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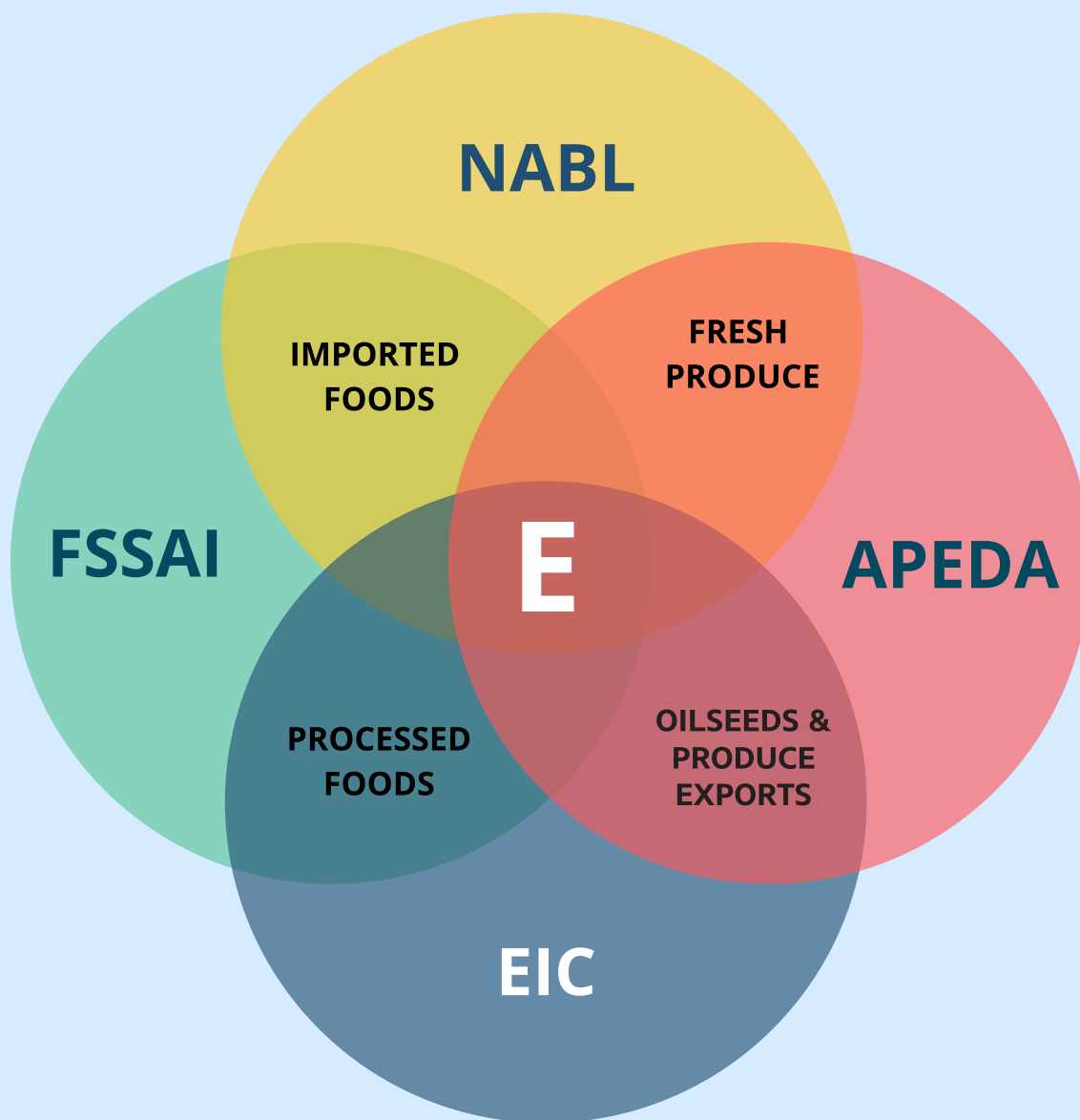
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CASMB MEMBER'S ACHIEVEMENTS



How this Mumbai based SME association is fighting for innovation?



**CHAMBER FOR ADVANCEMENT
OF SMALL & MEDIUM BUSINESSES**

Mr Nilesh Lele
President CASMB



Introduction of the Interviewee including information about the start-up/ business:

In India, SMEs contribute towards nurturing equitable economic growth, but also in employment generation, to reduce regional disparities, and enhance the export potential. Covid has brought new threats to the SME sector with various insuperable challenges, including liquidity crunch, low-motivated workforce and supply chain disruption, adverse effects on import and export perspectives and so on. But Covid 19 has caused massive losses to SMEs and compelling critical actions for the revival.

Mr. Nilesh Lele, President of the Chamber for Advancement of Small & Medium Business, Mumbai, shares their experience handling this arduous task and a road map that helped many entrepreneurs lead to everlasting and triumphant success. Experts from his interview,

Questions:

Q1. Can you share about your Association CASMB?

We all know that MSME contributes the largest to the job market employing more than 11 crore people, and also contributes to the Indian GDP and especially to Manufacturing Export GDP in India. We realized that during Covid, MSMEs faced more significant problems than some of the larger corporations because of migrant laborers returning to their hometowns due to a liquidity crunch in the financial market, which is why this Chamber was founded. As the name suggests, we were on advancement. We want our MSMEs to advance to the

next level from the current one, and we help them in various ways.

The top 3 things any startups and MSEs need are mentorship, Funding & Market Access. We are intentionally working on ensuring the MSEs - especially our members, get access to those. We have our own incubation centre for early-stage startups; we handle them. We also run a YouTube channel where a lot of knowledge-sharing videos are available in which market experts have come to our platform. We share their knowledge not only about all the above three aspects but also on the Finance aspect, the latest technology available, branding, managing human capital and much more in more than 100 videos with us.

We have also done a fundraising activity Fund Plus. In the last nine months, we have done three such events - One in Nagpur in March, one in Mumbai in April & September in Bangalore. Especially Startups looking for SEED or Incubation and equity Funding from investors, more than 60 startups pitched in and were able to succeed.

Q2. How are you Empowering Farmers to become Entrepreneurs?

The way the farmers operate in India is peculiar. They don't look at their profession as a business. They don't know about their input cost, financing cost, etc.; We are educating them to understand it. We help them by working out their cost and pricing, and at the same time, they get a good market, particularly the export market. We help them with novel technology available to extend the shelf life of the products so that they get a better realization.

Q3. How are the Global Markets for Plant-Based Food?

Plant-Based food is becoming very popular, gaining much acceptance, especially in the Western World. For eating red meat, we grow plants to feed the animals, we feed the animals, grow them and finally slaughter them for that meat. Now there is no need to do these. This is a thought process. You may think you are eating a chicken or beef burger, but the ingredients are plant-based. It might be soya or pea. You are mimicking the meat by using all the vegetarian sources like the taste, the amino acid profile, the mouth feel, and macronutrients like proteins, carbohydrates, and fats. You are imitating or mimicking all those things using vegetarian sources rather than going for non-vegetarian or slaughtering animals. Already there are two-three startups where I am associated as a mentor, and most of them are currently targeting the US Market for exporting this plant-based food which is becoming popular in the US.

Q4. What is your association's Role in Institutions & Universities?

A lot of colleges are opting for internships. About 10 + lakhs engineers graduate every year and almost 10 lakhs + engineers in the third year do one month of internship. Effectively there are 10 lakhs months of manpower that has been invested, but what is its output? That is why we make an effort to make this internship fruitful so that it is a win-win. We handhold students to get an internship, fill the skill gap, and help them get jobs if they want to start a startup - we handhold them from the formation of the company and upto taking the products available in the market.

Q5. What is your say on Academic Research?

The Council for Scientific and Industrial Research (CSR) has around 20 + research labs across India. For food, there is PSPR in Mysore, and there are a few more in the food industry. Academic institutes like The National Institute of Food Technology Entrepreneurship and Management (NIFTEM) exist. A lot of research is happening in the institutes, but they are not necessarily reaching the actual end user. We are trying to be a single point of contact. Be it technology providers, Technology seekers, government policies and subsidies, or TNSME in the food industry. Governments and institutions are doing their own part, and startups and MSMEs are doing their own part. Not all the stakeholders can come together, but our Chamber wants to play that role. A whole ecosystem is being created where an MSME can get things done in a single location.

Q6. How do you see Training helping in Capacity Building?

Training is critical as things are changing in this world too fast, particularly in technology. Prior to Covid, there was not much familiarity with zoom or google meets, but now it is not so. Likewise, doing money transactions through UPI. So, Training definitely keeps upgrading our skills, be it technical Training, soft skills training, leadership skills, managerial skills etc.; these are becoming very important for an employee or an entrepreneur. Now, people and companies are realizing its importance as it motivates employees & helps them achieve new skills.

All these things, even people with a non-IT background, are now thinking about how they can use Artificial Intelligence in the food industry and agriculture. These kinds of upgrading skill sets are essential and will come only from Training.

Q7. Do Study Tours get appreciation from Entrepreneurs?

This is uniquely done. In the last two years, we had the

Covid era, and we were not allowed to visit factories, do tours, or even travel. From 2020 to 2022, we conducted three factory visits, but they were virtual factory visits. Our small team of 2 videographers with a camera visited a Namkeen manufacturer's factory in Maharashtra, and people could watch that factory visit in virtual mode sitting at their homes. It was well appreciated and watched by more than 10,000 people. But in addition to that, now our government also offers schemes under the marketing initiative under the Ministry of MSME. Even for the international exhibition, you can get a subsidy of up to 5 lacs, which you can use for your travel, setting up a stall and things like that. We also want to facilitate that for our members.

Q8. What do you say about Digitalization?

Whether we like it or not, we cannot escape Digitalization. Now we were used to virtual meetings. Want for physical Newspapers has mostly gone, and now people are comfortable reading papers online. This is because many changes happened, like internet speed has gone up, and accessibility and availability of the internet have become easy across India. Almost everybody in India has a smartphone now. This is the future - the more digital we go, we grow. We have crossed 2 Billion UPI transactions per month, where even a small shopkeeper going to the bank every day earlier is not going now. Currently, there are few cheque payments or cash withdrawals, and almost all money transactions are done through UPI and other options.

Q9. What are the factors Stopping MSMEs' growth?

A few reasons are predominant. Most MSMEs are one-man shows. They are stuck in long-core issues like bank-related or non-availability of credits. Secondly, they are unaware of so many things happening or available, like GEM Portal, a government e-marketplace for government tenders, a receivable portal called TReDS, and SAMADHAAN, which is for recovery redressal. Most MSMEs are unaware of such things, which is where the bottleneck is. They are unaware of where they can get the related technology, how they can get cheaper finance, where they can get a good market etc. Ultimately, he struggled to handle his day-to-day issues like labour and electricity problems. These are the two reasons dragging the growth of MSMEs & these are the current limitations for many MSMEs.

Q10. What is your opinion on the global recession and the future of MSMEs?

There is talk about a global recession. That is "two successive quarters of negative growth." In fact, we don't see it happening in India because ours will always have positive GDP growth, and we need not worry

about recession. We must also understand that a recession will open up many opportunities. India will keep expanding as a larger-scale economy depends on self-consumption, so we need not worry much about what is happening in the rest of the world. But we need to keep one eye on that and the other on what is happening in Russia and Ukraine.

All in all, for India, 2022 - 2023 will be a great year; probably, the whole decade will be great because a lot of the manufacturing sector gets boosted, and a lot of infrastructure is happening. With the improvisation of National Highways, a lot of time is saved on the transportation of materials. Many things will change, and in the next seven years, India will prosper and become the world's Food Capital.

India can play a big role in terms of the export of food products, export of pharmaceutical products, and exporting a lot of things. Recessions might come and go, but it is part and parcel of the global economy, but actually, India can actually benefit a lot because of what has happened in the last three years.

Few adaptive measures, strategic planning, and innovations in SMEs to counter the pandemic situations are definitely the right way to achieve reasonable sustainability. SMEs require suitable support and guidance by researchers, professionals and practitioners in manufacturing and distribution to develop strategic roadmaps for survivability and sustainability - and this will be the next good step for survival.

Source: CMR India.com

Interview By:

Mr. Mithran Sri Ram

Editor In Chief
National News Bureau
Senior Media Personality
with 36 years of experience
served with well known
Tamil Satellite Channels and
also currently the State Vice President of "South
India Press Club" organizing Recognition &
Awards Functions at
Tamil Nadu.



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**Founded in 2020 during the height of Pandemic of COVID-19 CASMB is focused
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A person who is free from all diseases is a healthy person. Except for the pandemic, the beginning of the 19th Century marked an overall sound health of common man. Thanks to the natural organic food, including millets in particular, that were easily digestible and responsible for good health! For a healthy person, his or her mind and senses are in a state of harmony and poise. A person with extraordinary physical strength is not necessarily healthy. He/she has merely developed his/her musculature, possibly at the expense of something else. Our body is made up of earth, water, fire, space and air. A balance of all these basic elements is a must to maintain good state of health. Food plays a pivotal role in this and for that millets hold a key position.



Anatomical and physiological evidence is in favour of man being a vegetarian but medical practitioners' opinion is mostly in favour of a mixed diet. So millets can play a supportive role to maintain sound health. Different millets are used as staple in different states in India. SMB entrepreneurs in particular, can make use of the cheapest source of nutritious foods not only for

their families but also for their employees. This will lead to healthy business family and also to a sound economic base.

On India's suggestion, United Nations General Assembly at its 75th session in March 2021 declared 2023 as the International Year of Millets (IYM 2023). FAO is the lead agency for celebrating the year in collaboration with other relevant stakeholders. Millets can grow on arid lands with minimal inputs and are resilient to changes in climate. IYM 2023 will be an opportunity to raise awareness of and direct policy attention to the nutritional and health benefits of millets and their suitability for cultivation under adverse and changing climatic conditions. The year will also promote the sustainable production of millets while highlighting their potential to provide new sustainable market opportunities for producers and consumers.

Let us join the hands with UN and FAO for improving our health by use of good portion of millets in our diet which in turn will be responsible for improving the productivity and GDP of India.

JAI HIND.

Dr. Prakash Kondekar,
Advisor, CASMB



Editor's desk

Millets are one of the oldest, small-seeded grains which can grow well in dry zones under marginal conditions of soil fertility and moisture.

Due to their short growing season, millets can develop from seeds to ready-to-harvest crops in just about 65 days. This highly beneficial characteristic of the millets is of vital importance in densely populated regions of the world. If stored properly, millets can keep well for two years or beyond.

Millets not only grow in adverse conditions and provide nutritious grain and fodder, but they can also fit well into multiple cropping systems under irrigation as well as dryland farming due to their short growing season.

The prolonged and easy storability of millets under ordinary conditions has given them the status of Famine Reserves and this feature is of great importance for India, as the agriculture of our country suffers from unexpected changes in monsoon.

The millets commonly grown in India include Jowar (sorghum), Bajra (pearl millet), ragi (finger millet), Jhangora (barnyard millet), Barri (Proso or common millet), Kangni (foxtail/ Italian millet), Kodra (Kodo millet) etc. Among the food crops, millets occupy a relatively lower position in Indian agriculture, though they are really important from the point of food security at the regional and household level.

Therefore, to ensure food and nutrition security for our country, it is important to increase the production of these crops and simultaneously revert the control of production, distribution and consumption.

The year 2023 is declared as International year of millets. These Indian organic miracle grains are the power house of nutrition. So on the occasion of New year our team has decided to give a nutritional treat in the form of 7th issue of Purnabrahma with the theme Indian Organic millets, the power house of nutrition. This issue is nutri informative platter of Indian millets. We are honoured to have articles from many renowned scientists, professors, industry people and even students.

Let's join hands together and spread the information on nutritional benefits of Indian organic millets on this international year of millets 2023.

Happy New Year to all. Be healthy, be fit !

Thank You!



Mrs Rupa Kanvinde
Chief editor

Subeditor's desk

The world will be observing 2023 as the "International Year of Millets (IYM)". India being the major producer of millet worldwide, both the central and the state governments are leaving no stones unturned to make it a people's movement so that the Indian millets, recipes and value-added products are promoted globally.

Millets, the golden grains of India, also known for their miraculous health benefits, flew under the radar after the Green revolution made paddy and wheat more accessible. It was a time when government policies did not provide incentives for growing millets. It discouraged farmers from cultivating millets consequently reducing millet consumption.

With people in urban areas becoming more health-conscious, the demand for millet based products is on rise. This in turn is fuelling and creating ample opportunities for budding market entrant entrepreneurs.

As per reports, there is a huge potential in starting a millet business due to innovative millet business ideas. The future scope may not be limited to: (i) Establishing millet processing units (ii) Launching millet value addition products to meet the taste preferences of people (iii) For farmers, there is an option to become millet seed entrepreneurs. Farmers can also join the government seed production programme for producing quality seeds (iv) Aggregating millets in the warehouse for supermarkets and food industry (v) Millets packaging for supermarkets and retail industry (vi) Bakery production using millets as the prime grain (vii) Millet based hotel industry/ tiffin and meal services is another sustainable option (viii) Starting millet export industry, considering India as the largest producer of millets. Interested can join hands with Agricultural and Processed Food Products Export Development Authority (APEDA) for the export of millets (ix) Millet business for creating Farmer Producer Organization (FPO) which will successfully deal with the constraints and challenges faced by the farmers (x) Finally, creating an e-Commerce platform for millet products will create more business as it will reach large customers.

We at Purnabrahma, through our current issue on millets, are envisaged to create the run-up for the IYM 2023, to position millets as alternative staple across the country and the globe. We wish to create awareness, encourage young minds by nurturing their creative thinking in finding probable solutions to the problems in the millet sector. Moreover, Purnabrahma aims to promote research in millet processing and millet products, to encourage farmers towards sustainable agriculture, to improve nutritional status of pre-school children and women of reproductive age by providing a more diverse food basket.

Lastly, millets have immense scope and the day is not far away when these forgotten grains will become the most sought-after grains for all of us!

Wishing all the readers, a very happy, healthy and a prosperous 2023!

Thank you!



Dr. Ritika Joshi
Sub editor

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Millets: A Super Food and Super Guru of ICT



Prof. Aniruddha B. Pandit

A **WARDEE** of ISTE National award for outstanding research, 1995, Prof. R.A. Rajadyaksha Best Teacher award on 15 occasions in the past 20 years, VASVIK award (1996), Fellow, Maharashtra Academy of Science (1997), IChE - Herdilia award for excellence in basic research (2001), Distinguished Alumnus award, Institute of Technology-Banaras Hindu University (2004), Distinguished Alumnus award, UICT (2008), INSA, Best Teacher award (2012), Vishwakarma Medal of Indian National Science Academy (2015), Fellowships of Maharashtra Academy of Sciences (2000), Indian National Academy of Engineering (2006), Indian Academy of Sciences (2008), Indian National Science Academy (2009), National Academy of Sciences in India (2009), Fellow of TWAS (2015), **Professor Aniruddha B. Pandit**, FNA, FTWAS, FASc, FNASc, FNAE, FMASc, Vice Chancellor, Institute of Chemical Technology, Mumbai & Sir J.C Bose Fellow, Government of India, spoke with CASMB Advisor, Dr Prakash Kondekar, on his view on the Millets and its Indian approach. In addition to his research contribution, Prof. Pandit has contributed to innovation in teaching, at graduate and undergraduate levels, demonstrated experiments for elaborating the physical principles of many chemical engineering operations. He is actively involved in working with committees in the area of harnessing solar energy & with tribal population in extending the chemical engineering principles for drying of farm/forest product & water disinfection for potable water. He is a president of a NGO named Land Research Institute dealing with the Energy and Town planning sector.

Dr. PK : Prof Pandit, first, let me welcome you to the CASMB family and thanks for sharing your time with Purnabrahma.

Prof. Pandit : I am also delighted to join this family of CASMB.

Dr. PK : Before talking about millets, I will be happy to know your academic & research contributions, for the benefits of our members and student community associated with CASMB. I know you have unique creative approach of using fundamental knowledge, coupled with simple, elegant experiments which has resulted into novel cavitation reactors. Sir, you have authored over 370 publications, 5 books and over 12 chapters (with over 22,000 citations) and have 15 patents & you are on the Editorial board of five International Scientific Journals. You have guided 48 PhD's and 88 master's students so far.

Prof Pandit : After returning to India in 1990, I joined ICT as a UGC Research Scientist 'B' and was subsequently promoted to Scientist 'C' (Professor's Grade) in 1996. I was instrumental in starting a major activity & program in the area of Hydrodynamic Cavitation for intensification of physical and chemical processing applications. I have successfully exploited the cavitation phenomena for a variety of operations such as crystallization, emulsification, nano-particle synthesis and processes such as esterification, oxidation etc. on industrial scale. I was an active industrial consultant for many large size national and international companies.

Dr. PK : Can you also tell us about your administrative contributions?

Prof Pandit : Sure, Dr. Kondekar. I had taken over the charge as Vice Chancellor of Institute of Chemical Technology on November 29, 2019. Prior to this, I had acted as a Dean of Human Resource and earlier as Dean of Research Consultancy and Research Mobilization. I was coordinator of ICT-DAE centre for Chemical Engineering Education and Research since its inception in 2008. I am privileged to have been associated with the editorial board of 5 international journals and an associate editor of Ultrasonic Sonochemistry. I have guided and completed international science collaborations with Universities from France, Australia and Netherlands. I am also the member of the project appraisal and evaluation committees of the DST and UGC, Govt of India. Currently I am serving as a member

FEATURED ARTICLE



of the BOG of the IIT Bombay. I am also working as an active industrial consultant to many national and international industries.

Dr.PK : In the pre-independence era, Indian breakfast plate constituted majority of millets. Your comments on that?

Prof. Pandit : That is not strictly correct. Millets was a major diet grain in the area where the rain-fall was scanty. These crops being scanty with short cultivation period, were available somewhat throughout the year as they could grow with one or two short spell of rain. The domestic animals used to feed upon it and hence it was treated as animal food. The proper cultivation was limited and majority of it was naturally grown. Britishers could not really savour the fibrous structure of the millet flour and hence they could not use it in breadmaking. These were mostly consumed in central India. Whereas, South India had a staple food as rice and Northern India as Makkai (corn). Both were unsuitable for bread making. The wheat cultivation grew slowly and was made available only in the cities where Britishers resided and the rural India used to have mostly Jowar, Bajra etc. Users of wheat flour were limited to special occasions e.g. *Puri, Roti, Chapati, Phulka* came much later as the availability of wheat increased due to increased cultivation giving much higher yields and increased availability due to the use of bulk transportation facility making wheat available easily and it became a fashion to use it to show the affluence.

Millet as a super food is a recent phenomenon but by

this time cultivated land area for millet had significantly reducing availability of the same in the cities. Rural India still prefers millet, especially Central India, where south continued with rice and north shifted to wheat due to high yielding crop varieties.

Dr PK : There is a general feeling that there is a dominance of oats and its produce on the Indian breakfast table since last few years.

Prof. Pandit : This is not the case. Oats are limited to urban population and its usage in rural India (>70% of the population) is minimal. Kellogg's entered India with deep pockets with an aim to change/ re-organize the breakfast habits of India. They only partially succeeded and that too with a large advertising budget and could not sustain it. Now you can see, how Kellogg's have come out with new products such as *upma, poha* etc., the traditional Indian breakfast items. Indian ready-made food manufacturers used the marketing technologies of Kellogg's with their native Indian taste giving run for money to Kellogg. The penetration of oats (Quaker oats the famous British brand) has not been as expected. In fact, a few Indian companies, came up with Masala Oats combining best of both the worlds and that is the only brand which is growing.

The increase in the international travel and familiarity of western food can also be a reason to some extent but even now, Indians leaving abroad still prefer traditional Indian breakfast and would eat cereal, muesli etc. as a last choice/ alternative, mainly due to a quick snack and ease of preparation. The influence of more western dominant representation in UNO and food and Agricultural Organisation (FAO), received dominant say in grains and the millets took a back seat. In fact, it has now become fashionable in the western world to eat millets (due to its super-food status) and I am sure the cycle is likely to reverse in the next 10 years.

Dr. Kondekar
with
**Prof. Aniruddha B.
Pandit**





Anti nutritional Factors in Millets

By: Dr Prof. Shriram Maruti Naikare

Millets are considered as poor man's food. Generally it is grown on dry land, in hilly areas. But it is considered as powerhouse of nutrients since it has enormous health benefits.

Millet grains constitute Pearl millet (*Bajara*), Finger millet (*Ragi*), Foxtail millet (*Rala*), Sorghum (*Jowar*), Little millet (*Kutaki*), Proso millet (*Wari*), Barnyard millet (*Sama*), Kodo millet (*Kodra*), Brown top millet (*Makra/Murat*) and Amaranthus (*Rajgira*).

Health Benefits of millets:

- High soluble fibre (high soluble fibre prevents glucose absorption) which results in slow release of sugar
- Insoluble fibre prevents constipation, improves digestion
- Detoxifies blood
- Gluten free (checks celiac disease, stomachache)
- Complex carbohydrates (High polysaccharides)
- Rich in magnesium, lignin (prevents cancer)
- Lower glycemic index (GI of millet is 41-6, Avg. 55)
- Starch moderate –high resistant starch and are slow digestibility
- High in Protein, Mg and Ca which helps in reducing blood pressure

- High in Phosphorus
- Reduces heart diseases, helps in lowering cholesterol
- Helps in weight loss and diabetes
- Improves gut bacterial profile (lactic acid bacteria)
- Reduces the anemic condition (as Ragi contain high Fe)
- Increases immunity by increasing the resistant power
- Helps in digestion (Ragi malt rich in Fe, Ca, protein and Enzyme Amylases)
- Natural source of antioxidants
- There are number of Health-Promoting Properties

Anti-Nutritional factors:

In general, the anti-nutritional factors interfere with the nutrient availability, digestion and absorption thereby reducing the Net Protein Utilization (NPU), and Protein Efficiency Ratio (PER), resulting in many health disorders. The naturally occurring anti-nutritional factors in millet grains are required to be inactivated or destroyed by using appropriate processing technologies before consumption or making value addition through various food products.

In general, the various anti-nutritional factors are reported to be found in legumes, pulses, cereals and are protease inhibitors, haemagglutinins, saponins, tannins, cyanogenes, gossypol, lathyrigenes, allergins, cycasin, favism, phytate, cyanogenic glycosides, lupin alkaloids, polyphenols, goiterogene, cyanogenetic glycosides, etc.

Millet is underutilized because of the content of several heat stable and heat labile anti-nutritional and/or toxic/ potentially toxic factors.

Mechanism of Anti-nutritional factors:

- The mode of action of anti-nutritional factors on the gastrointestinal tract and its microflora
- Decreased levels of heat shock protein 70 and 90 in gut epithelial cells after exposure to plant lectins
- Physiological mechanisms- Impairment of nutrient digestion and transport capacity in the salmon intestine by anti-nutrients
- The major anti-nutritional factors in millets are

polyphenols, calcium chelating agent, phytates (0.48%), polyphenols, tannins (0.61%), trypsin inhibitory factors and dietary fibres (anti-nutrients) having metal chelating and enzyme inhibition activities.

The anti-nutritional factors in millets are discussed below:

Anti-nutritional factors in Pearl millets (*Bajara*)- The prominent anti-nutritional factors are polyphenols, phytic acid, tannins, goitrogenes (goitrogenic compound (C- glucosyl flavones (C-GFs), phytates (0.48%), tannins (0.61%), trypsin inhibitors, dietary fibre etc. These are considered as anti-nutritional, possess metal chelating and enzyme inhibitory activities. Now a days, polyphenols are considered as “life span essential” phytochemical. Millet polyphenol is a complex mixture of cinnamic acid derivative and benzoic acid results in enzyme inhibitory and anti-cataractogenic activities.

Anti-nutritional factors in Sorghum - It contains anti-nutritional factors like tannin, cyanogenic glucoside, phytic acid, trypsin inhibitor, oxalate and coarse fibrous seed coat. (Etuk et. al. 2012) Due to the presence of these constituents, sorghum is categorized as low nutrition value and food for the poor which leads to low protein digestibility and low mineral absorption (Mohammed et. al. 2011). Researchers have revealed that processing conditions (pearling, dehulling, malting, fermentation) reduces the anti-nutritional factors and increases the nutrient bio-availability (Adebawale and Solana, 2012)

Anti-nutritional factors in Ragi (finger Millet) - Some of these factors present in Ragi include tannins, non-starch polysaccharides- glucans, protein inhibitors, oxalates and phytates which directly or indirectly affect the digestion of nutrients.

Foxtail millet and Proso millet - They possess certain phytochemicals with anti-nutrient effect (Saleb et al. 2013) which may hinder efficient utilization or digestion of minerals and thus reduce the nutritional bio-availability and nutritional quality.

Millet grains contain greater proportion of husk and bran, requiring de-husking and de-branning processes prior to consumption (Hadimani and Maleshi 1993). Barley pearler is used for de-branning or polishing the grains.

Kodo millet (Kodra) and Little millet (Kutaki) - These grains have variety of phytochemical constituents including derivatives of hydroxyl-benzoic acid and hydroxyl-cinnamic acid, myricetin, catechin, luteolin, apigenin, daidzein, naringenin, kaempferol and quercetin with vast health benefits and thus can be utilized as functional food ingredients.

However anti-nutrients (tannins, oxalates, trypsin inhibitor and phytates) present in these millets restrict their utilization since these factors bind with the essential nutrients and make them unavailable.

Amaranth (Rala) - It contains secondary metabolites such as tannins, oxalates, phytates, trypsin inhibitor and phytic acid. Amaranth grains are required to be de-braned (polished) by using pearling machine to remove husk. Amaranth is considered as a good source of high quality balanced protein profile due to its high content of lysine, methionine and cysteine as well as dietary fibres and minerals (Marcone, 1999).

Therefore it is used in many functional foods, cookies, snacks and fasting food items. (Simwaka et. al.2017)

In conclusion the anti-nutritional factors in the above millet grains could be drastically reduced by application of a variety of processing techniques such as pearling application, heat applications (roasting, baking, frying, cooking,steaming) , fermentation, soaking germination, malting, puffing, etc. This helps in preparation of value added products of promising nutritional, health promoting and disease recovering benefits.

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- c. Red Capsicum

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- a. Tea Extracts
- b. Coffee Extracts

Herbal Extract

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- c. Lakdang Turmeric
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- a. Flakes Seeds
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- c. Areca Nut
- d. Black Rice
- e. Black Carrot
- f. Catechu



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Millets as functional food

By - Dr. Shalini S. Arya

Abstract

In the recent years, consumers demand for convenient fresh food products that has nutritional and functional values have increased. Food products containing wholegrain cereals which are rich in dietary fibres (DF) and micronutrients are mostly preferred. Consumption of such food products have shown to reduce the risk of cardiovascular diseases, lowering cholesterol, reduction in plasma glucose, type 2 diabetes, obesity and certain types of cancers, in epidemiological evidences. Studies have shown that millets are rich source of DF and thus provide low glycaemic index values. Millets helps in addressing malnutrition as these are considered as high-energy yielding nourishing foods and taken as flour, parboiled and served as porridge with milk. Millets and millet containing food products has biologically active compounds (rutin, flavonols, phenolic acids, and their derivatives) which possess antioxidant potential and hence, these essential components make millets functional food.

Keywords: Millets, nutritional security, sustainability

1. Introduction

Since consumers, in the recent years, have shown interest for food which are not only nutritional but are also functional in nature, and boost up their immune system. Food products containing wholegrain cereals which are rich in dietary fibres (DF) and micronutrients are mostly preferred. Consumption of such food products have shown to reduce the risk of cardiovascular diseases, lowering cholesterol, reduction in plasma glucose, type 2 diabetes, obesity and certain types of cancers, in epidemiological evidences. These food products can be defined as functional foods. The scientific evidence shows that there is a very strong relationship between food and

health and resultantly created a new need for the development of new, novel and functional food. DF in food and its health benefits have been well researched. It is well proven that diet deficient in DF causes hernia, constipation, obesity, cardiovascular diseases, diabetes, blood pressure etc. Therefore, consumption of sufficient amounts of DF is recommended to avoid above diseases. As per the guidelines of Indian Council of Medical Research (ICMR), Hyderabad, the daily diet of an adult should contain atleast 40 g of DF. A commercially available food product can be labelled as "High Fibre", if it contains at least 3 grams of fibre per 100 grams or 1.5 grams of fibre per 100 kcal per serving.

Dietary fibre can be defined as carbohydrate polymers with a degree of polymerisation (not less than 3), which are not hydrolysed by the enzymes present in small intestine of human [10]. Dietary fibre may contain naturally occurring edible carbohydrate polymers in the food or carbohydrate polymers obtained by means of physical, chemical or enzymatic treatment from food raw material or synthetic carbohydrate polymers.

Studies have shown that millets are rich source of DF and thus provide low glycaemic index values. Besides the nutritional properties, millets are important because of the economic impact on developing countries. Millets helps in addressing malnutrition as these are considered as high-energy yielding nourishing foods and taken as flour, parboiled and served as porridge with milk. Millets and millet containing food products has biologically active compounds (rutin, flavonols, phenolic acids, and their derivatives) which possess antioxidant potential and hence, these essential components make millets functional food. It has been documented that antioxidants in millet grains possess antitumor activity in addition to this, they are considered as potential prebiotic with health benefits. Apart from the traditional way of consuming millets, they can be used in making chapati, muffins, bread, cookies and biscuits. The scientific and common names of different millets, their functional constituents and health benefits are mentioned in **table 1.1**. In **figure 1.1**, application of millets in the preparation of various functional food products are depicted.

Table 1.1: Millets and their scientific and local names, their functional constituents and health benefits

Sl no	Millets and their scientific names	Common name	Functional constituents	Health benefits	Images of millets
1	Foxtail millet (<i>Setaria italica</i>)	Kakum, Italian millet, Chinese millet,	Ferulic acid, p-coumaric acid, flavonoids	In diabetic conditions, it acts as an anti-hyperglycemic green millet and anti-lipidemic agents, inhibits pro-inflammatory and hypertrophic response	
2	Kodo millet (<i>Paspalum scrobiculatum</i>)	Kodra, varagu, varigalu	Phenolics, tannin and phytates	In postmenopausal women, it helps in reducing the risk factor of cardiovascular diseases.	
3	Barnyard millet (<i>Echinochloa frumentacea</i>)	Jhangora, sawa millet, Japanese barnyard millet	Carotenoids, α -tocopherols, phenolic acid, flavonoids	Inhibits the growth of the developing cells, helps cancer in reducing blood glucose, and lipid levels	
4	Little millet (<i>Panicum sumatrense</i>)	Kutki	Ferulic acid, gallic acid flavonoids, tannins	In cardiovascular disorder, it reduces the cholesterol level. In case of diabetic patients, reduces fasting blood glucose, blood glucose and liquid parameters.	
5	Pearl millet (<i>Pennisetum glaucum</i>)	Bajra, samalu, samai	p-coumaric acid, catechin, catechol, ascorbic acid, gallic acid	Natural source of antioxidants, lowers triglycerides level, prevents heart diseases, reduce inflammatory bowel diseases.	
6	Proso millet (<i>Panicum miliaceum</i>)	Barre	Ferulic acid, chlorogenic acid, caffeic acid, p-coumaric acid, syringic acid	Glycaemic response and plasma levels are improved, provide protection against D-galactosamine induced liver injury.	
7	Finger millet (<i>Eleusine coracana</i>)	Ragi	Ferulic acid, caffeic acid, quercetin	Act as antioxidant. Risk of diabetes mellitus and gastro-intestinal tract disorders are reduced,	

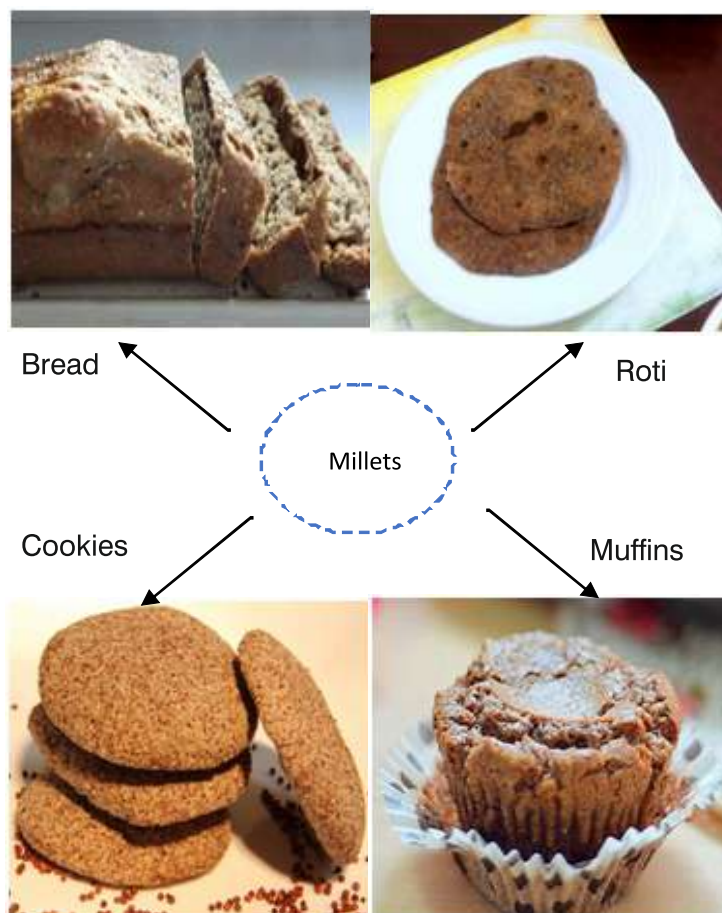


Figure 1.1: Application of millets in the preparation of various functional food products

1.1.1 Millets

Millets are traditional small seeded cereals, which are cultivated across the globe and the most commonly cultivated species are Pearl millet (*Penisetum glaucum*) being the major millet while secondary group of millet include finger millet (*Eleusine coracana*), foxtail millet (*Setaria italica*), little millet (*Panicum sumatrense*), kodo millet (*Paspalum sorobiculatum*), barnyard millet (*Echinochloa corona*) and common millet (*Panicum miliaceum*). The beneficial properties of millets are good productivity on infertile land, drought and pest resistance with short growing cycle.

Millets, even though high in nutrition and has many health benefits but are the underutilized cereals. Pearl millet is widely grown millet and the other millets are categorized under secondary group as minor millets. Foxtail, barnyard, kodo, little and common millets are the examples of minor millets. Minor millets have health benefits such as they are considered to be alkaline in

nature which in turn helps to maintain the pH of the body which is important in preventing illnesses. They are non-acidic and non-allergic, so it makes them easily digestible cereals. They are good source of vitamin B, magnesium and antioxidants, alongside millets provide dietary minerals such as manganese, phosphorus and iron. Essential amino acids except for lysine and threonine, are present in millet protein, but has high level of sulphur containing amino acids methionine and cysteine. In **table 1.2**, various health benefits of millets, their functional characteristics and mechanism of action are explained. The active compounds present in different millets and their mechanisms of action are explained in **table 1.3**. In **figure 1.2**, different benefits of millets as an approach for sustainable agriculture and healthy world is depicted.

Millets: an approach for sustainable agriculture and healthy world

Food Security:

Sustainable food source for combating hunger in changing world climate. Resistant to climatic stress, pests and diseases.

Nutritional security:

Rich in micronutrients like calcium, iron, zinc, iodine etc. Rich in bioactive compounds. Better amino acid profile.

Safety from diseases:

Low GI: a good food for diabetic person. Can help to combat cardiovascular diseases, anaemia, calcium deficiency etc. Gluten free.

Economic security:

Climate resilient crop. Sustainable income source for farmers. Low investment needed for production. Value addition can add to economic gains.

Figure 1.2: Benefits of millets in a nutshell

Adopted from [29]

Table 1.2: Health benefits of millets, their functional characteristics and mechanism of action

Diseases	Functional characteristics	Mechanism of action
Micronutrients deficiencies	High content of iron, iodine, zinc, calcium, magnesium	Diet having millets. Staple cereals bio-fortification.
Obesity	Dietary fibre	Controlled carbohydrate release. Low glycaemic index.
Diabetes	Dietary fibre. Antioxidant rich protein concentrates	Slow release of glucose Low glycaemic load.. Postprandial hyperglycaemia is inhibited by the action of phenolics. Phenolics blocks the action of complex carbohydrate hydrolysing enzymes (amylase, α -glucosidase). Improves sensitivity of insulin.
Cardiovascular diseases	Protein concentrate, phenolic extracts (kodo, finger, proso, foxtail, little and pearl)	Protection of cardiovascular tissues by inhibiting pro inflammatory and hypertrophic response and stimulating endothelial cell responses.
Cancer	Phenolic extracts (kodo, finger, proso, foxtail, little and pearl)	Inhibiting lipid peroxidation in liposomes, scavenging singlet oxygen and inhibiting DNA scission.
Inflammation and wound healing	Antioxidants	In diabetes, enhance the dermal wound healing process with oxidative stress mediated modulation of inflammation.
Ageing	Antioxidant of finger millet	Protection against ageing by scavenging free radicals. Inhibition of glycation and cross linking of collagen.
Anti-microbial activity	Polyphenols, protein extracts.	Anti fungal and antibacterial: Active against <i>Bacillus cereus</i> , <i>Aspergillus niger</i> .
Ocular diseases and disorders	Polyphenols, flavonoids	Scavenge reactive oxygen species (ROS), anti apoptotic activity. Inhibiting the production of nitric oxide (NO).
Coeliac diseases	Protein	Millet protein is devoid of gluten, which prevents coeliac disease.

Adopted from [29]

Table 1.3: Active compounds in different millets and their mechanisms of action

Active compounds	Millets	Mechanisms of action
Phenolic acids	Foxtail, kodo, finger, proso, little, pearl	They donate hydrogen atom to electron deficient free radicals via benzene rings' hydroxyl group. Thus, forming a resonance-stabilized and less reactive phenoxyl radical.
Flavonoids	Foxtail, kodo, finger, proso, little, pearl	Nuclear structure polymerization or a double bond and carbonyl function in the heterocycle increases the antioxidant activity. Thus, it forms a stable radical of flavonoid through conjugation and electron delocalization.
Tannins	Finger	Procyanidin o-quinone produces oligomeric compounds through various coupling reactions which retain the number of hydroxyl groups and can act as prooxidants by forming reactive oxygen species through futile redox cycling.
Xylo-oligosaccharides	Finger	Ester linked phenolic acids, presence of >C=O (uronyl/acetyl) groups and degree/nature of polymerization are the properties that imparts strong antioxidant activity to polysaccharides
Insoluble fibers	Foxtail	Their unique phytochemical composition attributes to the antioxidant properties.
Protein and peptides	Pearl and foxtail	The antioxidant property of protein is due to complex interactions between their ability to quench free radicals and single oxygen, reduce hydroperoxides, enzymatically remove specific oxidants and alter the physical properties of food systems in a way that separates reactive species.
Carotenoid	Finger, little, foxtail, proso	They act as antioxidants due to their ability to quench single oxygen and free radicals.
Vitamin E	Finger, little, foxtail, proso	Biological activities of tocopherols are mainly because of their antioxidant action by inhibition of lipid peroxidation in biological membranes.

Table 1.4: Millets and their nutritional constituents

Millets	Protein (g/100g)	Carbohydrate (g/100g)	Fat (g/100g)	Crude fibre (g/100g)	Mineral (g/100g)	Energy (kcal/100g)
Foxtail	12.3	60.9	4.3	8.0	3.3	351
Kodo	8.3	65.9	1.4	9.0	2.6	353
Barnyard	11.6	74.3	5.8	14.7	4.7	300
Little	8.7	75.7	5.3	8.6	1.7	329

[Adopted from 100]

Table 1.5: Millets and their applications in food products

Millets	Applications
Foxtail	Noodles, multigrain bread, soup, cereal porridge, pancakes, chakli
Kodo	Chapati, dosa, idli, puttu, boli, biscuits, bread, cakes and cookies, cereal-based extruded products
Barnyard	Bread, porridge, snack foods
Little	Biscuits, dosa, paddu, idli, upama, sev

Conclusion

Millets are nutritionally important cereals, easily sustainable, and drought-resistant with various applications in the food industry. Millets have several health benefits majorly consisting of improving digestibility, antioxidants, hypoglycaemic activity, etc. Therefore, variety of novel, convenient and consumer friendly food products needs to be prepared and developed.

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Millet: Future of Plant Based Food Products!

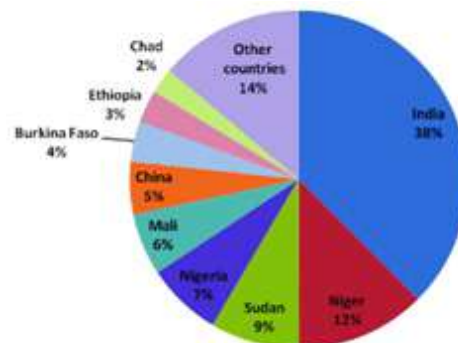
By - Shalaka Bhatkar and Ritesh Mathur

The growing clean label movement and the veganism revolution are driving up demand for plant-based foods and drinks. Growing environmental consciousness, increased interest in health & wellness, and variety in protein sources, the market for plant-based products has made significant strides in recent years. In the United States, 87% of consumers eat foods made from plants, according to a Nestle survey. Whereas the vegan community has made plant-based beverage a top focus. Plant-based beverages are a category of products that consistently attracts a lot of attention on the food market each year. There are a variety of factors driving these products' popularity. They are mostly used by people who limit or avoid animal products in their diets as a vegan alternative to cow's milk. This is a result of society's growing understanding of the positive effects of plant-based diets on health and the adverse effects of extensive animal husbandry on the environment. Additionally, individuals with dietary allergies and intolerances to specific milk components drink beverages made from plants. One of the plant beverages less appreciated among consumers is the millet beverage.

Millet is referred to as "yesterday's coarse grains and today's nutri-cereals." Millets are regarded as "future crops" since they are resistant to the majority of pests and illnesses and can thrive in the hard conditions of Asia's dry and semi-arid regions. In terms of global agriculture production, millet ranks as the sixth cereal crop and one of the most significant drought-resistant crops.

Nutri-cereals are making a strong comeback in the Indian grain producing sector after years of neglect. With a market share of approximately 40.62% and an anticipated production of 10.91 million tons in 2018-2019, India dominates the world's millet market and India is the world's leading producer of millet. Millets are incredibly nourishing, non-glutinous, and do not produce acid, making them calming and simple to digest. It is actually one of the least allergenic and most digestible grains on the market, and because it is a warming grain, it will aid to warm the body in cold or wet areas. The Millet Network of India (MINI, 2009) has urged the Central Government to include millets in the National Food Security Act and has asked the center to

phase in the introduction of millets into the public distribution system (PDS) in order to provide a sizable market for millet farmers that will act as a greater incentive.



Millet production (%) in different countries of the world

Millet grains are gaining popularity among food technologists and nutritionists due to their technological and health benefits. Millet can be utilised on a wide scale to make plant-based products.

Millet-based milk has been linked to the solution of consumer issues such as cow milk allergy, lactose intolerance, calorie concerns, and the prevalence of hypercholesterolemia and celiac disease.



Pearl Millet Milk

The millet milk has higher calories (383 kcal) and similar levels of carbohydrates (78%) when compared to dairy milk. Although millet milk has more crude fibre (0.9%) than dairy milk (0.73%). Millet milk has a high ash percentage (0.35%) due to its mineral content.

Malted milk exhibited an increase in protein and fibre content. The malting procedure is advantageous since the end product has more protein and less fat. Because the millet milk is naturally free of lactose and gluten, it is regarded as the greatest choice for someone with a metabolic issue like lactose intolerance or celiac disease.

There is an increased interest in the creation of dairy-free probiotic products. In compared to the raw material, millet products that have been fermentation have a longer shelf life and better nutritional qualities. An appealing drinkable fermented millet-based beverage can be made by using a starter that contains the normal lactic acid bacteria for yoghurt production, *Lactobacillus delbrueckii subsp. Lactobacillus bulgaricus* and *Streptococcus thermophilus*.



Finger Millet Fermented Drink

The biotechnological method of fermenting millet into beverages has many advantageous elements. The basic processes for making some of the fermented beverages include steeping, milling, slurring, sieving, fermentation, sedimentation, and cooking. However, crucial procedures in the production of fermented beverages include malting, mashing, and fermentation of the extracts. In most traditionally fermented

beverages natural uncontrolled fermentation is employed while in few cases starter cultures are used.

Koozh is a finger millet-based fermented food product popular in South India, has a promising future in health promotion. It can be consumed in both beverage and porridge format and is produced both traditionally and modern technique. The bacteria present in *Koozh* are lactic acid bacteria (LAB).

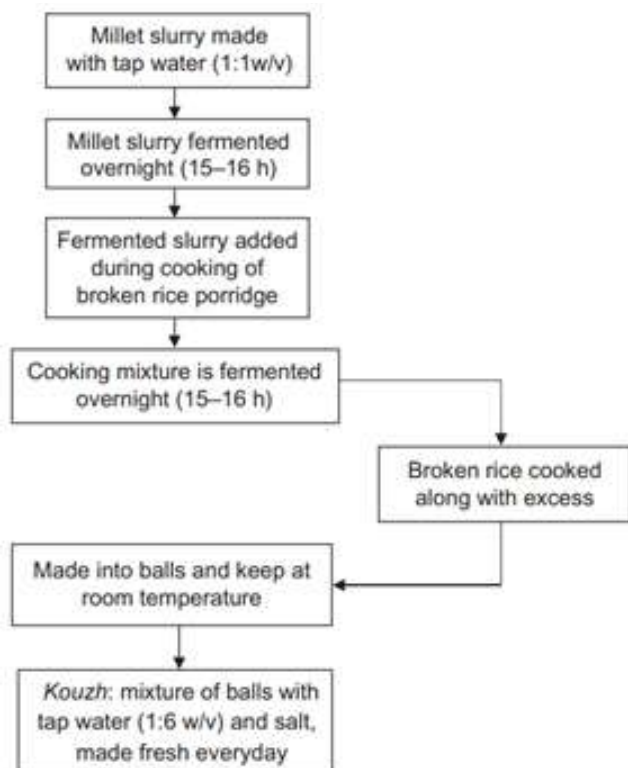
Indigenous preparation of Koozh from finger millet

The National Institute of Food Technology, Entrepreneurship and Management - Thanjavur created a unique millet-based ice cream with lactose-free "millet milk" (millet extract). Due to its low glycaemic index, millet ice cream is also suitable for diabetics. In comparison to ordinary vanilla ice cream, millet ice cream offers 59% less calories, 22 % less carbohydrates, and 43% less fat calories. The millet ice cream, in contrast to other ice creams, contains omega-3 fatty acids, which are typically absent from vegetarian diet.



Millet Lactose free Ice cream

Members of the Millet Project created two unusual food products for the community to try. "Millet slider" was the first item. The 55 poll participants gave the millet-based beef replacement 4.5 out of 5 stars, indicating that they thought it was very good. The second item, a "Mighty Millet Snack Drop," was similarly well received and was prepared with malted millet, dried figs, and toasted hazelnuts. These plant-based meats, which are often produced from legumes, millets, beans, or soy and mixing them with additional components like edible oils and starch, claim to have the same taste, flavour, texture, and mouthfeel as animal flesh. Meat Analogue Rolls were made by using various plant sources like millets, wheat and soy. The two most popular methods for converting vegetable protein into a layered fibrous structure that closely resembles the look and feel of meat are "high-moisture extrusion" and "shear-cell" technology.



Extrusion Processing of Millets

Millet is a cereal with good amount of starch that can be extruded after making flour and conditioning to required condition. Millet flour or grits exhibit good extrusion characteristics. Due to its benefits of great efficiency, low cost, and convenience, extrusion processing technology was typically used in the food industry, particularly in the processing of grains. Extrusion is a high temperature, short time process that incorporates a number of processes, including melting, texturizing, caramelising, and shaping in addition to mass and heat transfer, mixing, shearing, and particle size reduction. The expanded extrudates by decorticated millet extrusion at 13-15% moisture content showed low bulk density, high water solubility, and molecular dispersion of starch. The highest radial expansion, water solubility, and molecular dispersion of starch were produced by extruding decorticated millet at 15% moisture. The greater the starch content of the extrudates the greater is the expansion, the more the protein then the expansion is less. Millets lack in good quality protein, so combining them with soy/pulse has found to enhance both quantity and quality of protein in millet products. Such a product developed using extrusion technology, was low in fat, high in protein and fibre, rich in other functional aspects. Twin-screw extruders are used to create millet-based extruded



snack meals with the necessary quality using a blend of kodo millet-chickpea flour (70:30), pearl millet, finger millet, and soybean flour, as well as sorghum, soy, and rice flour. For the feed rate and screw speed combination of 9.5 kg/h and 250 rpm for pearl millet, finger millet, and decorticated soy bean composite flour, expansion index (2.31) and sectional expansion index (5.39) were found to be at their maximum. All product characteristics, including the expansion ratio, bulk density, hardness, and crispiness, are greatly influenced by the barrel temperature.

In the industry, millets have been used in a number of processing areas. Many new products, such as Bajra lassi, have been developed combining the nutritional superiority of pearl millet and healthful lactic acid bacteria. Millets can be affordable, satisfying, and healthful addition to a normal diet. Processing and utilization of millets in plant based product development have promising prospects with regard to nutrition, quality and health benefits and can be an alternative to cereals but its full scope and utilization is yet to be established. There is still a need to focus on improving the processing methods for minor millets to make them more palatable without compromising the health benefits, considering the variety of the effect of processing on the nutritive value of millets.

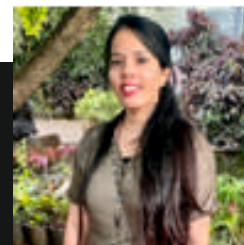


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Millets: A Superfood for India

By: Mr. Sanjay Yenugwar M. Tech (Food Sci. &Tech.)

Introduction:

India is one of the fastest growing economies in the world, houses over 1.25 billion people and with the growing population, faces challenges not only adequate food supply but it also needs to meet the required nutritional levels. Further, rapid urbanization led to increasing lifestyle disorders like diabetes, obesity, low immunity, hypertension, and cancer which is affecting both the young and old generation. The focus should be on adoption of healthy and nutritious foods which are natural, non-chemical, and fibrous. These foods should be high in essential amino acids, vitamins and minerals to ensure balanced nutrition for a healthy living.

Main Text:

Traditionally millets have been our ancient grains and have been a part of India's food culture and these foods were cooked depending upon the region, climate and nutrition. These millets are the nutri cereals like *Ragi*, *Bajra*, *Jowar*, Amaranths, Foxtail and grown largely in Rajasthan, Maharashtra, Karnataka, and Andhra Pradesh. These forgotten foods have been replaced with western foods like pizzas, burgers, processed with high levels of salt and sugars. Millets are the oldest cultivated grains in the world but largely confined to the traditional consumers in the rural and tribal belts of the country, the 'Superfood' is increasingly seeing a healthy growth in terms of production as well as consumption.

As per the Union ministry of food processing industries, the production of millets increased from 14.52 million tonne in 2015-16 to 17.96 million tonne in 2020-21.

Regular consumption of millets could help manage the risk of developing type 2 diabetes, reduce hyperlipidaemia, hypertension, and body mass index (BMI), thereby helping manage cardiovascular disease risk, improve haemoglobin level, and reduce anaemia, as well as helping calcium retention

In addition, millets are recognized as smart foods as they are "good for you" (nutritious and healthy), "good for the planet" (can survive with less water and other inputs and have a low carbon footprint), and "good for

the farmer" (can survive in high temperatures and resilient).

After birth, the first 1000 days of life are a critical stage and a window of opportunities for healthy growth, including physical, social, emotional, and cognitive development. Similarly, the adolescent stage is another important growth period in the human life cycle. Although several other factors affect growth (e.g., infection), diet is a major factor which cannot be neglected. Nutrition deficient diets hinder children's short and long-term physical, mental, and emotional development, affecting not only individual development but also economic and social development of the country.

Diversified diet, especially staples, are needed to address the global challenge of hidden hunger. More than 70% of the energy intake comes from Big 3; rice-, wheat-, and maize-based foods in developing countries of Africa and Asia. The traditional crops, such as millets, are rich in nutrients including protein, iron, and zinc. Finger millets are particularly rich in calcium along with other nutrients that are generally lacking in other staples, such as milled rice, refined wheat, and maize.

The year 2023 has been approved by the United Nations as the International Year of Millets, which is expected to attract major attention to millets. Previous systematic reviews and meta-analyses conducted on millets' health and nutritional benefits showed that regular consumption of millets could help manage the risk of developing type 2 diabetes, reduce hyperlipidaemia, hypertension, and body mass index (BMI), thereby helping manage cardiovascular disease risk, improve haemoglobin level, and reduce anaemia, as well as helping calcium retention. To bring this solution to reality, awareness about the nutritional value is needed to drive demand and investments in millets along the value chain, from farm to fork.

As per the Indian Institute of Millets Research, the demand for millet has increased by 176% and exports by 20% in the last two years indicating awareness about the health benefits of the superfood. "There's hype created around quinoa which is marketed well among niche consumers. So, the quantum of millet consumption is much higher than quinoa which is consumed intermittently more as a fashion statement. India is preparing to position millets globally as a nutrition-dense grain as the world celebrates the International Year of Millets 2023.

❖ Types of millets:



Pearl millet/Bajra: Grown and consumed extensively in the African and Indian subcontinent from ancient times, pearl millet is rich in phosphorus which helps cells store energy, and many other vital minerals. Often cooked in winter, pearl brings warmth to the body and increases energy levels. The millet recipes include *kambankoozh*, an old-time porridge from Tamil Nadu and *bhakri roti*, eaten across India, from Maharashtra to Gujarat and Karnataka.

Finger millet/Ragi: Has the highest calcium content of any millet and grows easily in arid areas. Often referred to as an anti-diabetic grain, its high fibre content also checks constipation, cholesterol and intestinal cancer. The millet recipes include *Ragi* balls or *ragimudde* as they're locally known, are a staple in Karnataka. Ragi malt, or porridge being highly nutritious and easy-to-digest is a common weaning food.

Note: Both *bajra* and *ragi* contain *goitrogens* that could aggravate the thyroid gland, if taken too many times in a day

Fox tail millet/Navane: Possibly the oldest cultivated millet, it is thought to have originated in Northern China, where it is highly regarded as a healing food for postpartum and digestive health. Foxtail millet has a rich mineral content and is especially high in iron. A popular fasting food in some parts of India, it is interestingly called *xiaomi*, or little rice in Chinese. The millet recipes include *idli*, *upma*, *payasam*, and *biryani*. Commonly made into porridge in the northern parts of China.

Little millet: The smallest of the millet family, little millet is yet another reliable catch crop grown across India. It is very easy to cook and is often simply used as rice and in fact, can be used in any recipe that demands rice. Higher iron content gives it an edge over rice,

especially for those with anaemia.

Barnyard millet: Barnyard millet grows faster than you can say *samvatkechawal*. One of the highest fibre and iron content amongst fellow millets, it has a low carb content is a good source of B-complex vitamins. The millet used to make different types of porridges. Slightly sticky when cooked, *samvatkechawal* is popular during *navratras*, when they are used to make *upma*, *khichdi* and *pulav* during fasts.

Proso millet/Varugu: Though its protein content is similar to that of wheat, it is considered a far higher quality protein source because it is not only rich in essential amino acids (leucine, isoleucine and methionine), it is also gluten-free. About as old as foxtail, proso is one of the more delicious and temperate millet varieties. The millet recipes include *upma*, *pulav/biryani* and *porridge*.

Kodo millet/Araka: As with other varieties, kodo was domesticated several thousands of years ago. It has a high amount of lecithin and is excellent for strengthening the nervous system. It is also rich in B vitamins, especially niacin, B6 and folic acid, as well as the minerals such as calcium, iron, potassium, magnesium and zinc. The millet recipes: *upma*, *idli*, *pulav/biryani* and *porridge*.

The dieticians and health experts are also supporting millets as a part of their dietary plan, especially in diabetic, weight management, pregnant women and other lifestyle disorders. Being gluten free and protein rich grains, they act as value added food in an individual's food pattern. Few of these ancient grains such as *Ragi* are sources of calcium too, making it a complete food. Gluten-free grains have a significant impact on weight-loss and diabetes as they are low in glycemic index, protein rich and slow releasing carbs.

Today, most of the corporate hospitals are promoting these nutri-cereals and involving them in the patient's dietary menu, thus dietitians are taking a step forward in explaining the benefit of these ancient grains and making them believe and follow the same.

Value added diet recommended by the dietitians will be followed by the pregnant women and they sincerely follow the same, so as not to compromise on the child's growth and development. Studies and research state that few of these ancient grains like *Ragi* and *Bajra* boost energy levels during pregnancy, reduce bloating. *Ragi* and *Jowar* is one of the most preferred grains in the southern India and parts of Maharashtra during pregnancy for its valued added benefit for both mother and foetus.

Consumers are increasingly seeking value and better outcomes for self-management of health and wellness and therefore there is an increasing demand of organic, non-GMO, sugar free, Gluten free, Low GI foods. Millets, with all its health benefits are coming back on the shelf of the supermarkets, organic stores, and with growing e-commerce there is a potential market.

It is fairly a benchmark as the government would like to promote millets from this year onwards. This year has been declared as 'Year of Millets'. And not only that, as per the announcement by the Department of Agriculture, the centre is drawing up an ambitious plan to increase millet production in the country to 45 million tons (MT) by 2030 from the current levels of 17 MT.

With the innovation of ancient foods Institutes like Indian Institute of Millet Research (IIMR) have been developing technologies in the Ready to eat (RTE), Ready to Cook (RTC) by reviving traditional Indian food not only in its natural form, but also introducing its use for making pasta, noodles, and other condiments to tickle the urban palate and bring back nutrition in the otherwise carbohydrate rich diet.

Now companies have commercially launched millet-based products like *Jowar Idli*, *Upma*, *Ragi malt*, *Jowar flakes*, *Multigrain millet Atta*, *Jowar Pops*, and *Millet Cookies*.

'BARVI AGRO FARMER PRODUCER COMPANY LIMITED' has started its journey in the year 2019 and has got legal existence in the Year 2021. It is a group of over 300 farmers spread across the areas like Murbad, Nashik, Ghoti, Manmad, Otur and Allephata etc. in Maharashtra. Company has been into the Ragi (Finger Millet) process products like Sprouted Ragi flour, Papad and Cookies etc. Company encouraged the farmers for growing Ragi (Finger Millet) in their farms.

Products made by Barvi Agro Farmer Producer Company Limited:



Thus, millets are good for farmer, good for the planet, good for health and will be the next generation smart & Super food for India.



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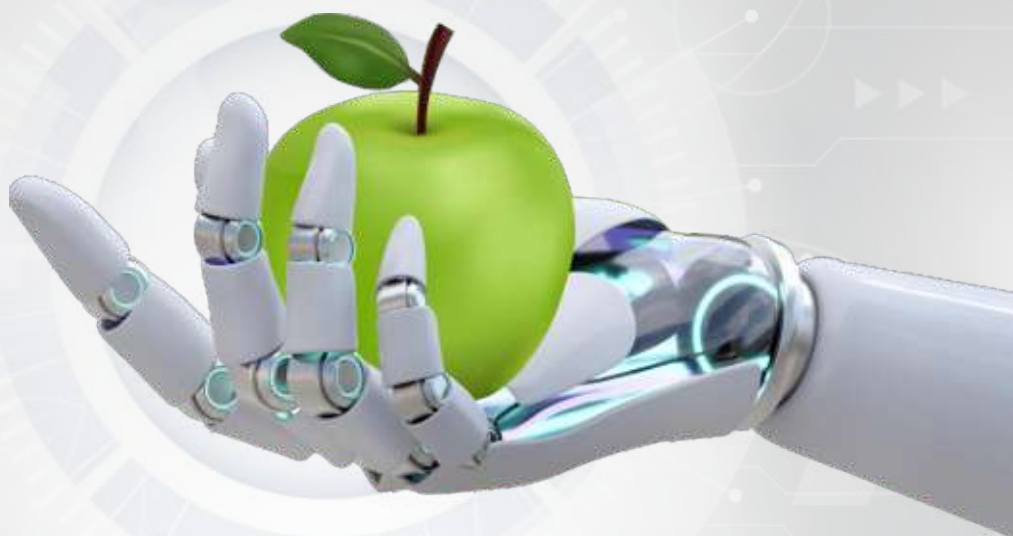
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Image of Relic Treat's millet based products

Satej Foods manufactures a ready-to-eat and ready-to-cook range of millets-based products under the brand name Relic Treat.

All About Millets - The Nutri Cereals of India

- By Sushama Rathod, Founder Satej Foods and Tejaswi Rathod, Co- Founder, Satej Foods

Nutritional cereals like Ragi, Jowar, Bajra, etc. are presumably familiar to Indians who have either heard of or eaten them. If not, we have all been hearing since 2018 about the Indian government's ongoing attempt to revive millets and increase their use in regular meals. Have members of the current youth generation, especially the one's residing in metropolitan cities who favor junk food, ever eaten millets on a regular basis or even know what they are? Unquestionably, no is the response. According to the most recent NSSO household consumption expenditure survey (which is older than ten years) less than 10% of rural and urban

households reported eating millets. This clearly illustrates the inadequate level of awareness and millet intake, but on the brighter side with an amazing potential for reviving and re-introducing the millets in the diets of present and the future generations. (NSSO Household Expenditure and Consumption Survey, 2011-2012).

So today let's know more about millets - the humbled superfood of Indian diet and some more aspects related to it - Millet refers to a group of small-seeded annual grasses grown as grain crops, primarily on marginal soils in temperate, subtropical, and tropical countries.

Around 97 percent of the world's millet is produced in the semiarid tropical regions of Africa and Asia. Ragi (finger millet), Jowar (sorghum), Sama (little millet), Bajra (pearl millet), and Variga (Proso Millet) are a few of the popular millets available in India. One of the first plants to be cultivated for nourishment, these grains have their earliest traces in the Indus civilization.

It is cultivated in over 131 nations and is the traditional diet of about 60 crore people in Asia and Africa.

The earliest Yajurveda texts in India mention millets, naming foxtail millet (priyangava), barnyard millet (aanava), and black finger millet (shyaamaka), indicating that millet usage was widespread and predates the Indian Bronze Age (4,500BC).

In India, millets were the main grain produced up until fifty years ago. Millets have shifted from being a staple meal and an essential component of regional food cultures to being despised by modern urban consumers as "coarse grains"-something that their village ancestors may have thrived on but had abandoned in favour of a more "refined" diet. Unfortunately, this processed diet lacks the essential nutrients that are vital for us (food should be as local and wholesome as possible).

A good source of protein, fiber, essential vitamins, and minerals is millet. The protection of cardiovascular health, delaying the onset of diabetes, assisting individuals in achieving and maintaining a healthy weight, and controlling intestinal inflammation are just a few of the potential health advantages of millet, additionally it is also an adaptable grain since ages.

Traditional Millets and Their Health Benefits (1)

Finger Millet (ragi) :

- Increasing Bone Strength

Natural calcium sources are crucial because they support young children and older people in maintaining strong bones. Ragi flour is recommended as a food during weaning because of its high nutritional value. the southern regions of India in particular. Natural iron is abundant in finger millet, and eating it can help treat anaemia. In addition to being helpful for migraines, it is beneficial in cases of melancholy, anxiety, and sleeplessness.

Pearl Millet (bajra) :

- Is Beneficial for Insomnia

It is a good source of iron and is also important for the formation of a healthy immune system. Pearl promotes relaxation and combats sleeplessness. Breakfast with pearl millet ensures a stress-free day free of headaches. There are various health benefits for children, such as increased vitality. It promotes bowel movement, protects cell formation, and so forth.

Sorghum Millet (jowar):

- Prevents cancer and enhances digestive health

It can improve intestinal health and possibly regulate

diabetes. It can also prevent cancer. The ability to increase red blood cell quality and stimulate the development of healthy bones. Extra fibre intake aids in the removal of LDL-bad cholesterol. improve heart health and safeguard the body from heart attacks, strokes, and atherosclerosis.

Kodo Millet (kodra):

- Beneficial to Diabetics

The benefits for people with diabetes are its high antioxidant content. Kodo has dietary fibre and protein. This Kodo millet dish is delicious, easy to prepare, and healthy. They both understand how to combat and manage diabetes. Enjoy the tasty and healthy dish to fend off diabetes.

Foxtail Millet (rala) :

- Optimal for the Thyroid

Cooking with foxtail millets will teach a youngster the importance of these ancient grains and help them grow up healthy. Kids can digest and absorb it with ease. The best source of iron and cures for anaemia actually contains high calcium levels and treats constipation.

Barnyard Millet (vari):

- Beneficial for Losing Weight

Its nutritional profile is beneficial for weight loss because it has six times as much fibre as wheat does. It keeps the stomach full for a very long time and digests more slowly. Millets are high in fibre and quickly satisfy hunger, which helps people avoid overeating. Simply include this millet in at least one meal if you want to lose weight.

Little Millet (kutki) :

- A Crucial Good Fat

It is the best source of vitamin B and minerals including zinc, calcium, and potassium. It is a component in South Indian millets meals that are more traditional. Most importantly, its high fibre content makes it a nutritious alternative to rice. Little millet contains a lot of antioxidant qualities. Dietary fibre in it protects against high blood sugar. (1)

One of the breakthroughs in healthy eating are these traditional millets. Due to its exceptional rich nutrient content, millet is very significant. It can strengthen the digestive system, guard against diabetes, and strengthen the immune system. Additionally, it enhances the health of the nerves and muscles and boosts vitality.

Millets will benefit future generations much if they are

introduced to children at a young age. Evidently, mother's milk needs to be given to a child until they are at least 6 to 8 months old. When it is able to chew on semi-solid foods after that, millets can be gradually introduced. Starting young aids in the development of a taste for millets, which, thankfully, can take the place of grains like rice and wheat to improve the health of traditional Indian meals. Millets are a tasty and incredibly nourishing grain. Additionally, they are thought to have the lowest grain allergies.

According to research that was recently published, millet-based midday meals can boost relative growth by 50% in children who participated in a three-month feeding study with 1,500 kids in Karnataka. The meals, which were created by scientists and chefs and contained small amounts of millet as a substitute for rice, received a taste rating of above 4.5 on a 5-point scale from the children. Dr. Ashok Dalwai, Chair, Empowered Body, Doubling Farmers' Income, Government of India, and Prof. Ramesh Chand, Member, NITI Aayog, jointly released the study's findings. Later on in the day, the findings were presented at the Tasting India Symposium.

This Smart Food study was conducted by The AkshayaPatra Foundation and the International Crops Research Institute for the Semi-Arid Tropics and was titled "Acceptance and impact of millet-based mid-day meal on nutritional status of adolescent school-going children in a peri-urban region of Karnataka state in India" (ICRISAT). The study involved early teenage schoolchildren from four villages near Bengaluru: Thathaguni, Kagallipura, Allahali, and Chensandra. Anthropometric measurements-height, weight, and age-were used to gauge growth, while sensory assessments were used to gauge acceptability. The researchers found that children who were fed millets had a 1.5% increase in height on average in three months while children in the control group registered a 1% increase in height during the same period. In effect, the study group children grew 50% taller than the height increase of control group children. (2)

In an effort to promote and uphold a healthier future and sustainable agriculture, the Food and Agriculture Organization (FAO) supported India's request to observe an International Year of Millets in 2023 in 2018, and the United Nations General Assembly has proclaimed 2023 to be the International Year of Millets. This was approved by a United Nations Resolution,

which was spearheaded by India and backed by more than 70 other countries.

In his most recent monthly address to the country, Prime Minister Narendra Modi said that the year 2023 would be recognised as the International Year of Millets. A resolution proposed by India that proclaimed 2023 the International Year of Millets was approved by the U.N. General Assembly in April 2021. Its goal is to raise knowledge of millets' positive health effects in the general public. "Craze for these very coarse grains, millets, is surging today around the world," remarked PM Modi. He mentioned how international visitors to India have been served millet foods, and how much they have enjoyed them. In addition to wanting information about our coarse grain, they were curious about millets.

Many attempts are being made today to expand the demand for millets in India and around the world, including changing people's perspectives. A lot of organizations are emerging to promote this cause. There are initiatives underway to teach farmers better millet-growing practices. Because of their propensity to avoid gluten, they are given a lot of attention. There are a lot of dishes that use millets as their main ingredient.

The "marvel grains" of the future will be millet because they can withstand drought and require little outside help. Millets are sustainable for the environment, for the farmer farming them, and they offer affordable, high-nutrient options for everyone because of their high tolerance to adverse environments.

On October 15, 2022, "MahilaKisanDiwas" or "International Rural Women Day" was observed by the National Gender Resource Center in Agriculture (NGRCA), Directorate of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmer's Welfare, and National Institute of Agricultural Extension Management (MANAGE), an independent organisation under MoA&FW. The topic of this year's MahilaKisanDiwas is "Millets: Empowering Women and Providing Nutritional Security" because the United Nations (UN) has designated 2023 as the "International Year of Millets." On that occasion, our Agriculture Minister, Shri. Narendra Singh Tomar, stated that the goal of IYOM 23 is to expand millet production, orderly process them, and make the greatest use of them so that 2023 will mark the beginning of the people's movement for millets.

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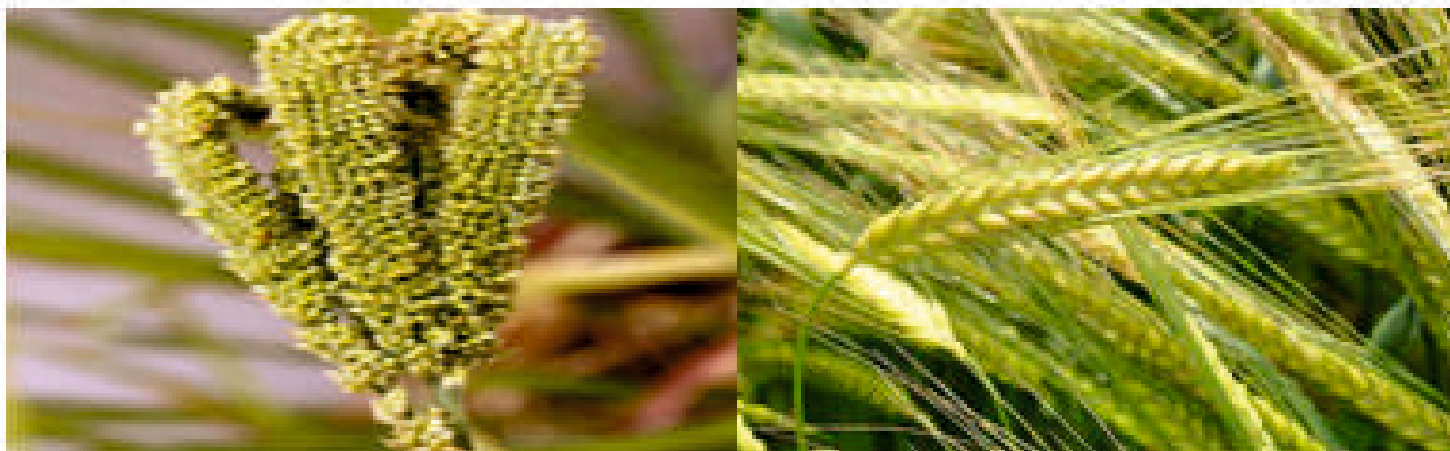
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Organic Millets for Preventive Health

Dr Prakash Kondekar, Advisor, CASMB

Prosperity of nation depends upon the health of people living there, which in turn primarily depends upon better organic nutrition through food. Food and Agricultural Organization's (FAO) vision for nutrition is "a world where all people should eat healthy diet from sustainable, inclusive and resilient agri-food systems". FAO's mission is to tackle malnutrition in all its forms by accelerating impactful policies and actions across agri-food systems to enable healthy diet for all.

Organic millets can help fulfil the goals of providing better nutrition. Hence FAO/UNO has declared 2023 as the International Year of Millets. FAO will support all stakeholders to accelerate impactful policies and actions through five inter-dependent action areas, of which action area 1 is to generate, collate and share data on healthy diets and agri-food systems. Good nutrition is FAO's first defence against disease, malnutrition in particular.

Climate change will see more extremes of droughts and higher temperatures and millets will be more important as a solution for the farmers. Millets are basically the last crop standing in times of drought and withstand extreme high temperatures also, organic by default. Malnutrition and increasing non-communicable diseases are critical and millets target some of the biggest needs directly like, anaemia, calcium, zinc, folate, protein deficiency and even diabetes. Millets are highly nutritious, have a low carbon foot print and due to their resilience and survival with minimal water, are a

good risk management strategy for the farmers. As a result millets will definitely tackle in unison some of the biggest global issues: o Poor diets and health o Environment issues (e.g. climate change and water scarcity) o Rural poverty. Millets were a traditional crop across much of Africa and Asia (India in particular). Four decades ago when we used to live in villages, millets remained to be our staple food in different forms, with traditional recipes.

In India, malnutrition mainly prevails among the young children and women. Malnutrition can be undernutrition or overnutrition. In this regard, organic millets, can offer major solutions.

Millet grain is rich in nutrients and has potential to prevent various diseases and promote health. They are a rich source of minerals such as calcium, iron, potassium and zinc, vitamins such as B-complex, especially B6 and folacin, fiber, polyphenols, proteins, phytochemicals and micronutrients. India, Nigeria, Niger, Mali, Burkina Faso, Chad and China occupy top spots in millet production. Finger millet (*Eleusine coracana* L), little millet, foxtail millet, *P. Beauvois* and *proso* millet are the species most commonly found among the different varieties of millet. Finger millet (*Eleusine coracana*) belongs to the taxonomic family Poaceae and in India it is commonly known as *Mandua* or *Ragi*. Finger millet has an embryo and endosperm covered by a shell called testa. Finger millet is accessible in many colours such as white, tan, red, yellow, purple and brown. Red finger millet is grown majorly in African and Indian countries like Sri Lanka, Nepal, Madagascar, Malaysia, Uganda, and Japan.

In India, finger millet (mostly organic) occupies the largest area of cultivation among small millets. Finger millet is unique among grains such as barley, rye and

oats with higher nutritional content and special properties as a subsistence food crop. Finger millet is an essential food source in southern Karnataka. Although finger millet has many nutritional benefits, it contains thirty times more calcium than rice but in semi-arid and tropical regions it is the least targeted and least used crop. Due to the growing awareness amongst the masses things are changing positively. In developing countries, there is a huge possibility for finger millet in value-added food products, as millet is gluten-free and can therefore be used by people with gluten allergies and those with gut problem. It has beneficial health properties, such as antidiabetic (type 2 diabetes), anti-diarrheal, anticancer, anti-inflammatory, anti-cancer (chronic myeloid leukemia K562), anti-atherosclerotic effects, anti-bacterial and antioxidant properties.

Finger millets have many functional properties, like, anti-oxidant, anti-protein glycation, anti-microbial, wound healing property etc. The main protein fraction is **eleusin**, which has a high biological value, meaning that it is easily incorporated into the body. There are also significant quantities of tryptophan, cystine, methionine and total aromatic amino acids. If that sounds too complicated, all you need to know is that these are considered crucial for human health, and that most cereals are deficient in these components. This high protein content makes finger millet a very important factor in preventing malnutrition. The cereal can be an especially good source of protein for vegetarians because of its methionine content that constitutes about 5% of the protein.

Importance of Sprouting of Finger millet (*Eleusinecoracana*) (Nachni/Ragi)

The terms sprouting, malting and germination are used conversely to refer to the process of soaking the seeds in water until saturation and then germinating under controlled conditions. Sprouting has been reported to enhance the nutritional quality of seeds by increasing the content and accessibility of essential nutrients and reducing the level of anti-nutrients. The long germination time leads to significant dry matter loss through respiration, which is undesirable.

The finger millets main protein fraction is **eleusin** which has a high biological value, meaning that it is easily assimilated into the body. Presence of



abundant amino acids, and other vital vitamins and minerals make finger millets the millet of choice over other cereals.

Amaranth (Rajgira) Improves heart health, strengthens bones, prevents hair fall, fights cancer, treats diabetes, prevents heart disease and stroke.

Jowar (Sorghum) is a complex carbohydrate that digests slowly.

As a result, it leads to stable blood sugar levels. Hence, it is a great diet choice for diabetics and people who want to lose weight. *Jowar* contains 8.45



mg of iron in every cup. Since the iron in *jowar* is non-heme (difficult to absorb), pairing it with a source of Vitamin C will give you the maximum benefit. *Jowar* is good for bone health because it contains high magnesium levels, *jowar* helps maintain calcium levels in the body (magnesium increases calcium absorption). 100 g of *Jowar* provides 11 g of protein, which supplies the body with energy and aids in cell regeneration. Gluten is a protein component found in wheat and barley-based foods. It causes digestive problems such as bloating, pain and stomach cramps. *Jowar*, a gluten-free whole grain, is considered an excellent alternative for people who suffer from 'gluten intolerance. Compared to other cereal grains like barley or rice, *jowar* contains much higher concentration of fibre. A single serving contains over 12 g which is almost half the recommended daily intake for fibre. *Jowar* is a high-fibre diet which lowers the risk of obesity, stroke, high blood pressure, cardiac disease, diabetes and digestive problems.

So in near future, not only in India but more than 72 countries in the world will be using various types of millets so as to have good healthy people in their countries.

Dr Prakash Kondekar
Advisor, CASMB



Indian Finger Millets (Ragi/ Nachni) and its Effects on Nutrition

- Prof. Rupa Manoj Rawal

India is a country with distinct physical boundaries and is surrounded by an ideal climate that is suitable for a wide range of agricultural patterns because of its rich plains and numerous perennial rivers. India uses over 3/4th of its arable land for food production. Based on the suitability of climatic conditions for agriculture, which is a primary activity, consumption and eating practices are classified. These classifications of various dietary food categories make it easier to provide individuals with a balanced diet that includes foods like grains, fruits, vegetables, and other seasonal products for daily consumption.

The proverb "A sound body produces a sound mind and happiness" is accurate. One must be aware of the advantages of grains and their nutrients, with Indian Finger Millets being a good example.

Indian finger millets should be regarded as a nutritional power houses in they act as are source for survival and are linked to a fuel source that provides energy for activity. Learning about specific health supplements that manage health conditions is vital, taking into account the surroundings and way of life.

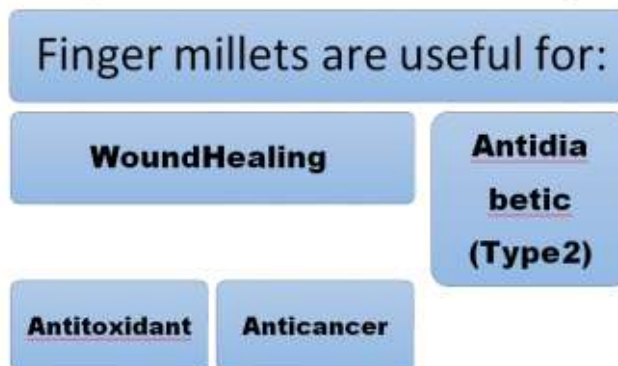
Finger millets have been viewed as a viable strategy for reaching nutrition security. Since the protein and essential elements in finger millets are comparable to or even higher than those in wheat, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is concentrating on enhancing the production of finger millets (*Eleusine coracana*), Rice (*Oryza sativa*) and Maize (*Zeamays*). In India and Nepal, Ragi, also known as finger millet, is a significant staple grain. It grows in cooler, higher elevations up to 2000 m above sea level and has a higher water requirement than most millets.

➤ Advantages of Indian Finger Millet : (Review of Literature)

The fiber, vitamins, and minerals in finger millet keep both kidneys and heart healthy. Potassium helps nerve end messages to the brain and muscles so they can function. Fiber content in finger millet helps to reduce harmful cholesterol that could help to prevent heart disease.

- According to Asquith and Butler(1986), maximum utilization of the nutrient potential of the millet is limited by the presence of phytates, phenols, tannins and enzyme inhibitors. Tannins bind to both exogenous and endogenous proteins including enzymes of the digestive tract affecting utilization of proteins
- According to Rao and Prabhavati(1982), finger millets have a high concentration of tannins ranging from 0.04 to 3.74% of catechin
- According to Rao (1994); Antony and Chandra (1998); Antony and Chandra (2000), brown finger millet contains 360mg/100 go ftannins, additionally, they discovered that tannins may hold 50% of their on that is consumed in the diet
- As per Ramachandra et al. (1977), the tannin concentration of different cultivars of finger millet has been observed to adversely correlate with the in vitro protein digestibility. It has been discovered that germination, fermentation, roasting, boiling, and soon can lower the tannin content.
- As per McDonough et al. (2000), finger millet is rich in essential amino acids likely sine and methionine which are important in human health and growth. In addition, it also contains useful amounts of two poly unsaturated fatty acids-linoleic acid and ?-linolenic acid
- According to Birch et al.(2007); Jacobson et al.(2008), Finger milletal so contains both water soluble and lipo soluble vitamins: thiamin, riboflavin, niacin, and tocopherols
- As per, Obilana and Manyasa(2002), finger milleti soften grown and consumed primarily in developing countries by small-hold farmers with limited agronomic resources, it is of ten referred to as a "crop for the poor" or a "famine food"

➤ Functional properties of finger millets



Although finger millet has been referred to as a lost crop due to lack of attention, it is also thought to provide nutritional and health benefits. Considering the difficulties with sustainable food production, climatic changes, and population growth. This has given farmers, nutritionists, and feed makers the chance to conduct research for better understanding.

➤ Nutritional Sensitivities

The food industries are confronted with a challenge as a result of rising nutritional awareness generating new food products with unique health-improving characteristics. The dietary fiber and polyphenols in finger millet are known to provide regular consumers with a number of health benefits, including anti diabetic, antioxidant, and antibacterial as well as protection from chronic diseases related to diet. Due to their improved water and nitrogen usage efficiency, tolerance to insect pests and diseases, and resistance to external pressures, mini millets have been labeled "smart foods" or "healthy snacks" because they are better adaptable to several of environmental conditions.

➤ Millets for the Millennials - 2023 UNInternational Year of Millets. The social media could be used as an



effective way to market about millets because youth being the majority of the population they can create fan base or act as an influencers. They can promote the fact that how millets can be a good meal to maintain

weight during the lifetime. The value of this historic crop as a less water-intensive alter native to rice should be promoted by young farmers: "Eat modern and healthy, eat what comes from the soil of the state, "should be conveyed." We need more and more people, especially young people, to adopt good food choices. "Making sure that our products and recipes appeal to all age groups is important.

➤ Organic Manures in Nutrient Management supported by (INM).



Since finger millet is typically grown in poor soil, better cultivators respond well to additional fertilizers, as do other crops. In comparison to main

crops, finger millet has few advice available for nutrition management under various agro-climatic situations. In finger millet, there is considerable room to address the problems with nutrition management. The integrated nutrient management (INM) shows the path of agricultural sustainability as it provides enough scope of soil fertility enhancement including enrichment of soil microbial activity. The major objectives of INM are enhancement of crop productivity by providing essential nutrients and increase in resource use efficiency. Recent development in research in precision agriculture suggests soil test crop response (STCR) approach in different crops for targeting of nutrient inputs and yield output. On the basis of published work on nutrient management of finger millet, an initiative has been taken to bring information together on the options and methods of nutrient management under different situations to achieve production sustainability.

➤ Potentiality of Finger Millet



Millets acts as a staple food and fodder



Millets sequesterate carbon, thereby adding CO2 abatement opportunities to enhance agro biodiversity ecological benefits



Bio-fertilizer

Yield Better



Organic manure are known not only to improve physical and chemical properties but to create congenial environment for soil micro organism and enhance efficiency of

chemical fertilizers. Under the changing scenario of global warming and climate change, cultivation of ecological sound and hardy millets may be a wise alternative for optimum output with food and nutritional security. India is the largest producer of various kinds of millets and it has the pride of place in having highest productivity among small millets. An area of 1.27 million hectares with production of 2.61 million tones average 1489 ha-1 It has been considered as most profit making

crops and free from major pest/diseases and easy in cultivation

➤ The health benefits

Since our appetite is more accustomed to the bland softness of wheat and white rice, the deep, earthy flavours takes some time for getting used to. But they do have several advantages. Because millets are gluten-free grains, they are a blessing for people who are gluten in tolerant or who want to cut back on their consumption of gluten. Additionally, it is already a well-established fact that eating millets regularly can aid in weight loss due to their high fiber and bio active chemical content.

Prof. Rupa Manoj Rawal

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FSSAI West Region conducted awareness training on hazardous usage of newspapers for street food vendors

Date: 2 DEC 2022

It is widely observed that street food vendors across the country use newspapers to wrap food items for takeaway and the food authority has stressed on the grievous health concerns posed by consuming food wrapped in newspapers. FSSAI Western Region, Mumbai along with **Chamber for Advancement of Small and Medium Businesses (CASMB)** have conducted survey on 2nd December

human health and if ingested, can make your body incapable of eliminating toxicants or their metabolites through excretion. It may in fact, keep accumulating and lead to problems related to lungs and kidneys. However, an overdose of chemical solvents in ink can even lead to cancer-related complications.

Through the survey conducted it was observed that about 36% of stall owners in and around Andheri (East), mostly selling fried food items such as pakoras, samosas, fries, etc. along with rotis or puris use newspapers for wrapping food items for parcel or takeaway. In order to promote and ensure the successful implementation of the training undertaken on good sanitary & hygiene practices, Food safety and hygiene kits including paper plates, aprons, gloves, nail cutter, head caps and soap were distributed by the food authority.

The enthusiastic participation and feedback from the street food vendors entails a positive training story. Through this initiative the authority was also able to convince these FBOs to attain FSSAI registration and received an ardent & affirmative response from the attendees.

FSSAI WR intends to conduct more such trainings in future for the effective implementation food safety practices across the community.



2022 for food stall vendors using newspapers as packaging material for food items and training for the same was conducted near Chinai College, Andheri (East).

Ms. Pritee Chaudhary, IRS, Regional Director, FSSAI WR along with Ms. Vaidehi Kalzunkar, Deputy Director (Technical), FSSAI WR and Sh. Umesh Kamble, Secretary General, CASMB were present at the event and sensitized the Street Food Vendors on usage of newspapers which are a health hazard and portray a major food safety concern.

The ink and dye on newspapers are toxic to





Superfoods for Gluten Free Diet

By: Mrs. Kanika Nandurdikar

Once used mostly as bird feed, millets are now growing in acceptance as a “**Super Food**” among all individuals, worldwide. Millets are generally ground into flour and are used in regular daily cooking to make chapatis (bhakris), pancakes, chillas, dosas, cakes, cookies, breads etc. Millets are unbelievably nutritious and a great source of magnesium, manganese, zinc, potassium, iron, B vitamins, fibre & protein. Also, they are naturally gluten-free. With time, people have become extremely conscious of their health and general well-being. We’ve all heard about the hazards of consuming gluten foods in one way or another. Most of the people just have a vague understanding of what gluten is and why it is potentially harmful, but it’s a need of the hour to

go deeper dive on the subject to understand exactly what it is.

Global research suggests that “About 6%-7% of the world population is gluten intolerant. It’s more common than celiac disease, which affects about 1% of the population.”

What is GLUTEN?

Gluten is a protein naturally found in some grains including wheat, barley, and rye. Sometimes it’s in oats, but only because the oats may have been processed with other foods that contain gluten. Gluten acts like a binder, holding food together and adding a “stretchy” quality. It’s common in processed foods such as bread, pasta, pizza, cereals, savoury snacks etc.

Humans have digestive enzymes that help us break down food. Protease is the enzyme that helps our body process proteins, but it can’t completely break down gluten. Undigested gluten makes its way to the small intestine. The small intestine is unable to fully absorb each unit of protein, and this leads to poor digestion and

other issues. Most people can handle the undigested gluten with no problems. But **'gluten-sensitive people'** often report that gluten causes abdominal pain, bloating, **constipation, and irritable bowel syndrome**. This is the reason why our body sometimes reacts badly to an overload of gluten. With gluten everywhere, it's no surprise that so many of us struggle with weight and other health problems, despite living in the advanced modern world.

Celiac disease is a chronic digestive and immune disorder that damages the small intestine. When people with Celiac disease consume gluten, their immune system attacks and damages the lining of their small intestine. With repeated exposure to gluten, the body becomes less able to absorb nutrients into the bloodstream. According to the NHS UK, this can cause undernourishment, loss of bone density, miscarriage, infertility, neurological disorders or a rare type of bowel cancer. Many people with celiac don't even realize that they have celiac disease. The damage that happens to the intestine is very slow, and symptoms are so slow that it can take many years to diagnose the same. It is also one of the most common genetic disorders.

“There is no cure for the condition; the only treatment is a strict gluten free diet for life.”

Milletts are superfood for people who follow gluten free diet.

Milletts can provide nutritional security and protect against nutritional deficiency, especially among children and women. As they are gluten-free, have a low glycaemic index and are high in dietary fibre and antioxidants, milletts can also help in health challenges such as obesity, diabetes, and lifestyle problems. Once you add milletts to your system, gluten intolerant people can see **incredible health improvements**. They may experience less bloating, reduced inflammation, clearer skin, lower blood triglycerides, improved blood sugar control, weight loss and more energy.

In case of people with intestinal disorders, consuming milletts in its natural form may delay the digestion process and can affect their gut health. In those cases, people can go for Sprouted Milletts. Sprouted grains are lower in starch than regular grains and higher in protein, vitamins, and minerals.

Research is still being done on their health benefits, but scientists have identified some promising findings in

sprouted milletts, such as:

- Diabetes-fighting properties
- Decreased risk of cardiovascular disease
- Better health for nursing mothers (decreased depression and fatigue)
- Protection against fatty liver disease
- Easier digestibility
- Increase in key nutrients
- Lower blood pressure levels

Overall benefits of Sprouted Milletts

- **Easily digestible** : It helps people who are sensitive to digesting grains. The sprouting process naturally activates starch, protein and lipid degrading enzymes that “pre-digest” a grain. The grain uses dense protein and complex carbohydrates as fuel to grow, converting them to simpler amino acid and glucose molecules. This means that some of the enzymes our bodies use to break down the seed have already been applied, making it easier to pass through.
- **Increased Nutrient Content:** The little germinated seeds are regarded as nutritional powerhouses due to their high vitamin and mineral content. Sprouting transforms the nutrient profile of grains and allows your body to get the most from whole, natural foods.
- **Low in Fat&contains good carbs:** Sprouting reduces the fat % in grains & increase the fibre content. Sprouted millet flours can be consumed as a replacement of refined/wheat flours.
- **Sweeter taste & great texture** : Sprouted millet grain flour has a sweeter taste. This is due to the breakdown of starch into simple sugars during sprouting process. Also provides great texture in baking breads, cakes & cookies as they have long-lasting softness & volume and increased shelf life.

NIHKAN is on a mission to support the challenges faced by consumers who have “diet restrictions”

either due to lifestyle choices or conditions such as celiac disease, gluten intolerance, gluten sensitivity, and lactose intolerance. And hence, curating finest products to provide health, nutrition & wholesome foods using ancient superfood grains of India. Combining traditional age old methodology for modern food choices of convenience & taste too.

We started our journey with Dehydration of Green Bananas to produce most healthiest **Green Banana flour** which is high in resistant starch, great amount of dietary fibre & abundant in potassium. This superfood is a saviour for gluten free recipes as it can be used as a binder instead of using any gum or starch. Green Banana flour has a mild earthy taste which works very well with Millet based flours in formulating Gluten free recipes and increasing the nutritional value of the meal. NihKan's Dehydrated Sprouted foods includes Dehydrated Sprouted Legumes & Millet based flours which can be instantly used for a complete meal.

We recently launched 100% Millet based Noodles, which is a revolutionary product in this category without using any other grain.

NihKan's range of products includes all 100% Gluten free & plant based products which are manufactured using sustainable processes packed in fully recyclable packaging.

We urge consumers to understand their **signs of body** and **make informed food choices**.

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Millet & Millet Products - a Current Market Update!

By: Ms Neha Pandit Tembe

Once upon a time labelled as the food of poor, millets have grown to become the latest fashionable trend in health food industry! In rural regions consuming millet based chapati or bhakri with vegetable and little chutney was a wholesome simple daily lunch long before when wheat entered each household and caught the centre stage. More so, among the farmers, daily wage workers and labour intensive working community, it used to be a healthier option which kept one fuller for longer. In fact before the green revolution promoted wheat and rice cultivation, millets were a staple for large sections of the country especially where access to irrigation was an issue too.

Thus these coarse cereals are not new for the Indian subcontinent. We have been growing and consuming millets for many years. Some millets may be consumed more than others in different states. For example consumption of Jowar is more in Maharashtra, Bajra is consumed more often in Rajasthan and Gujarat, Ragi again in Maharashtra and southern states like Karnataka etc. On the other hand in some places millets are being used as animal and bird feed only; they remain underutilized and neglected because of little knowledge and also issues like cooking time, taste, and texture of millets based preparations are sceptical. On the other hand, states like Orissa, Tamil Nadu, West Bengal and few others have negligible millet consumption as per National Nutrition Monitoring Bureau (NNMB). These problems can be solved easily by targeted spread of information & educating not just rural but even urban consumers and farmers. And thus the declaration of year 2023 as International Year of Millets by United Nations comes at a right time to encourage the farmer's, educate the consumers and even support the environment.

Food and Agricultural Organization (FAO), reported

that traditional food processing, such as decortications, milling, germination, fermentation, malting roasting etc., are commonly used for preparation of food products from millets to improve their edible, nutritional, and sensory properties. But industrial method of processing millets are not well developed compared to other cereals. Further, majority of consumers still prefer the taste of other cereals, so per capita consumption of millets is still low. Moreover, there is concern of anti-nutrients present in millets. Thus there is lot of scope for technology improvement in millet processing.

A sustainable choice: it's a known fact that millets are draught resistant, pest resistant crops and thus of supreme importance in near future, not just for India but globally. These crops have a short cultivation time, can survive extreme weather conditions, with very less or no pesticides and maintenance. Thus their carbon foot print is better which makes them a sustainable crop over others.

Nutrient profile wise millets are said to be super cereals due to the presence of more fibre, minerals, phytochemicals, antioxidants compared to staples like rice or wheat. With the focus on preventive nutrition and health improving foods more and more health professionals are promoting and replacing regular wheat chapatis & rice with millet chapatis or millet grits. As worldwide cases of gluten sensitivities & intolerances are on the rise, these naturally gluten free millets offer an excellent inexpensive option. Even the public distribution system of the country needs to include more diverse grains so as to provide calories and nutrients. In this article we would not go into details of nutrient profile of millets, but simply state that they are an efficient option to bring about diet diversity which is the need of the hour today to tackle malnutrition & nutrient deficiencies.

Millets have a wide range of applications. The use is not limited to just main meals and staples anymore. This property of adaptability & wide applications make it easier to include them in everyone's diet in some form or the other for both traditional as well as non-traditional consumers. The properties of millets are such that they can be blended with other grains or used on own for multiple applications. As per current scenario among the common ones all the small millets i.e. Foxtail, Little, Kodo, Proso, Barnyard, and Brown top contain a husk which needs to be removed but Sorghum, Pearl millet and Finger millet don't have a husk layer so just by cleaning sorting them one can

use them. This is maybe another factor why they are more commonly used at household scale as well.

While a group of urban population is just getting introduced to rural and traditional recipes like jawar & nachani (ragi) bhakris, bajradebhras, ragi aambil/ambli, jowarukad, ragimudde or puttu, ragisandige, ragihalbaor unde, ragi malt/porridge, nachani sheera, bajra raab, bajra khichdi and rotla etc. There are also a plethora of fusion products coming in market made from millets. With consumer demand for more and more global cuisines many Indian as well as foreign brands are coming up with regular foods with a twist of millets. This gives the benefit that a brand need not educate a consumer from scratch about a new food but just highlight how the millet product is better for them. For example wheat vermicelli or refined wheat instant noodles are already known food in most households, so when a brand launches millet vermicelli or noodles the consumer already knows the end usage & has an idea of recipe preparation. Thus acceptability is better. In fact, soon we will experience a flood of millet noodles, pastas, vermicelli brands in the urban setup at least.

Making millet flour or grits is generally the first process after cleaning sorting. They can very well be used in extrusion technology and that creates multiple options like chips, crackers, noodles, pastas, unfermented breads, khakhra, puffs, sev and more. The grain can be puffed under heat which can be then flavoured with many spices and flavours. For example: jowar puffs, ragi puffs etc. Naturally popping them (like popcorn) gives a popped grain as also puffs can be made by blending with other like rice and extruding.

Broken grains/ grits like broken wheat (daliya or lapsi) of various sizes are being made from millets for texture like semolina (rawa) to be used for upma, idli, khichdi, chillas etc. Ragi rawa, Jowar rawa are already seen in the supermarket shelves. With a combination of rice/ dals/ pulses plus millets these products are also ranked higher on nutrition rating. When a cereal/millet is combined with pulse or dal the quality of protein is improved. An additional step of fermenting or sprouting the grain can enhance the nutrient profile.

Since millets (esp. ones without husk/bran) can be made into flours easily we also see millet dosa mixes, pancake mixes, millet dhokla mix, millet cookies, cake mixes, ready to eat cupcakes, biscuits and more on the shelves. Another unique application of roasted millet flours(either malted or plain) is instant nutritious porridges or kheers or a supplement to be added to

liquid of choice like milk/buttermilk/chaas. The health conscious are also demanding millet based cakes and brownies instead of wheat or refined wheat based. Not commercial brands but several home and small scale bakers are already offering millet based desserts though this trend is seen only in tier 1 cities for now.

As mentioned before, millets are versatile and can undergo extrusion process well. Products like ragi chips, jowar puffs and sticks, ragi balls, murukku, nimki being very well loved by all because of the texture and taste too. Another snack Khakhra is enjoyed by many people and with addition of millet flours the nutrient quotient can be increased for it. We already have several bajra, jowar khakhra since a long time. There is an assortment of flavour options available for all such snacking items and so one need not compromise on taste when introducing health factor.

Energy or protein bars & chocolates is another unique application for millets either in the form of flours or mini puffs. Just like rice and wheat they can be pounded into flakes and used for preparation of poha or as flakes in ready to eat multigrain breakfast cereals. Millet based breakfast cereals/granola or muesli is also accepted well by the population. There are some small scale start-ups offering bajra and jowar flakes too to be cooked like poha or chivda or have with milk.

While the 3 millets- Pearl millet, Finger millet, Sorghum have been accepted and being experimented to a great extent the other millets do seem to be neglected in new product development. The reason for the same may be less production or less awareness among the public or being neglected and considered as the food of poor or animal-bird feeds. Even as staples, people are not yet demanding or have become aware that most of the small millets needs a big concerted effort from the industry and health professionals to change the scenario. Thus we get stuck in a loop of less demand leading to less production and less availability, which in turn affects consumption. Only after being accustomed to the grains, people would then be ready to buy food products made from them.

One disclaimer that needs to be highlighted just like for any health/ diet food product in the market would be that just by adding millets in a high in saturated fat, salty and sugary foods or junk food cannot become super healthy. For example a brownie made from jowar flour can still be high in fat and sugar and calories, same for multi millet cookies. Or a gluten free vegan pizza base from bajra can still be high in calories depending on fats and cheese used.

Multigrain millet based khakhra need not always be an ideal choice depending on what all is added! So consumers still need to make conscious choices by understanding the product.

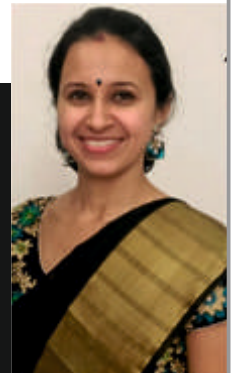
Nevertheless, India is a foodie nation that enjoys its parathas, chapatis, dhoklas, dosas, mithais, snacks as well as pastas, pizzas, noodles, biscuits and desserts equally, if not more! Thus the variety of regional foods as well as acceptance of global cuisine by Indians is a unique opportunity for food companies to develop millet based products. When health, nutrition, environment and climate change is at stake, our good old millets can pose the best answer and deserve a comeback. One can say that diet fad or not, giving millets their limelight was long overdue for multiple reasons and we can use this opportunity of International Year of Millets 2023 to the best of our capacities!

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Food Nutrition Indian Scenario

Prof Sunita Karad

India is a country with crop varieties that are as diverse as the land, its people, cultures, languages and so on. However, many of these varieties were lost or forgotten when the Green Revolution saw farmers being asked to forgo indigenous varieties for lab designed high-yielding varieties (HYVs) to ensure better productivity.

With the urban hunger for a healthier lifestyle increasing in the recent years, many traditional varieties with amazing health benefits are seeing a gradual resurgence.

The Sattvic Diet:

Obtained from the Sanskrit terminology for "sattva", the sattvic diet stresses on freshly cooked simple meals for a clean, dynamic, strong, knowledgeable, and ethical way of life. It focuses on preparing only the required amount of food, eating everything in moderation and avoid wastage of dishes. It also recommends steering clear of processed, canned products and to opt for freshly cooked foods at all times of the day.

Moreover, the sattvic diet entails how raw ingredients should be obtained - by plants grown organically, ripened, seasonal harvest, without harming any animals, as well as how food should be cooked - with a sense of appreciation, care, and kindness for all living beings. Nevertheless, the sattvic diet is not actually bland and subtle in taste, it, in fact, consists of all the six flavors, namely sweet, bitter, salty, sour, spicy and stringent.

Sattvic diet is known to promote flexibility and agility of the mind and keeps it energized all the time. The prerequisite of this regime is that it attempts to bring about a balance between the body and mind, which helps an individual to live a longer and healthier life.

Since the Sattvic diet envisages eating in small proportions or moderations, it helps in losing those extra inches to attain ideal body weight. The diet also strengthens the immunity power of the body, without rendering it pale or weak. Augments the immune system, helps in lowering the inflammation, averts chronic ailments of diabetes, heart disease later in life, besides combatting seasonal infections and illnesses such as cough, cold, flu. Since the diet is very clear and

pure, devoid of any unwanted protein or fat, it is inadvertently helpful in enhancing the defense mechanism of the body, to ensure good overall health. It assists in reducing the chances of heart disease risk factors such as LDL (bad) cholesterol. And thereby smoothen digestion processes, provides energy, and regulates metabolism, which bolsters disease resistance. Furthermore, the sattvic diet consists of fresh and tasty meals that are also light on the tummy, thus preventing bloating, indigestion, fatigue, irritation, and lethargy. In this manner, a holistic sattvic meal plan keeps the body fit, thwarts toxins from blood circulation and instills calmness in the mind helps in detoxifying the body.

If the regime is followed by some good physical exercises like yoga or pranayama, it protects the body from various lifestyle diseases such as diabetes, blood pressure etc. Use of ghee, coconut oil, sprouted seeds in the diet is always advised. These are known to be good fats which are necessary to maintain a healthy brain and enhance memory powers, which helps in taking cognitive life decisions. The Sattvic diet is known to nourish the tissues and cells as it is effortless to digest. This Ayurvedic dietary system is known to utilize the six tastes of Ayurveda namely, sweet, salty, sour, pungent, bitter, and astringent to balance the sattva rajas and tamas Gunas (mental energies of the body). It can provide a rounded meal that has both nourishing and purifying qualities, which boosts immunity and metabolism.

What are Rajasic, Tamasic and Sattvic Diets?

A Rajasic diet mainly consists of foods which contain spices and rich in taste such as onion and garlic, deep fried foods, coffee, tea, refined food items, sugary foods, and chocolates etc. These foods give instant energy for a brief period, but ultimately, we get to experience an energy low or stress as well. A dominantly Raja sic quality diet disturbs the mind-body equilibrium. This type of diet is feeding the body at the cost of the mind. A rajasic person qualities- weak digestive system, always in a rush to eat food fast and prefers rich foods.

A Tamasic diet chiefly consists of reheated foods, chemically processed foods, nonveg foods, alcohol, cigarettes etc. A tamasic person will be dull, unimaginative, unmotivated, careless, unaware, and lethargic. They will experience illnesses such as diabetes, obesity, and liver disease. A balanced diet gives your body the nutrients it needs to function correctly. To get the nutrition you need, **Sattvic Diet:** A balanced diet should include a variety of foods from the following groups:

Food comes under Sattvic Indian food: Fruits, Vegetables, Grains, Dairy products, Nuts, beans, Lentils and pulses

Fruits contain high fiber, Vegetable includes minerals and Vitamins, Grains and dairy products includes Foods, Nuts, beans, soy products. Most of your daily calories should come from fresh fruits, vegetables, whole grains, legumes, nuts, lean proteins. Body needs calories from food for walking, thinking, breathing, and other important functions. The average person needs about 2000cal /day to maintain their weight, but the amount will depend on their age, sex, and physical activity level.

Males tend to need more calories than females, and people who exercise need more calories than people who don't. As per the Ayurveda Eat Food as per your Prakriti, As per the season, Locally grown and cooked traditionally.

Person	Calorie requirements
Sedentary children: 2-8 years	1,000-1,400
Active children: 2-8 years	1,000-2,000
Females: 9-13 years	1,400-2,200
Males: 9-13 years	1,600-2,600
Active females: 14-30 years	2,400
Sedentary females: 14-30 years	1,800-2,000
Active males: 14-30 years	2,800-3,200
Sedentary males: 14-30 years	2,000-2,600
Active people: 30 years and over	2,000-3,000
Sedentary people: 30 years and over	1,600-2,400

Sattvic Diet Includes essential nutrients are broken into two categories: **macronutrients and micronutrients**. Macronutrients are eaten in large amounts and include the primary building blocks of your diet - **protein, carbohydrates, and fat** - which provide your body with energy.

Vitamins and minerals are micronutrients, and small doses go a long way. There are six main groups of essential micronutrients and macronutrients.

1. Protein: Protein is essential for good health. Protein provides the building blocks of the body, and not

just for muscle. Every cell, from bone to skin to hair, contains protein. A startling 16% of the average person's body weight is from protein. Protein is used primarily for growth, health, and body maintenance. All your hormones, antibodies, and other important substances are composed of protein. Protein is not used to fuel the body unless necessary.

Proteins are made of up different amino acids. While the body can create some amino acids on its own, there are many essential amino acids that can only come from food. You need a variety of amino acids for your body to function properly. Advantage of having protein is that you don't need to eat all the amino acids at once. Your body can create complete proteins from the foods you eat throughout the day.

Healthy sources

In sattvic Diet, you can get protein from plant sources like **beans, soy, nuts**, and some grains. **Exactly 60 grams** how much protein you need daily depends on a variety of factors including how active you are, and your age as described in the above table calorie chart. Despite the growing popularity of high-protein diets, there haven't been enough studies to prove that they're healthier or can have high protein diet to have weight loss.

2. Carbohydrates: are necessary for a healthy body. Carbs fuel your body, especially your central nervous system and brain, and protect against disease. Carbohydrates should make up 45 to 65 percent of your total daily calories'.

Healthy sources: unrefined grains, beans, and fiber-rich vegetables and fruits.

3. Fats: Healthy fats are an important part of a healthy diet. Fat supports many of your body's functions such as vitamin and mineral absorption, blood clotting, building cells, and muscle movement. Fat is high in calories, but those calories are an important energy source for your body. 20 to 35 percent of your daily calories come from fat, including healthy fats in your diet can help you to balance your blood sugar, decrease your risk of heart disease and type 2 diabetes, and improve your brain function. They're also powerful anti-inflammatories, and they may lower your risk of arthritis, cancer, and Alzheimer's disease.

Healthy sources: The most famous unsaturated fats are **omega-3** and **omega-6 fatty acids**.

Unsaturated fats are important for your body as they provide essential fatty acids your body can't make. You can find these **healthy fats** in **nuts, seeds, and vegetable oils** (like olive, avocado, and flaxseed). Healthy fats are an important part of a healthy diet. According to, fat supports many of your body's functions such as vitamin and mineral absorption, blood clotting, building cells, and muscle movement. Fat is high in calories, but those calories are an important energy source for your body. Avoid Trans fats and limit your intake of saturated animal-based fats like butter, cheese & ice cream.

4. **Vitamins:** Vitamins are vital for warding off disease and staying healthy. The body needs these micronutrients to support its functions. There are 13 essential vitamins that the body needs to function properly, including vitamins A, C, B6, and D. Each vitamin plays an important role in the body, and not getting enough of them can cause health problems and disease. Vitamins are essential for **healthy vision, skin, and bones**. Vitamins may lower the risk of lung and prostate cancer, and they're powerful antioxidants. Vitamins like vitamin C boost the immune system and help the body heal.

Healthy sources : If you eat a varied, well- balanced diet full of vegetables and fruits, and have a normal and healthy functioning digestive tract, you likely don't need to take vitamin supplements.

5. **Minerals:** Much like vitamins, minerals help support the body. They're essential for many body functions, including building strong bones and teeth, regulating your metabolism, and staying properly hydrated. Some of the most common minerals are calcium, iron, and zinc. In addition to strengthening bones, calcium helps with nerve signal transmission, maintaining healthy blood -pressure, and muscle contraction and relaxation. Iron supports your red blood cells and hormone creation, while zinc boosts your immune system and wound healing.

6. **Water:** You can go for weeks without food, but you can't last more than a few days without water. Water is crucial for every system in your body. It's also the main thing you are made of. About 62 % of your body weight is water.

It improves your brain function and mood. It acts a shock absorber and a lubricant in the body. It also helps flush out toxins, carry nutrients to cells, hydrate the body, and prevent constipation.

Healthy sources: Fruits and vegetables can also be a great source. Munch on some spinach or watermelon to stay hydrated.

A balanced diet is crucial, containing the proper amounts of carbohydrates, proteins, fats, vitamins, minerals, and fiber. It helps prevent any additional health issues from excessive cholesterol and blood sugar. Balanced Diet helps in reducing the risk like heart disease, kidney disease, etc.

High levels of triglycerides or cholesterol in the blood are typical in people with diabetes. Some patients with diabetes may also be more prone to bone fractures. A calcium-rich diet can help support strong bones. You can achieve this by regularly consuming milk. Including calcium-rich dairy in your diet requires some careful planning. An excellent start is to develop a meal plan, especially for people with diabetes.

Whatever you choose, consider starting each meal with 45 to 60 grams of carbohydrates. This total should account for all the carbohydrates consumed from your foods that day. Then, check the food labels and choose unsweetened or low-added sugar food

Summary

The Sattvic diet is based on Ayurvedic principles, which promotes both health and happiness. It cleanses the mind and purifies the body and re-energizes the Pranas within, which consequently helps the sense in taking leaps and the body stretching without discomfort.

Many foods, including green vegetables, chili peppers, and protein sources, can boost metabolism and help people achieve or maintain a healthy weight.

The sattvic diet is high in nutrient rich plant foods and low in processed and fried foods.

Prof Sunita Karad

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The Power Vita Source: Millets

Mr. Shivendra Bhosale, Ms. Gunjali Moholkar

Introduction:

Millets are a group of a small, round whole grains grown in India, Nigeria, and other Asian and African countries. They belong to *Poaceae* family which is also known as grass family. Millets can also be cultivated in any wasteland. They are rich in protein, fiber, and antioxidants. More so, they are gluten-free. India produces around 12 billion MT of millets annually. In the year 2020 India produced 41% of the world's total millet production.



Healthify Millets:

Dr. Khadar Valli, 'The Millet Man of India', is a scientist who is trying to make people adapt the healthy lifestyle with the help of these small millets. He has taken initiatives to gather farmers and agricultural scientists to promote millets which in long run can save soil, water, environment and above all human health. There are 5 different types of small millets such as Foxtail millet, Kodo millet, Barnyard millet, Little millet, and Browntop millet. The lignans present in millets helps to heal diseases from the core. The carbohydrate to the fiber ratio is below 10. Millets such as Kangi millet, Kodo millet, Kutki millet, Sawa and Green sawa millet are the best to consume. These millets are called as positive grains (healing grains). As Dr. Vali, has rightly said "*For every ill there is no pill, but for every ill there is millet*".

Foxtail Millet:

The specialty of small millets is that they contain natural fiber, protein, calcium, iron, manganese, magnesium, phosphorus, antioxidants and vitamins.



Upon consuming small millets thrice a day, one gets 25-30 g of fiber necessary for us (every person needs 38 g of fiber/day) through grains. The foxtail millet is a balanced food: apart from having 8% of fiber it has 12 % of protein. This is a good food for pregnant women. These millets have sweet, bitter taste which is a good food for diabetic patients. It reduces cholesterol in the body. It acts like a medicine for those who suffer from stomachache, diarrhea, and burning sensation while urinating, and lack of hunger. The high fiber content helps to get relief from constipation. Eating foxtail millet is good for girls who suffer from heart ailments, anemia, obesity, arthritis, bleeding and burns.

Fox tail millet is also useful to get rid of some kinds of skin diseases, mouth cancer, lung cancer, abdominal cancer, Parkinson's disease and asthma (along with Kodo millet).

For Trachea cancer, rice of foxtail millet for 2 days and little millet for 2 days and other millets one on each day should be taken.

For Mouth Cancer, foxtail millets for two days, little millet for two days and the rest of them on each one day.

For Skin Cancer, browntop millet for two days, foxtail millet two days and the other three millets one on each day.

Some healthy quick style millet recipes:

In today's day to day hustle, where everyone wishes to earn high income at the cost of their health, it has become difficult to keep oneself in proper health check. So here are some of the few healthy recipes which can nourish the body and cherish the mind.

- Foxtail millet khichdi
- Foxtail millet pulao
- Ragi laddu
- Millet sweet corn fritters
- Ragi malt (porridge)
- Ragi Idli

Therapeutic healthymillets:

As we know millets are enriched with several beneficial nutrients, if they are incorporated into the diet, they will help one become healthy along with some below mentioned benefits.

1. **Millets Aids weight loss** - As the millets have low calorie content they are considered as an excellent food product for weight loss. When you consume the millets in diet you feel fuller for longer as they take time to get digested and absorbed into the

body which results in preventing oneself from snacking and overeating.

2. **Millets keeps your blood sugar levels low** - The millets have low glycemic index which lowers the risk of developing diabetes if one consumes it regularly.
3. **Millets boost your immunity** - As millets are source of power vita they help to develop and strengthen our immunity leading to fewer chances of catching diseases.
4. **Millets reduces cardiovascular risks** - Millets control and prevents excess fat storage as well as effectively lower the risk of high cholesterol, strokes, and other heart complaints. It optimizes the circulatory system as it contains potassium content which regulates the blood pressure.
5. **Millets prevents asthma** - Unlike wheat, millets do not contain any allergens that lead to asthma and wheezing. As millets are enriched with magnesium, they reduce frequent migraine attacks.
6. **Millets helps your digestion** - As we know that the millets are rich in fiber content which ensures good

digestion. It prevents bloating, gas, cramping and constipation.

7. **Millets acts as an antioxidant** - The millets have antioxidant properties which helps to detox the body, it flushes out toxins from the body and neutralize the enzymatic actions of the organs.

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Benefits of Millets - from a Pre-teen's perspective

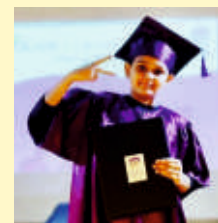
As an 11-yr old curious kid, I am well aware that we need the right quantity and quality of food to lead a healthy life. And luckily for us Indians, we do have such a superfood present in almost every kitchen - Millet. Be it in form of Traditional foods like Bajra, Ragi, or Nachani or Western imports such as Barley, Oats, and Quinoa - we have surely tasted Millet. They are super healthy and are recommended to be eaten in every meal by adolescents.

Millets are one of the earliest cultivated grains in India and we must use millets to keep our traditions alive. Millets are found in hot temperature places like India and by buying millets we help the economy. Millets are grown in many countries and can give a huge profit for Indian farmers.

Kids should eat 90-100 grams of millet every day as it's rich in carbohydrates, is high in nutrition and dietary fiber, and has Vitamin A & B. Eating millet improves your brain function and cognitive behavior like your memory and attention. Millets boost your growth and health by up to 50% and are recommended to be eaten as a kid. Millets are also a good source of fiber, magnesium, iron, calcium, zinc, potassium, and phosphorus. Millets were widely grown as fodder for our birds and animals until we realized its other health benefits. Since they can easily withstand dry and high temperatures with less irrigation or electricity, therefore, less or no pesticides or fertilizers are required for them to grow. The most common millets are ragi, jowar, and bajra which are used widely to prepare snacks or foods for adolescents. These millets are gluten-free and can play a vital role in preventing and curing several health diseases.

However, sometimes the cooking recipe and taste of the millet itself is very boring. Thankfully, many health and taste-conscious companies have tried new ways. For example, Slurrp farm made millets dosa powders that are healthy, easy to cook, and yummy. My mom often gives this to me for school breakfast and I enjoy it very much. With innovation and creative applications, many things can be made from millet. It can be used to replace wheat as it is healthier and food items like bread can be made from millet.

As a growing pre-teen, I feel that millets are super important and improve our health astonishingly. It would be amazing if food experts and entrepreneurs could create innovative ways to bring millet into our daily life.



Master. Aarav Lele

Studying 6th grade at JBCN International School Chembur.



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