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Millets: Reviving A Nutrient-Rich Tradition

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ABSTRACT: Millets can be important part of a healthy diet; SDG 3 (Good health and well-Being) Millets are good sources of minerals, dietary fibre, antioxidants and protein. With a low glycaemic index, they are a good option for people with high-blood sugar.

KEYWORDS- millets, nutrient-rich, tradition, SDG, antioxidants, glycaemic index, protein

I. INTRODUCTION

“Children happily eat little millet khichdi,” says Ispari Dani, an anganwadi worker in Goudaguda panchayat in Koraput district’s Lakhimpur block. “The new recipe has created curiosity among them.” [1,2,3]

As many as 3,751 preschool children within 3 to 6 years of age, in Lakhimpur, are being fed little millet khichdi twice a week as part of the Odisha Millets Mission, a flagship programme launched by the state to revive millets in the tribal areas here. The initiative, run in collaboration with the Mission Shakti Department, also introduced millets-based dishes at anganwadi centres.

“Earlier, millets were considered a poor-man’s food. But now, even the government has recognised its health benefits,” Dani explains, hopeful that the younger generation will come to appreciate the nutritive value of this cereal crop.

Adivasi women play an instrumental role in introducing millets-based recipes to the meals of schoolchildren, to fight malnutrition and ensure dietary diversity among preschool children. The need for such a programme stems from the abysmal state of nutrition among young ones in the state — over 69% of children in Odisha in the age group of 6 months to 4 years are anaemic, according to the National Family Health Survey-5, 2019. Similarly, in the age group of 5 years, 33.5% are underweight, 43.1% are stunted and 15.9% are wasted. In Koraput district, where the mission has been introduced, over 44% of the children are underweight, 40.6% are stunted and 28.5% are wasted.

The tribal revival

Located in the Eastern Ghats, Koraput is home to several indigenous communities and represents a unique mosaic of ethnic life and culture. Over 50% of its population belongs to the Scheduled Tribes, who sustain their livelihood primarily on rainfed agriculture, collection of uncultivated wild food and forest produce.

Over the years, monocropping and the use of chemical inputs to enhance crop yield eroded the rich agrobiodiversity once abundantly found in the tribal hinterlands. As a result, the area under millet cultivation shrunk, forcing the tribes to replace climate-resilient, nutritious traditional crops with hybrid paddy, maize and cotton. The public distribution of rice and wheat also lowered the importance of local food culture and preferences, while the influence of urban food diminished the demand for local cuisine, especially among the youth.

“These days, the diet of tribal children is not optimally diverse and has, instead, become cereal-centric,” says District Social Welfare Officer of Koraput Bidyulata Patra. “The traditional varieties of millets, pulses, vegetables and wild fruits, which they once consumed regularly, are now missing from their plates.”

Children between 0 to 6 years need special attention as the nutrition they receive at this time lays the foundation for their optimal development. During this phase, lack of a nutritious, balanced diet could result in lifelong health implications and increase the risk of a child becoming undernourished and prone to micronutrient deficiency.

Why local food matters

To address this challenge, “Inclusion of millets in the Integrated Child Development Service programme would transform the nutritional status of preschool children,” believes Sabita Sahu, Child Development Project Officer in

Koraput's Lakhimpur block. "This would increase dietary diversity and nutritional gains and also revive the age-old traditional culture of millet consumption."

District Collector of Koraput Abdaal M Akhtar (IAS) stresses, "It's high time we promote these nutri-cereals to fight against malnutrition as millets are traditionally a major staple among tribal communities. They are also climate-resilient crops, can thrive with less water and have pest-resistant qualities."

Similarly, Dr Debabrata Panda, Assistant Professor, Department of Biodiversity and Conservation of Natural Resources at Koraput Central University, points at the "immense potential" that such traditional crops have "to bridge the nutrition gap among women and children".

"The diversity of local food should not be underestimated," he warns.

Several studies have emphasised that millets are rich in protein with a balanced amino acid profile, making them superior to most other cereals like maize, wheat and rice. Millets are high in calcium and folate content, which helps in foetus development, whereas magnesium and potassium control blood pressure. The crop is non-glutinous, easy to digest and also beneficial for women suffering from polycystic ovarian disease, as it helps to cut down visceral fat and regulate menstrual cycles.

"Tapping the nutritional values of millets could be a potential low-cost, pragmatic strategy to enhance the nutrition intake in tribal areas," says Nabakishore Kundu, a Lakhimpur-based medical officer.

The Odisha Millets Mission promotes millet consumption, production, value addition and marketing in 142 blocks in 19 tribal-populated districts. It reaches 1.5 lakh small-scale farmers and covers more than 75,000ha under millet cultivation. The crop is gradually regaining its value in the community's food basket. Local women's self-help groups (SHGs) and farmers' producer organisations purchase millets directly from farmers at a fair price.

"This has been creating local demand for the forgotten millets," says Suryakanth Nahak, Block Agriculture Officer, Lakhimpur. "Farmers are getting incentives under minimum support price for finger millets under the initiative."

How are women benefited?

This nutri-sensitive programme has also been benefiting pregnant women and lactating mothers. Every month, they receive 4.9 kg of ragi chatua take home ration (THR), which is prepared from ragi, peanuts, sugar, sesame and cardamom powder. These women are encouraged to add water or milk to the ragi chatua THR and mix it well before consuming. [4,5,6]

Women's SHGs lead the THR unit in Lakhimpur. They prepare the ragi chatua and little millet khichdi from the training they received from WASSAN, a not-for-profit and the programme secretariat of the Odisha Millets Mission. Anganwadi workers, cooks and SHG members go through comprehensive capacity-building programmes on processing millets, preparing dishes, storage and maintaining general hygiene.

"This programme is an assured source of income for the women's SHGs and farmers alike," says Tapas Chandra Roy, Scheme Officer, Odisha Millets Mission, Koraput. "It will also boost local millet production and promote a circular economy, wherein the entire demand is met through locally grown millet."

Priti Ranjan Ratha, Lakhimpur Block Development Officer, highlights how this state government initiative brings to focus the intricate link between agriculture and nutrition by engaging women on the frontline.

Sanari Miniaka, a tribal woman, farmer and member of an SHG in Toayaput village, Lakhimpur, says they can go for hours without the need for more food once they have a bowl of mandia jau (finger millet gruel).

"We can work hard throughout the day on our farms. If our children eat mandia regularly, they will become healthy and strong like our grandparents," she adds.

Sarpanch of Goudaguda panchayat Bhagabati Muduli says they will monitor the quality of food delivered to the area's anganwadi "to ensure the best quality, hygienic food for preschool children".

According to a government official, the state will analyse the learnings from this programme and replicate the model in other districts of the state. The aim is to make Koraput self-sufficient with respect to the production, procurement and distribution of millets from farm to plate.

The Public Distribution System

“For decades, food grain self-sufficiency has been the focus of food delivery programmes in India, not nutrition,” points out Devinder Sharma, food policy and agricultural trade expert. “These provided calories but didn’t address protein and micronutrient deficiencies,”

II.DISCUSSION

In the culinary history of India, the existence of millets, also known as nutri-cereals, can be traced back to 4500 BC, which indicates it was an integral part of local food cultures for centuries. However, millet varieties were referred to as coarse grains in the post-Green Revolution phase in the later twentieth century. They were rapidly replaced by their more-refined counterparts, wheat and paddy, as significant staples in the agricultural landscape of India. With the marginalization of millets as a staple on consumers’ plates, its cultivation also became less cash remunerative. Hence, millet’s share in the total grain production of India gradually decreased from 40 to about 20 percent.

Despite the dwindling statistics, the importance of millet continues and is increasing with time due to its climate-resilient nature and highly nutritive value. Millets, being highly nutritious and resilient crops, offer a range of benefits that contribute to multiple SDGs. By promoting millet cultivation, we can address several goals, including zero hunger (SDG 2), good health and well-being (SDG 3), sustainable agriculture (SDG 12), and climate action (SDG 13). Globally, the consumption of millet is also gaining popularity due to its gluten-free nature. Rich in nutrients like iron, calcium, fiber, and protein and low in glycemic index, millets are considered a “smart food,”[1] beneficial for consumers and farmers (SDG3). They can survive less rain in higher temperatures and even saline soils[7,8,9]. Millets, which can be used as food, fodder, and biofuels, have low cultivation costs and short crop cycles, making it well-suited for regions facing water scarcity or drought conditions cycles. Hence, numerous efforts were seen at the national and state levels to revive millet cultivation. Encouraging the consumption of millet-based products can contribute to improving public health and achieving food security. By promoting millet production, we can reduce pressure on water resources and enhance water efficiency, thereby supporting the sustainable use of water (SDG 6) and ensuring climate-resilient agriculture (SDG 13).

To promote the cultivation of millets as resilient, affordable, and nutritious cereals globally in the public psyche, the United Nations General Assembly declared 2023 as the International Year of Millets (IYM 2023). In India, millets were already rebranded as nutri-cereals in pre-COVID times (2018), followed by the emergence of several state millet missions in states like Odisha, Chhattisgarh, and Assam, among others, to popularise millet cultivation among farmers. The Government of India is spearheading the celebrations of IYM 2023 by promoting it as a “people’s movement” and attempting to establish India as the global hub for millet.

To motivate farmers to adopt sustainable practices of millet cultivation and restore the presence of millets to the plates of consumers, the Department of Agriculture and Farmers’ Welfare has planned several millet-centric activities. These include food festivals/millet melas (fairs), training of farmers, awareness campaigns and workshops, and motivating Farmer Producer Organisations (FPOs) to showcase the diversity of Indian millets, among others.

Complementing rigorous efforts of the government to popularize Indian millets nationally and globally, a host of civil society organizations have adopted the promotion of sustainable millet cultivation among farmers. The primary objective is to motivate farmers to adopt millet cultivation and generate awareness about the rising global importance of millet as a prosperous and healthy cereal. Many organizations work closely with FPOs and various state millet missions to increase millet land acres, promote post-harvest processing enterprises, facilitate farmers to sell millets at minimum support prices (MSPs), and improve local consumption to address food and nutrition sufficiency.

S M Sehgal Foundation promotes sustainable practices of pearl millet cultivation in multiple states, including Haryana and Rajasthan.[2] Farmers are encouraged to use recommended quantity of macro and micronutrients based on an initial soil test analysis. The balanced use of soil nutrients increases soil fertility and improves the quality and quantity of yields. Besides, farmers are motivated to adopt millet cultivation by replacing crops like cotton that could be more water-efficient. They are further encouraged to sell millets by registering under the government’s Mera Fasal Mera Byora[3] portal. Since 2020 with these efforts, more than 3,500 farmers have been motivated to start growing pearl millet on 3200 acres of farmlands approximately.



Story of Change

Before 2019, in Runera village, located 32 km away from the district headquarters of Nuh, in Haryana, farmers grew water-intensive crops like cotton, paddy, and pigeon pea as primary kharif crops, using water from a neighborhood canal. The aspirational district of Nuh, as enlisted by Niti Ayog, has semi-arid climatic conditions with an average annual rainfall of 336 mm to 440 mm and saline groundwater.

Sehgal Foundation (SF), under a CSR-supported partnership, started motivating farmers in Runera, who were completely unaware of the multiple benefits of millet cultivation, to adopt sustainable agricultural practices.

As part of this initiative, millets were reintroduced to the farmers as a climate-resilient and highly nutritious alternative to crops like cotton and pigeon pea. The team conducted multiple sessions with farmers and motivated them to cultivate pearl millet, emphasizing its growing global and national market demand. In the beginning, only ten farmers of Runera started pearl millet cultivation. These farmers were provided with a package of practices (PoP) for half an acre demonstrations including micronutrients such as zinc sulphate, boron, ferrous sulphate, potassium, and magnesium. The seed was provided for one acre. In the remaining half an acre, the farmers followed traditional cultivation practices of unabated use of Urea and DAP. Observing the success of millet cultivation in 2019, there has been an increase in the adoption of the micronutrient package of practice in three consecutive years, as shown in the graphical representation below.

In 2022, without any demonstration, millet cultivation was adopted by thirty-six farmers, which is about 20 percent of the entire farm area in Runera.

In terms of yield difference, the half-acre demonstration plots experienced a maximum of 480, 560, and 720 kilograms in 2019, 2020, and 2021 respectively, whereas in the same half-acre control plots, the maximum yields recorded were 380, 460, and 430 kilograms respectively (Average yield increases amounted to 23%, 25% and 31% in 2019, 2020, and 2021 respectively.)[10,11,12]

The once-forgotten and forbidden grain is creating new opportunities and silently changing the agriculture landscape in one of the remotely located villages of the Nuh district. The increase in adoption increased the area under pearl millet cultivation and replaced cotton and pigeon pea. Longer crop cycles (8–9 months) of cotton and pigeon pea incur greater costs in labor, pesticide, and irrigation cycles. Contrarily, millets require lesser inputs with shorter crop cycle (3–4 months) and are mostly rain-fed. In addition, cotton and pigeon pea are more prone to disease and weed infestation, negatively impacting the outputs and incurring losses for the farmers. The following table shows the cost of cultivation of each crop.

In villages like Runera, millets have the potential to offer smart solutions to address local issues of malnutrition among women and children, and the requirement of cattle feed.[13,14,15]

Rizwana, a women farmer beneficiary, reports, “Intake of millets, which increased after we started growing them in our farmlands, improved digestion and controlled diabetes levels.”[16,17,18]

The story of Runera aligns with what the FAO Director-General QU Dongyu mentioned in the Opening Ceremony of the IYM in December 2022: “Millets can play an important role and contribute to our collective efforts to empower smallholder farmers, achieve sustainable development, eliminate hunger, adapt to climate change, promote biodiversity, and transform agri-food systems,”[19,20]

RESULTS

Millets are ancient, traditional grains that are round and small in size. They belong to the Poaceae family (Grass family) and are cultivated in Asian and African countries. They are also Gluten free, rich in fiber and antioxidant. These hardy grains are rain fed and require less water to grow. Millets were mostly used as fodder for animals but now its slowly taking its place on our plates as well.

There are various kinds of millets. Broadly they can be divided as Naked grains (Ragi, Jowar, Bajra) which do not have a hard husk and Husked grains (Foxtail, Little, Kodo) which requires the husk to be removed before consumption.

To know more on what are the traditional millets and what are they called in different languages refer: About Millets | Kaulige Foods - Bengaluru's Millet Hub

Millet Cultivation in India

Millet Cultivation in India is going on from ancient times. India is the largest producer of millets in the world with total cultivated area of 12.45 million hectares, producing 15.53 million tonnes. Bajra is the largest produced millet in India followed by Sorghum (Jowar). Among States, millet cultivation is highest in Rajasthan followed by Maharashtra. India is also the highest millet cultivator of Barnyard, Finger, Kodo, Little millet and pearl millet as well. Data of the last 10 years shows consistent, improved increase in millet cultivation in India. The Government of India is also encouraging to increase the consumption and production of millets and taking efforts to create consumer awareness.

Nutrition & Health Benefits of Millets

Millets are gluten free, fibre rich, have bioactive compounds and are low in glycaemic index. This makes it applicable for a number of health benefits.

Controls blood sugar levels- The low carbohydrate and fibre rich properties of millets makes it suitable for diabetes. The lowest carbohydrate and highest crude fibre are found in barnyard millet.

Reduces Micronutrient deficiency- Millets are high in micronutrients such as iron, calcium, zinc, magnesium, iodine as compare to other cereals. Ragi has highest amounts of calcium as compared to other grains.

Improves digestive health- The insoluble fibre in millets acts as a prebiotic which helps support good bacteria.

Obesity- The low glycaemic index, slow release of carbohydrates and fibre rich content makes it suitable for obese individuals.

The Nutrition profile of some of the popular traditional millets in comparison with Rice and Wheat are shown in the table below:

Millet cultivation: Solution to Climate & Food Challenges

The importance of Millet cultivation has now been recognised by the world with experts relying on Millet cultivation to solve food and water insecurity. Millet is a very efficient crop, they consume 70% less water than rice, grow in half time of wheat and need 40% less energy for processing. They are also resistant to pests, stress and varying climate which makes it a very steady crop. Not just that, millet cultivation generates sustainable income source for farmers with low investment. With Global population increasing rapidly and projected to reach 8.5 billion in 2030, there is a need for diversification of crop by promotion of crop cultivation that can grow in the toughest environment. Millets offers a solution to this climate and food crisis.

Government of India in boosting Millet cultivation

The United Nations declared 2023 as the International Year of Millets on proposal by Government of India. Government of India has also setup various events, programs and interactions on millets to engage consumers and create awareness. The Government is not just now but also from 2018 have started realising the potential of millet cultivation and hence the National Year of Millets was celebrated in 2018 with campaigns and awareness on millets. The Government has taken many steps to ensure millet cultivation to happen in full swing. Apart from notifying millets as nutri-cereals, Food Corporation of India (FCI) have been roped in for the provision of surplus millet transport. The Government of India also plans to roll out various programs in India and even Abroad to popularize millet consumption and cultivation. This can also be seen in the recently released Front of pack Labelling (FOPL) regulations of FSSAI (Food Safety and Standards Authority of India). The Indian Nutrition Rating (INR) Score which is a 5-star rating is calculated basis parameters including percentage of Fruits, Vegetables, Nuts, Legumes and Millets. This can be seen as a big policy change step to promote traditional millets.

To know more on Front of Pack Labelling Regulations, please refer blog: FSSAI Front of Pack Labelling in India | Information Center (foodlabelsolutions.com)

Millet Adoption by Food Industry

Although the use of Millets in processed food industry and restaurant or hotel chains is not seen much, however a lot of newer food companies are formulating millet-based products. Amazon, Flipkart or any ecommerce websites have a long list of Food Brands offering millet-based products. Just a single search on millet-based products will give you brands such as the Wild Date, Rooted Co., True Elements, Slurp Farm, Food Strong, 24 Mantra, Gooddiet, ITC, etc. They offer products such as Millet pancakes, dosa, cookies, Chips etc.

Restaurants and Hotel chains have also in a big way brought in millet-based menus in their kitchens. Some examples of restaurants that brought in millet-based menu options are Punjab Grill. Through its Millet menu festival, they introduced millet-based food dishes such as Bajra Malpua, Puffed Bajra, Jowar and Tamatar Cheela, Ragi Te Khubani ka Halwa, Multigrain sevpuri to name a few. The Marriot Hotel at Indore and the Bombay Canteen have also introduced similar millet-based menu options. These millet-based menu options have also gained popularity as consumers realise the importance of health with taste.

Revival of traditional Millets

As people are becoming more health and climate conscious, the demand for tasty, nutritious and environmentally friendly food options is on high surge. With the boost from Government of India, the Food Industry are bringing in millet-based products into the market. Let's look forward to 2023 as the International Year of Millets and take pride in calling India as world leader in Millet cultivation.

IV.CONCLUSION

To tackle the twin challenges of climate change and malnutrition, the Himachal Pradesh state agriculture department, in collaboration with local civil societies and farmers, has launched a natural farming programme in June 2022.

"We are facilitating identification, documentation, multiplication and exchange of traditional seed varieties in 10 villages spanning across Bilaspur, Kangra and Mandi districts. Millet is one of the focused crops," said Anoop Kumar, state coordinator of RRA, Himachal Pradesh.

RRA has been working with local civil societies, farmers and relevant government departments to revive traditional crops in Himachal Pradesh, he added.



The road ahead to natural farming, where farmers are encouraged to shift to organic farming from chemical-intensive farming, entails myriad challenges. “Distribution of subsidised rice and wheat under public distribution system has changed people’s food habits,” said Kumar.

But investing in low-duty and low-input intensive crops like millet could be a game-changer. Awareness campaigns, training programmes, availability of quality seeds and incentive support for farmers are required to translate this into a reality, he pointed out.

Several states have played a promising role in restoring the lost glory of millets, one of the ancient crops grown by humans, pre-dating to the Indian Bronze Age (4,500 BC).

“States with suitable agroclimatic conditions should join hands to promote millets,” said PV Sathesh, director of the Deccan Development Society, who was honoured for his lifetime contribution to millets at the People’s Convention on Millets for Millions.

The production of millets has increased from 14.52 million tonnes in 2015-16 to 17.96 million tonnes in 2020-21, according to a report released by Press Information Bureau.

Read more: How investing in processing machines can help India promote millets

“Millets were orphaned by the centralised agriculture policies of the Green Revolution,” said Arabinda Kumar Padhee, principal secretary, Department of Agriculture and Farmers Empowerment, Government of Odisha.

Through Odisha Millets Mission (OMM), we have introduced millets in the state’s public distribution system and integrated child development services.

A minimum support price is also provided to farmers. We have promoted a multi-stakeholder approach that is community-driven, gender-responsive and farmer-centric. This has not only empowered small-scale farmers in the rainfed areas but also enabled Odisha to emerge as a powerhouse of millets in the country, he added.

Similarly, in north-eastern Tripura, civil societies such as Seven Sister Development Assistance and Voluntary Health Association (VHA) have been working with farmers to revive foxtail, proso, ragi and little millets.

“The fertile red soil and atmospheric conditions here are suitable for millet cultivation,” said Priya Tosh Pal, livelihood coordinator at VHA. The undulating hilly terrain, heavy rainfall, inadequate irrigation facilities and lack of plain land make millet crops the most suitable for farmers, he suggested.

Abhinash Moirangthen, assistant professor at the University of Imphal, Manipur, advocates for the need to promote millet farming across the Northeast.

Sustainable organic farming and millet cultivation go hand-in-hand, he said, adding that millet cultivation in Arunachal Pradesh is by default organic.

Read more: ‘Millets can solve our food needs as climate changes’

It is important to adopt farming techniques with the least adverse environmental effects while providing promising yields that can support farmers’ food security and livelihood, he added.

In Gujarat’s Bhuj, Geeta Ranchor has been growing bajra, sorghum, moth bean, custard bean, sesame, green gram and black gram under mixed and rotational cropping methods for years.

Around four years back, there was a severe drought, she recalled. “Most of our crop failed. But we sustained with bajra and sorghum. Because they need less water,” she said.

Shekha Banita, a neighbour of Ranchor, said:

We cannot survive without growing these traditional crops as we live in the most water-scarce area. Even our livestock depend on the residues of these crops.

Tejashvi Nari Chetna, representing a women federation with over 5,000 members in Madhya Pradesh's Dindori district, has been supplying cookies and namkeens prepared from kodo millet to 600 Anganwadi centres, reaching out to around 12,000 pre-school children.

"We feel proud to provide nutritious kodo millet food to Anganwadi children," said Rekha Pondram, a member of the women federation. Women self-help groups in our area are getting an opportunity to earn income through these millet value addition programmes, she pointed out.

"In the last few years, there has been a growing policy focus on millets, the miracle crops," said Naresh Biswas, the founder of NIRMAN, a non-profit working with the Baiga community in the Dindori district.

But adequate attention should be taken by the government and civil societies not to promote monoculture. Traditionally, millets are grown under mixed cropping methods by the Baigas.

Under this method, around 32 varieties, such as millets, pulses, cereals, tuber crops, roots, oilseeds, vegetables, etc., are cultivated. This eco-friendly farming method ensures food and nutrition security among tribal communities that depend on rainfed agriculture.

Biswas believes that providing minimum support price (MSP) and incentive support for a few millet varieties is a piecemeal approach to restoring the value and enhancing the market potential of these crops.

"Why are only major millets included under MSP? Why can't the government include minor millets under the MSP and provide an incentive support mechanism," he asked.

There are many challenges in millet farming, said Lahari Bai, a woman from the Baiga tribal community who was lauded by the Prime Minister for setting up a millet bank in her two-room house in Dindori.

Women often spend hours to process minor millets. It is very labour-intensive. Government should provide millet processing machinery in remote tribal areas. Providing training and capacity-building programmes to local youths and women is needed, she said.

"Harmonising traditional agroecological knowledge of tribal farmers with ecofriendly and technically feasible know-how would be critical to ensure successful come back of millets," said Annandana Seethram, who was honoured during the People's Convention for his exceptional leadership in furthering scientific engagement in millet promotion.

Besides, decentralised procurement, local processing and consumption should be ensured at each stage of value addition, he added.

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