar is a knowledge partner of OMM and stepped in for skill development, and inputs in plating and serving dishes. OMM provides a financial grant to set up the infrastructure and basic equipment, and training on diverse facets of business administration, book-keeping, and IT support. Students of the National Institute of Technology, Rourkela, also helped in marketing and building awareness about millets through internship programmes organised by OMM partners.



The Millet Cafe at Rourkela

Taking India's millets to the world

Dibyajyoti was selected by OMM to participate in an MSME trade fair in Paris in 2022. Travelling from the outskirts of Rourkela to the international stage was a milestone for Dibyajyoti's representatives. The millet ambassadors from Odisha shared the story of India's climate-smart healthy grains with entrepreneurs across the world. They also brought back ideas on presentation and packaging, to improve their own products at the cafe in Rourkela¹.

Key outcomes

- Odisha has emerged as an exemplar model for the promotion of millets. Women SHGs have trained other groups to build enterprises.

- OMM's push for millets and convergence with Mission Shakti has brought women to the centre stage of the state's millet economy. Many of the early starter SHGs are now organising training sessions for other women SHGs, who want to foray into the millet business.
- Dibyajyoti has hosted several SHGs from Chhattisgarh and Jharkhand on exposure visits to study and replicate their model.

Key learnings

- Women SHGs (WSHGs) can be tapped effectively as production and marketing channels for value-added millet products. It will come with the added benefit of giving women more economic agency.
- Capacity and credit for small millet entrepreneurs and WSHGs at critical points in their growth can contribute immensely to the expansion of the millet economy.
- Roping in young people from institutes of food and technology can help spread the message effectively and build the next-generation customer base. This can happen through internship programmes, school food festivals, and much more.
- It is important to archive traditional knowledge of millet recipes and build a bank of new ones that cater to evolving customer tastes.
- Millet food festivals play an important role in mainstreaming the grains in daily diets and providing a platform for entrepreneurs to showcase their innovations.
- Continued training of millet entrepreneurs is crucial for periodic upgradation of products and menus.



¹ This case study has been prepared based on inputs from members of Dibyajyoti SHG and the Odisha Millet Mission



Recipe training programme for WSHGs

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Millets are healthy grains and our effort is to try and get more and more people to add millets to their diets. We create products that make them tasty and acceptable, replacing refined flour and wheat or rice with millet. We have traditional recipes as well as new ones that we developed to suit people’s preferences. We customise based on feedback from clients and the training by OMM and other partners has equipped us to adapt. Children want pasta and gol gappas, adults want healthy, homemade snacks – millets are versatile and offer many possibilities. We hope that our cafe makes people realise that millets can easily be part of our daily diets.

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Prema Das
President,
Dibyajyoti SHG



The Dibyajyoti SHG members at the Millet Shakti cafe in Rourkela



07 A Multi-Stakeholder Partnership to Mainstream Millets as Nutritious Snacks for Children Under ICDS in Odisha

As per NITI Aayog's report on best practices in promoting millets in diets, a number of states including Madhya Pradesh, Chattisgarh, Orissa, Tamil Nadu, and Telangana have undertaken initiatives to include millets in ICDS.

Odisha's efforts to introduce Ragi-based ladoos as a morning snack to 1.49 lakh preschool-children under ICDS in nearly 7,000 Anganwadis in the tribal districts of Keonjhar and Sundargarh, is unprecedented in scale. The initiative supports livelihoods for 58 women SHGs involved in the preparation of these millet-based snacks.

Initiated under the Odisha Millet Mission (OMM), the programme contributes to children's nutrition and health outcomes, food diversification at a critical age, and influences large scale behaviour change in acceptance and consumption of millets in local communities.



Children receiving supplementary nutrition at Anganwadi centres

From mission declaration to actual implementation

The Odisha Millets Mission (OMM) declared inclusion of millet-based snacks under ICDS in its millet distribution and consumption framework, when it launched in 2017. The challenges identified were, setting up the process for end-to-end delivery, piloting the project, and gaining acceptance of the recipe from the children visiting Anganwadi centres. Further, to scale the programme, it needed financing and critical technical support to

standardise the preparation process and stabilise the supply chain of millets.

With funding support from the District Mineral Fund (DMF) at Keonjhar and Sundargarh districts, the millet-based morning snack programme was piloted in July–August 2020 and has since been universalised from April 2021 in the two districts. DMF funds have now been sanctioned for the programme in the two districts until 2026.

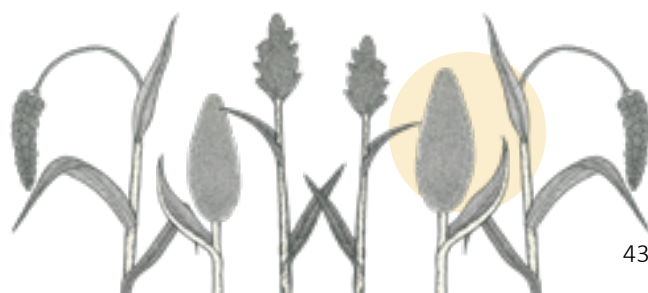
Technical support to standardise the recipe with recommended nutritional composition was provided by the Central Food Technological Research Institute (CFTRI), Mysuru. The Department of Women and Child Welfare, Government of Odisha was the implementing agency. WASSAN (Watershed support services and activities network), a non-profit organisation that partners with OMM, was the facilitating agency assisting in the planning, training and implementation process. It also built the capacity of SHGs and Anganwadi workers involved in the programme.

From procurement to production

Raw ragi for the ladoos is sourced from the state's procurement agency, Tribal Development Cooperative Corporation of Odisha and Odisha State Civil Supplies Corporation Ltd.

To procure and clean the grain, SHGs were selected by the department of Mission Shakti (the State government's mission for financial empowerment of women through Self Help Groups). These SHGs are responsible for sourcing, cleaning and storing millets as per demand from the (millet) value addition units at block level. Budget under the Odisha Millet Mission was utilised to establish cleaning, grading and destoning units. A seamless process of approvals for timely supply of millets was worked out for the SHGs to supply the desired stock on a monthly or quarterly basis.

The grain then travelled to another set of SHGs for value addition (into laddoo mix). These were nominated from existing empanelled SHGs under the ICDS value addition activity. Upon preparing the product, they supply it to the Anganwadi centres every month.



Training for food safety and hygiene

The SHGs handling the produce, processing and recipe preparation were provided comprehensive training in adherence to hygienic practices. WASSAN provided the training based on protocols developed by CFTRI, Mysuru. The training covered food safety and quality practices at all points - from procurement of ingredients, processing, storage conditions, to preparation of the recipe and serving the snacks to children, involving Anganwadi workers.



Preparation of ragi ladoo by SHGs

Sustained nutrition for children and secure livelihoods for women

The programme targets preschool children in districts where iron deficiency is rampant. The millet-based ladoos (22 gm) provide nutritional support over and above the existing menu served to children at Anganwadi centres.

The 58 SHGs involved in preparation of the millet-based snack received technical training and equipment, and have the capacity to diversify their income and build millet-based enterprises.



Millet ladoos provide nutrition support over and above the existing menu served to children at AWCs

Key outcomes

- The programme has created greater acceptance of millets in the community, reintroducing it in daily diets. It has also enhanced livelihoods, buyback support from the government during the programme and infrastructure and expertise development of SHGs encouraged rural enterprise. A standard recipe (and handling) for millet-based snacks has been developed, and available as a template for scaling up.

Key learnings

- Community nutrition programmes have the potential to generate acceptance for millets in diets, generating demand in the community.
- The learnings from the morning snack programme have enabled the State Government to develop a scale-up plan for millets-based Take-Home Ration (THR) for pregnant and lactating mothers and undernourished children¹.

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One of the key objectives of the Odisha Millets Mission is to include nutritious millets in ICDS, MDM and PDS. In this regard, inclusion of ragi ladoo in ICDS has already been launched in two districts, namely Keonjhar and Sundergarh through involvement of Women Self Help Groups under Mission Shakti Dept since 2019. This has received a very good response. Keonjhar has further included ragi ladoo for the boarders of ST Hostels. Under Odisha Millets Mission, in addition to ragi ladoo, pilots were also carried out on inclusion of ragi based THR. Based on the success, the Department of Women & Child Development is now planning to scale up inclusion of millets for pregnant and lactating women in a phased manner through *Mukhyamantri Sampoorna Pushti Yojana (MSPY)*. OMM looks forward to closely collaborating with the concerned departments in mainstreaming millets in government schemes for improving nutritional security. In addition to improving nutritional security, an assured market for millet farmers through government programmes would also support livelihoods of vulnerable rainfed farmers of Odisha.

Dr Arabinda Padhee
Principal Secretary,
Department of Agriculture
& Farmers' Empowerment,
Government of Odisha

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¹ This case study has been prepared based on inputs provided by the Odisha Millet Mission and WASSAN

08 Integration of Millets with ICDS Hot-Cooked Meals in Aspirational Districts of Telangana

Under the Aspirational District Programme (ADP) on NITI Aayog website¹ funded a programme for decentralised inclusion of millets in Hot Cooked Meals as a supplementary nutrition initiative under ICDS in three districts of Telangana. Jowar was once a part of the staple diet in Telangana. Over the past few decades, consumption of Jowar has declined due to low productivity and farmers' preference for high yielding paddy varieties. The decline in millet cultivation has changed local food habits and possibly nutrition outcomes as well.

The Supplementary Nutrition Programme under the ICDS is designed to bridge the gap between the Recommended Dietary Allowance and Average Daily Intake of children, pregnant and lactating women, by providing a nutritious diet at Anganwadi Centres. This pilot was further designed to mobilise local farmers, Self Help Groups (SHGs) and Farmer Producer Companies (FPCs) to cultivate, process and supply millets to support the nutrition programme targeting the community's most vulnerable women and children.

The pilot (Sept 2020–March 2023) aimed to address nutrition gaps for children and mothers with the introduction of millet-based meals at Anganwadis in the selected districts. It also aimed to encourage local cultivation of millets to facilitate the re-entry of millets into daily local diets.



The ICDS programme encouraged local cultivation of millets

Three districts were chosen on account of their maternal health, child health and nutrition indicators. Ten *mandals* of Jayashankar Bhupalpally, KB Asifabad and Bhadradi Kothagudem districts were chosen for the pilot. In the second year of the project, Asifabad district administration extended the project to the entire district.

Activating millet meals at Anganwadis and at home

The State Women's Development and Child Welfare (WD&CW) department proposed the pilot in the 3 districts to be implemented by the district administrations. Civil society organisations like WASSAN (Watershed support services and activities network), RRAN (Revitalising Rainfed Agriculture Network) and the Working Group on Millets were involved in designing the delivery mechanism and coordination between state department and district administrations. WASSAN was also responsible for creating awareness on cultivation practices among farmers.

The pilot took a two-pronged approach:

- Encourage the revival of millet cultivation by local farmers by providing seed support to help them convert a portion of their fields to local varieties in conjunction with knowledge of appropriate farming practices.
- Establish a local supply chain to provide processed grain to the Anganwadis for meal preparation; as millets were not centrally available for procurement, the pilot took a decentralised approach to procuring grains for local processing.

Promoting local cultivation

District teams mobilised farmers to enrol for cultivation. For the Kharif season in 2021, seeds were distributed by the district administration in 54 villages of KB Asifabad, 58 villages of Jayashankar Bhupalpally and 57 villages of Bhadradi Kothagudem. Seeds were distributed to nearly 6,000 farmer households, to grow 7 to 8 types of millets. Farmers were encouraged to start growing on small parcels of land. A similar trend was followed in 2022.

Local processing involving SHG/FPC

One SHG in each district was provided machinery and training to carry out the processing, which involved cleaning and dehusking the raw grains. In Kothagudem, a Farmer Producer Company was involved in processing as well. The processed grain (jowar, foxtail millet) was then turned into ready-to-cook mix by the SHGs under ICDS delivery framework. The millet-based ready-to-cook grains/mix were sent to Anganwadi centres where workers prepared hot cooked meals such as jowar upma, foxtail khichdi and jowar multigrain mix.

Recipe development with local community

Recipe development was done by engaging mothers groups and village elders. Anganwadi workers were trained to prepare the millet meals. In addition, community leaders and Panchayat officials were mobilised to carry out awareness camps on the nutritional aspect of millets. Food festivals revived memories of millets among locals, encouraging them to bring it back on their plates.



Anganwadi workers receive training to prepare meals with millets

Key outcomes

- The pilot covered a total of 3,545 Anganwadi centres where women and children were served two millet meals in a week. Over 94,368 women and children received millet-based Hot Cooked Meals.
- Sustained awareness and engagement with farmers brought about 1,000 acres under millet cultivation in each district. Most farmers did small scale cultivation and used grains for household consumption. Even though surplus for procurement was low initially, a trend began to emerge as interest and demand for millet seeds went up in the following cropping seasons.
- In Asifabad, the project reported that almost 80% of the ICDS beneficiaries cooked at least one additional millet meal every week, at home. KB Asifabad administration has since decided to continue the pilot as per availability of funds. As per district officials in Asifabad, village *kirana* shops saw a spurt in demand for millets.

Key learnings

- This unique pilot offers a potential model for local millet-based circular economies aided by the

government efforts to improve nutritional outcomes. Over a two-year period, demand catalysed through ICDS meals led to early shifts in local cultivation of millets, an increase in their household consumption and generation of a marketable surplus.

- The two-year intervention period also demonstrates that for significant impact on nutritional outcomes, local cultivation, production and marketing of millets, longer term investments can drive large scale outcomes. Integrating millet production and consumption habits locally requires significant efforts - for individual behaviour change as well as to create the enabling production, processing and marketing infrastructure.
- Districts like Asifabad that have extended the programme beyond the project period will help build an evidence case for this experiment that converges shared priorities across multiple government departments, with millets as a key enabler².

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With the support of NITI Aayog and WCD Department of Telangana, the programme for inclusion of millets in Anganwadi centres of aspirational district Kumuram Bheem Asifabad was started. Under this initiative, Anganwadi teachers and workers were trained in various recipes like foxtail millet khichdi, little millet payasam, ragi laddoo, ragi jawa, millet idli, dosa and appam etc. Further, food festivals were organised in every village, where these recipes were cooked in the community, taking it to local villagers. Initially, door-to-door visits were made by Anganwadi teachers to motivate people to consume at least one millet meal at home. Later, we started supplying jowar dalia, foxtail millets and ragi laddoo mix to Anganwadi centres to be served for 2 days as Hot Cooked Meal to children, pregnant and lactating women. To meet the increased demand, certified seeds procured from IIMR were supplied to increase cultivation by 6,000 hectares. The district was awarded the PM Award for Excellence in 2022, for the efforts taken in this programme. This initiative has helped immensely in reviving consumption of millets in the district, these grains were traditionally a staple diet of tribals. It has created tremendous awareness among people about the benefits of millets for health and environment.

Chahat Bajpai

IAS Additional collector (LB),
Asifabad

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¹ https://www.niti.gov.in/sites/default/files/2022-06/Take-home-ration-report-30_06_2022.pdf

² This case study has been prepared based on inputs provided by the WCD Department, Telangana, and WASSAN

09 Taru Naturals, a Responsible Enterprise Taking Millets from Farms to Fine-dining

During a stint in the social sector, Ruchi Jain, co-founder Taru Naturals, spent considerable time travelling across rural India. She gained a deep understanding of agriculture supply chain gaps that prevent Indian small scale farmers from finding profitable and accessible markets for their produce. This often led small farmers to sell produce to local traders or at village markets at unremunerative prices. She learnt that the farming communities had to be equipped and educated end-to-end on the agricultural value chain, to value their products and strategize localised solutions for self-sufficiency.

In 2016, Ruchi started nurturing the idea of creating an indigenous and heirloom food brand for the urban market that was good for the people, planet and profitable for the farmer. She founded Taru Naturals & Organics Ltd. with her mother who is a trained naturopath to promote organically-grown climate-resilient indigenous foods. The brand has whole grains, flour, ready-to-eat and ready-to-use packaged products made from millets, heirloom rice varieties, spices, lentils, healthy drinks and organic jaggery, among other products. It aims to offer clean and healthy food to consumers at fair prices and opportunities to farmers to become economically self-reliant, and while promoting climate resilient farming practices.



Ruchi Jain, co-founder of Taru Naturals with farmers on site

Integrating farmers with upstream processing, packaging and marketing

Taru Naturals presently networks with small farmers and Farmer Producer Companies (FPCs) across 14 states of India who practice natural and climate resilient farming techniques, and cultivate indigenous food. Farmers are provided mentoring support for at least a year through diverse skilling programmes on natural farming practices, climate-resilient cropping techniques, quality management and processing techniques. This process is resource intensive and demands personalised support

to each farmer over a stipulated period of time, after which Taru starts receiving the desired quality produce at their Mumbai warehouse, which is packaged, value-added at times, and then sent to consumers. Taru's team also invests in research and development of their product range in consultation with consumers. The feedback received is integrated into their mentoring support to farmers.

Taru's team visits farmers regularly and supports them for product quality checks, accreditation as per the National Standards for Organic Products, FSSAI-approved lab tests, customised packaging for each product and connects them to local marketing partners. The support is customised at a farm and farmer level. Tushar Shirke, from Purandar, Maharashtra is a millet farmer, who could not find markets to sell his produce. Taru's team assisted him to identify the gaps in cultivation practices that impacted the quality of produce, improve grain processing and identify marketing opportunities. He learnt the principles of natural farming and adopted quality control checks as per client preferences and demands. He also received assistance in securing market linkages. Tushar manages his business independently now and Taru is one of his many buyers.

Taru has also created a WhatsApp chatbot service to connect with over 10,000 farmers. The chatbot enables farmers to access standardised information to many FAQs at any given time. In helping farmers build businesses, Taru is providing critical support to small farmers. For their commitment to an idea that invests in farmers and promotes an inclusive value chain model, Taru Naturals bagged the 'Best Small Business' award at the UN Food Systems Summit 2021.

Taking millets to metro cities, restaurants, online marketplaces, community markets

From whole grains and stone-ground flours, millet energy bars, cookies, muesli, pancake and cheela mixes, upma and porridges, Taru Naturals has over 60 products made with millets, black rice, *khapli* wheat, lentils and other organically grown pulses and cereals. The procured farm goods reach the Mumbai warehouse where they are checked for quality and packaged. Value addition recipes and products like breakfast pre-ready mixes, healthy snacks and others, are made to suit urban tastes and trends, and make millets convenient, and aspirational for urban consumers. The brand uses both D2C (direct to consumers) and B2B (business to business) strategies, selling from their website, online marketplaces like Amazon, and retailing in the four metro

cities via SPARIndia supermarkets. Their organic whole grains, spices and other products are supplied to leading five-star hotels and restaurants such as the Taj Palace, Burma Burma, Smoke House Deli, as well as Chutney Mary in India and the United Kingdom. This year, Taru Naturals started exporting millet-based products to the United States, Canada, the UK, Switzerland, and Dubai. To create conversation around clean and healthy foods like millets, Taru Naturals has formed several online networks. The Moms Nuskhe Club has mothers sharing ideas for healthy foods for their families; there are local gardening clubs exchanging information on growing clean food. A network of chefs on the lookout for indigenous organic produce for their fine dining kitchens provides market intelligence on new trends, consumer preferences and demands. They also regularly interact with consumers via stalls at the Bandra and Chembur Farmers markets in Mumbai.

The challenges of creating a responsible, sustainable brand

Given the founder's commitment to invest what the business gained back into building an inclusive value chain where farmers benefit equally, Taru's initial years have been resource intensive. Taru invested time and resources in research and development work on standardised product quality, recipes, packaging and setting up systems. With 2023 declared as the International Year of Millets, their brand and philosophy is receiving a lot of recognition today, but early years have been tough. Ruchi shares that the modest fellowship received via the Unlimited Fellowship in 2019 was very crucial to support the operational costs of her business. "It is very challenging for entrepreneurs to receive financial support to take care of the administrative expenses, especially in the initial years when turnover is slow. My fellowship was helpful. And then by winning the Powered Accelerator award, I was able to invest more into my business." The award money was invested in the warehouse and branding of Taru's products. With a turnover of under Rs 1 Cr and requisite infrastructure in place, the brand now aims to reach out to many more restaurants, and establish more D2C linkages.



Taru Naturals has over 60 products made from millets and other indigenous grains

Key learnings

- Incubation support to millet-based entrepreneurs can be immensely beneficial.
- Millet entrepreneurs need partnerships with on-ground KVKs, local non-profit organisations that work with farmers and extension service providers to secure their sourcing backend for traceability and quality. Doing it by themselves can burden their business model with costs that are hard to fund or recover.
- Ventures in the millets space would benefit significantly from access to affordable finance towards processing equipment, product development, lab testing fee, quality accreditation and organic certification¹.

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Food should be healthy for you, profitable for the farmer, and support the local agroecosystem. The Taru model is inspired by agroecology models in India – who seek to integrate natural and climate-resilient farming techniques with the required quality accreditations and market linkages to establish an economically viable model.

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Ruchi Jain

Co-founder of Taru Naturals



¹ This case study has been prepared based on inputs provided by Ruchi Jain, co-founder, Taru Naturals

10 Slurrp Farm, a Successful Brand Story of Delicious, Healthy Millet-based Food Products for Children and (Now) Adults

Founded in 2016 with just two millet-based products, Meghana Narayan and Shauravi Malik, entrepreneurs and mothers, launched Slurrp Farm to make millet-based healthy and tasty products for children. Today they have nearly 60 products and are present in approximately 1,800 stores across the metro cities. They serve more than seven lakh customers through e-commerce and offline marketplaces in India. Slurrp Farm has grown 30X in the last seven years into a \$10 million business today, with a plan to double growth every year over the next 3 years.

Meghana graduated from Harvard Business School and Shauravi studied economics at Cambridge and worked in finance. They wanted to create ready-to-cook products for children, which were healthy and free of refined flour and sugar as well as artificial colours and preservatives. For a country that has such an incredible food culture and a large variety of grains including millets, the entrepreneurs viewed the lack of diversity on store shelves as a significant gap in India's ready-to-eat market. They decided to launch a brand that offered products made from whole grains and millets-something they themselves had grown up eating.



L to R: Shauravi Malik and Meghana Narayan, co-founders of Slurrp Farm

From a local to a global brand

Slurrp Farm began as a small experiment that has grown into a health-and-nutrition-conscious, millet- and whole-grain-based food brand for children. Meghana and Shauravi along with Umang Bhattacharyya (the third co-founder) worked cohesively to create recipes, engage with their customer base and develop marketing channels for their products.

For raw materials, they connected with millet and grain farmers and suppliers for reliable, organic produce.

While formulating recipes, the founders started with a list of things they didn't want to add into their own children's diet such as refined flour, sugars and additives. Mothers who shared the same sentiment, pitched in with recommendations and taste approvals. Product recipes were an outcome of advice from the community of mothers that they built and from nutrition experts. The goal was to get children to start young, encourage parents to introduce millets through baby porridge and milk mixes, make it tasty and convenient, and reach urban consumers, especially young mothers. The brand has since expanded its range to value-added products such as ready-to-use breakfast cereals or muesli, noodles, pasta, milk mixes, upma, dosa mix and several others using millets and healthy grains as core ingredients.

An integrated marketing strategy with mothers and parents at its core

Slurrp Farm has taken a consumer-centric approach to both product development and marketing. A cornerstone of the brand's marketing strategy was to create an active and engaged community of parents, with a focus on mothers and then went on to create its own community 'Yes Moms'.

The company also built an integrated e-commerce website, driving traffic through a combination of online marketing channels. The team at Slurrp published blogs with relevant content for young parents. Their YouTube platform featured experiences and testimonials of parent celebrities. Their Instagram account also drove engagement and traffic to their website.

In 2022, they launched their first ad-campaign 'Yes ka time aa gaya' - a series of 3 films showing a number of situations where mothers are compelled to draw the line and say 'no' to food suggestions from family and friends in the interest of their child's health. The company leveraged and amplified the campaign across digital touchpoints including YouTube, Instagram, and Facebook, and with leading influencers. The subsequent launch of their 'Yes Moms' online community offers mothers a platform to share questions and concerns, insights and experience on topics such as weaning foods for babies, immunity for toddlers and older kids and healthy alternatives for junk food.

Beyond their integrated e-commerce website, Slurrp Farm products are available on major e-commerce platforms such as Amazon, Big Basket, FirstCry, and on the company's own e-commerce integrated website.

Offline, products are available across the four metros. In the coming years, the founders are aiming to build a sustainable business and shape the way India eats.

Is “good for you, good for the planet” enough? Taste and convenience are critical to changing food habits

While the health benefits and climate-resilience of millets are part of the messaging strategy of Slurrp Farm, the founders believe that taste and convenience are key to consumer adoption. Hence positioning millets as healthy foods that can also be delicious, palatable and easy-to-make, has brought them repeat customers. Trendy packaging and products that offer healthy alternatives to existing and familiar recipes, are all strategies to improve consumer acceptance. “Innovate for India” is at the heart of their brand philosophy.

Mille - A new brand for adults

Mille came as a response to the global curiosity for millet-based foods, and was launched as a supergrain company in 2022 with an undisclosed investment and endorsement from Bollywood actor Anushka Sharma who wants to “put millets in the centre of our plates”. It has products such as breakfast cereals, pancakes, cake mixes and gluten-free grains, products made from millets, lentils and legumes that are nutritionally dense for people of all age groups (the target group is 25 to 50 years). Beating lifestyle diseases, helping you stay in shape, tasty and convenient food for a fitter and healthier life is Mille’s value proposition.



Slurrp Farm makes healthy grain alternatives for recipes that are part of everyday Indian diets

Opportunities ahead

Of their expansion plans, the founders share that they’re building a millet brand out of India for the world. The products showcase India’s millets and other superfoods that are good for the people and the planet. In 2022, they got the AWS Global Accelerator through which they entered the US, the UK and Europe (German) markets. Both Slurrp Farms and Mille are available in India and across these markets.

Key learnings

- Innovate for India: Make millets and whole grain alternatives for recipes that are part of the everyday menu. Health is a hook, but consumers are also led by taste, convenience, and packaging, in the decision to buy.
- Integrate, not replace: Food habits are difficult to change. Integrate healthier grains into mainstream foods.
- Build a community: Engage and educate consumers, build awareness through participative engagement both online and offline, and use feedback to improve products.



One of the co-founders of Slurrp Farm was interviewed for this case study. Information was also gathered from articles published in the media.

11 IIMR - Accelerating Success of Millet-based Enterprises Through Research and Incubation

Momos in the hills of Himachal Pradesh, instant noodles in Mumbai and ice cream at Trichy share a common ingredient: yes, millets. The fact that the United Nations General Assembly has declared 2023 as the International Year of Millet, has further highlighted India's remarkable efforts at reviving heritage grains as a sustainable approach to address food security, nutrition and climate-resilient agriculture. From the farmer's fields to fine dining restaurants, the millet movement has one underlying message: millets are good for you, and good for the planet. The nine millet varieties grown in India are a rich source of protein, fibre, vitamins and minerals, are heart and gut healthy, and prevent the onset of diabetes.

Challenges in the millet value chain

The acceptance of millets as a nutritional food alternative by consumers and as a viable business opportunity require significant investments in research, technology innovation and market development. Even as entrepreneurs are gearing up to explore business opportunities that millets offer, there are challenges in product development, finance and sustained market development (distribution and branding). In essence, large-scale adoption and commercialisation of millets requires addressing both demand and supply side challenges. Research investments in product development (for convenience, ease of use and value-addition), innovation and appropriate decentralised grain processing technologies and marketing infrastructure at large scale are the need of the hour.



Products incubated at Nutrihub

Nutrihub: Promoting millet science, technology and entrepreneurship

Indian Institute of Millet Research (IIMR), Hyderabad, now designated as a Global Centre for Excellence on Millets, is a premier agriculture research institute addressing end-to-end process of quality millet production and generating market demand. While it leads the scientific research for increasing millet production, IIMR felt the need for a dedicated institution to support entrepreneurship for commercialisation of millet products.

Nutrihub technology and business incubator, was set up as a Section 8 company under ICAR-IIMR in 2017 to build synergies between millet start-ups, investors, corporates, governments and academia. The technology and business incubator aims to commercialise millets and create demand for varied products. It offers 360-degree handholding support to millet-based start-ups, connecting them with farmers, funders and big industries. This is supported by on-site training and capacity building in technology, mentoring, research inputs, and grant facilitation. Start-ups are accelerated through private funding, to take products to market.



Millet Flaking unit at Nutrihub

Convenience as an innovation

Millet entrepreneurs at Nutrihub are supported with value-addition technologies and technical assistance (scientific validation of nutrition, palatability, and the shelf life of products). The big breakthrough for millets for product-led entrepreneurs is to improve the ease of value addition. Millets lack gluten, a protein present in wheat which makes it 'stretchy' and helps to bind food together. Being gluten-free makes value addition in millets a challenge. Nutrihub has developed millet-specific food processing solutions to address this challenge while ensuring that the quality of grain, nutritive value and shelf life are not compromised.



Start-ups at Nutrihub receive access to:

- **Millet production and processing technology:** This includes demonstrating millet-specific processing technology and equipment for improved grain quality and preparation of millet-based food products that retain nutritive value with an improved shelf life. Start-ups also have access to licensed technologies by ICAR-IIMR.
- **Financial linkages:** Start-ups receive assistance in launching their products at business platforms to attract investors from angel/venture capitalists or loans from commercial banks/financial institutions to help scale up at a faster pace.
- **Government linkages:** Nutrihub builds linkages with the State governments to help its incubatees develop millet-based products for government nutrition schemes.
- **Farmer connect:** Nutrihub builds linkages between farmers and entrepreneurs. Farmers are provided the expertise and processing tech for value additions needed by millet businesses.



Foxtail millet cheesebread developed at Nutrihub

Key outcomes

- Engineering innovations (in the form of equipment) and food processing technology development are complementary and need synchronous effort. When they come together, it reduces the significant investments that standalone entrepreneurs would have to make.
- Incubators that provide for technical and marketing support are required across the country to unleash entrepreneurial activity that can leverage the production and processing solutions developed at Nutrihub.

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As an institute we preempted, over 15 years ago, that demand should be brought up to increase profitability of millet farmers. We are working to strengthen the farmer to consumer value chain, and improve millet science. Lifestyle diseases linked to food choices have created a huge market for millet products. India is leading innovation of millet-based food and we are ready to cross boundaries and take our tech to countries like Africa and build south-to-south cooperation in millet tech and innovation.

B Dayakar Rao

Principal Scientist, ICAR-IIMR
& Director and CEO, Nutrihub

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I ventured into millets because my mother was diabetic and I wanted to make healthier alternatives. In 2021, I was an incubatee at Nutrihub and got the RKVY funding that year. I then started a small manufacturing unit. My venture was funded by HDFC and CapGemini CSR fund. In 2023, I approached Nutrihub for R&D, product development, validation and certification. Our value proposition is products made from iron-rich pearl millets (bajra). Bajra has a low shelf life of about 10 days once it is turned into flour, beyond which it begins to turn rancid or bitter. Our work at Nutrihub involved increasing the shelf life through combined hydrothermal treatment developed during the incubation at Nutrihub. Now our products have a shelf life of 6 months and I am planning to venture into the north Indian markets beginning with Gurgaon.

Mahesh Londhe

Nutrihub incubatee,
Founder of Agro Zee
millet products, Pune

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International Year of Millets (Shree Anna) India Stamp

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