SMART FOOD - FOOD THAT IS GOOD FOR YOU, THE PLANET AND THE FARMER

6

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THE NEXUS OF BIG ISSUES THAT NEED SOLVING

In the wake of climate change and water scarcity, it is important to ensure that the Indian agriculture sector is equipped with climate-resilient approaches and crops that can survive more stressful environments to maintain food production and meet the increasing demand. On the other hand, there is a global shift towards linking agriculture and nutrition to effectively combat the issues relating to nutrition and health. This calls for an overarching need to focus on crops that are suited to meet the current environmental challenges, nutritional needs and provide a sustainable livelihood for the farmers.

This encapsulates the definition of Smart Food, which is food that fulfils all the criteria of being Good for You (nutritious and healthy); Good for the Planet (e.g., low carbon footprint) and Good for the Farmer (e.g., climate-resilient and survive with less water). Thus, a focus on Smart Food contributes to addressing some of the largest issues, globally and in India, in unison: poor diets (malnutrition to obesity); environmental issues (water scarcity and environmental degradation); and rural poverty.

Biodiversity is one part of the solution-we need more diversity on farms and in our diets. However, focusing on niche markets alone or foods that will be eaten only occasionally will not have a major impact within a reasonable timeframe.

Diversifying the current staple foods is one solution that can have significant impact if achieved with Smart Foods. Usually, staples comprise about 70 percent of a food plate and are eaten up to three times a day. Also, staple grains such as rice and wheat, are often highly refined and the least nutritious part of the meal. Rice, wheat and maize provide over 50 percent of the calories globally. Wheat and rice contribute 70 percent of the carbohydrate intake of Indians[1].

The biggest challenge in diversifying staples is that we have a 'Food System Divide'. For decades, the vast majority of global investments have been poured into just three crops-rice, wheat and maize-the 'Big3'. This includes policy support, private industry investment, R&D, product development and even development aid. In India, these investments are mainly around rice and wheat.

The Green Revolution created a major change in the food system, popularising rice and wheat across India. Mass starvation could be averted by introducing high-yielding varieties and with government support, ensuring its availability and the accessibility of fertilisers. The Government of India (GoI) currently provides farmers and consumers safety nets like, for example, the Minimum Support Price (MSP), Public Distribution System (PDS) and Mid-Day Meals (MDMs). Until 2016, the MSP covered rice, wheat,

1 https://www.sciencedirect.com/science/article/pii/B9780124017160000258

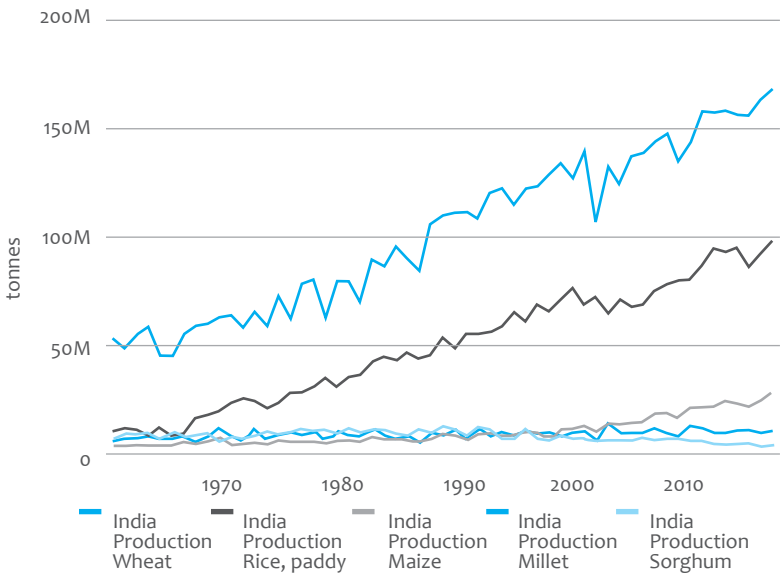


Figure 6.1: Production in India of rice, wheat, maize, millets and sorghum, from 1961 to 2017
Source: FAOSTAT (Oct 11, 2019)

pulses, oilseeds and cotton[2], PDS provided rice, wheat, pulses and sugar[3] and MDMs supported a menu predominantly comprising rice, wheat and pulses[4]. As a result, farmers had little incentive to grow alternative crops that were more suitable to their agro-ecologies and changing climate.

Figure 6.1 shows a significant rise in the production of wheat and rice, and almost a static growth of millets and a decline of sorghum. Maize, which is part of the Big 3 staples globally, the largest producers being USA and China, is now taking off in India.

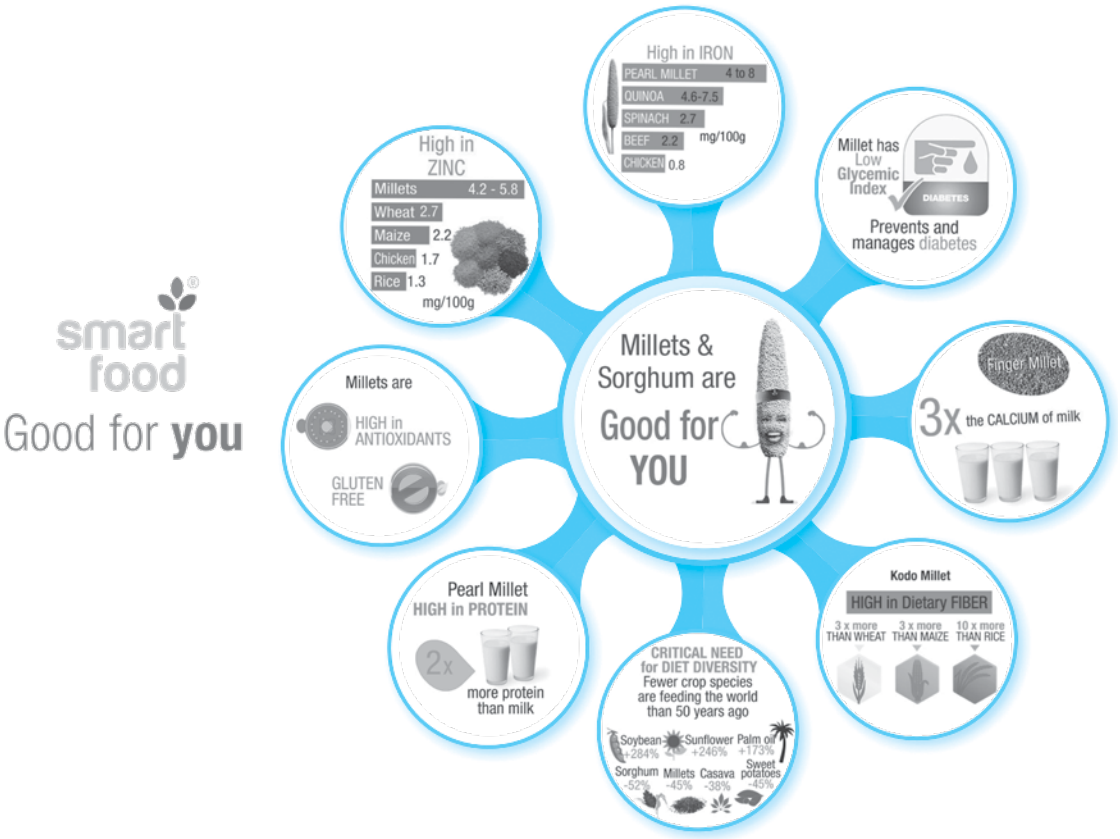
With this strong support, rice and wheat value chains became robust. When industries are well supported, they are more successful and consequently attract even more support and investment; hence, the cycle continues. This has created a 'food system divide' because of which it is difficult for other foods to break in as a staple, as their value chains are not as well developed and there is an uneven playing field. But we must take on the challenge to achieve a major impact. We can learn from the successes of the Big3 to create a Big5, later the Big7 and so on.

The Big3 phenomenon underlines the value of emphasising on just one or two crops and having a dedicated, focused effort. In 2017, the global spotlight was on pulses with the UN International Year of Pulses. At a similar time, GoI had a 'pulses self-sufficiency' goal and was highly successful in increasing productivity and production and reducing imports[5]. Now, the Indian government has turned its attention to millets and sorghum. This is partly because the focus has not only shifted towards nutrition, water scarcity and farmers' plight, but also due to the stress laid by several organisations and individuals advocating the return and support for millets and sorghum.

THE VALUE OF MILLETS AND SORGHUM

Millets and sorghum fit the Smart Food criteria of being good for you, the planet and farmer. Their nutritional benefits fulfil some of the biggest health needs. Their resilience and survival in hot, dry conditions also make them particularly significant in the light of climate change concerns. Moreover, before the dominance of the Big3 came about, they were the traditional staple in India and many other countries. Millets and sorghum also fit most of the big global health food trends of being an ancient grain, a super-food, gluten-free, having low glycemic index (GI), good for losing weight, etc. This is relevant because if millets and sorghum are to be in the mainstream and make up the Big5, they also need to be major global commodities.

2 https://www.nfsm.gov.in/
3 https://pdsportal.nic.in/
4 http://mdm.nic.in/mdm_website/Files/Food%20Grain%20Allocation/2019-20/3rd_4th_Qtr_2019-20_Allocation_of_FG.pdf
5 Ministry of Agriculture and Farmers Welfare, Government of India Sep 2018. Pulses Revolution from Food to Nutritional Security: http://dpd.gov.in/Retrospect%20and%20Prospects/Pulses%20Revolution%20From%20Food%20to%20Nutritional%20Security%202018.pdf



How millets and sorghum are Good for You, the Planet and the Farmer

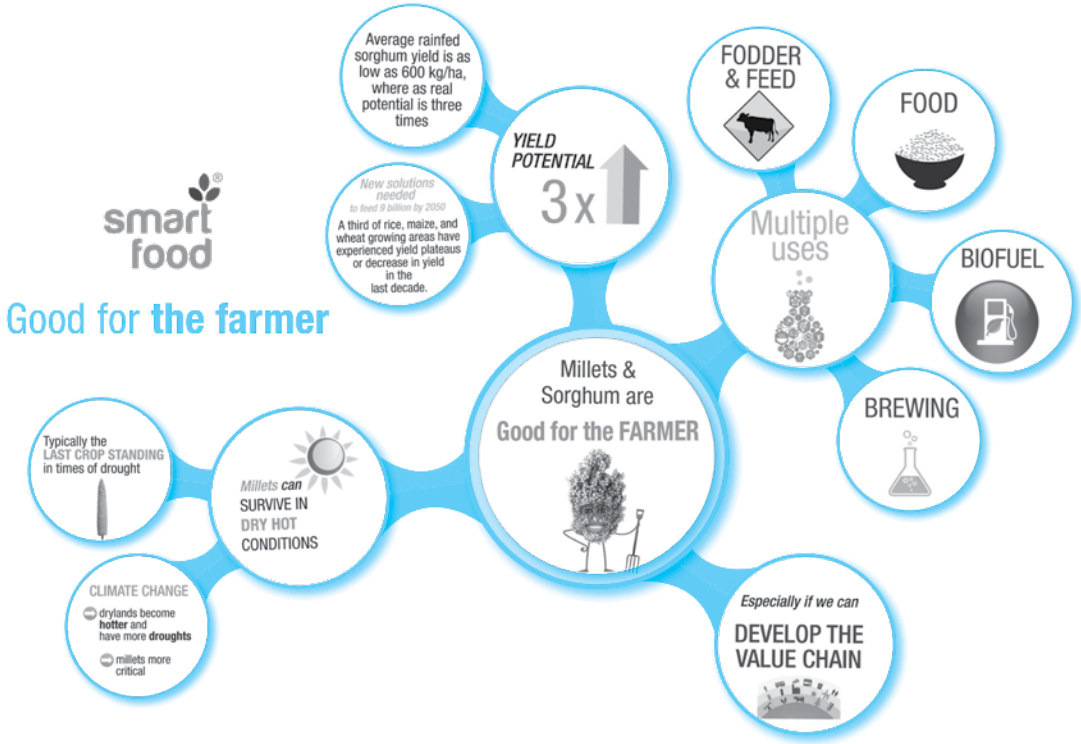
Millets and sorghum are highly nutritious and fulfil some of the biggest nutrition and health requirements[6]:

- Finger millet has three times the amount of calcium found in milk
- Some types of millets have very high iron and zinc content (much higher than that in meat). Although plant-based iron has lower bioavailability, high-iron millets can provide as much iron as red meat, close to the recommended daily allowance of iron
- Millets and sorghum have low GI, hence are important in view of rising incidence of diabetes
- They are also high in fibre

In this contex it should be noted that:

- Iron and zinc deficiencies rank among the top three micronutrient deficiencies globally; anemia is a major concern
- Calcium and protein deficiencies are high in Asia and Africa
- All these are particularly important for children and women
- With rising diabetes, the need for food with low GI is critical
- On-farm diversification with millets and sorghum provide a good risk management strategy for farmers because of the strong resilience of these crops to harsh conditions[7]
- Multiple, largely untapped uses for food, feed and fodder, brewing and biofuels offer parallel markets for the produce
- Have a low carbon footprint[8]
- Survive in high temperatures
- Survive with very little water; pearl millet often described as the last crop standing in times of drought

6 https://www.smartfood.org/the-initiative/good-for-you/
7 https://www.smartfood.org/the-initiative/good-for-the-farmer/
8 https://www.smartfood.org/the-initiative/good-for-the-planet/



- Serve as an adaptation and mitigation strategy for climate change

Moving from the Big3 to Big7- Smart Food Approach

With the support of the Big3, farmers have had little incentive to grow alternative crops that would be more suitable to their environment and the changing climate. This scenario is on the verge of changing, especially with the financial support offered by the central and state governments to revive millet cultivation, combined with the efforts of private industry, non-profits and governments to promote millets and sorghum with consumers and processors.

KEY PLAYERS IN THE VALUE CHAIN

In India, millet and sorghum cultivation has been strengthened by several government support schemes and research interventions. The year 2018 was declared by GoI as the National year of Millets, and it is also leading the charge internationally to have a United Nations International Year of Millets[9].

Following are some of the key efforts undertaken to strengthen the millet cultivation, promote consumption and encourage industry investment.

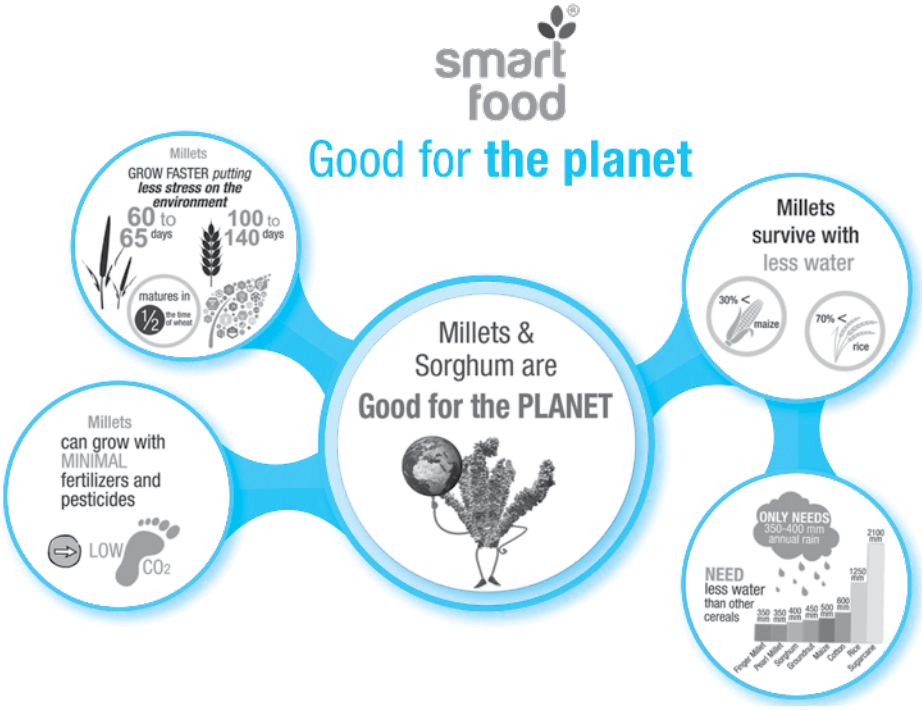
Initiatives by Central and State Governments

Including millets into key schemes

In 2017, millets and sorghum were added to the MSP scheme; specifically sorghum (jowar), pearl millet (bajra), finger millet (ragi) and small millets like little millet (kutki), kodo millet, barnyard millet (sawa), foxtail millet (kangni) and proso millet (cheena)[10]. In 2017, the PDS was declared to include sorghum, pearl millet and finger millet.

In September 2019, a letter from the Ministry of Human Resource Development (MHRD) to the states requested that sorghum, pearl millet, finger millet and kodo millet be included in the

9 https://www.icrisat.org/fao-nod-to-indias-year-of-millets-2023-proposal/
10 https://www.smartfood.org/press-note-on-nsfm-coarse-cereals-and-national-year-of-millets/



MDMs[11]. A few state governments have issued policies towards its implementation. The state government of Maharashtra recently announced that the quota of rice disbursed to schools will be reduced by 25 percent and replaced by sorghum, pearl millet and finger millet (nachni)[12].

Initiative for Nutritional Security through Intensive Millets Promotion (INSIMP)

INSIMP[13] was launched in 2011–12 under Rashtriya Krishi Vikas Yojana (RKVY-National Agriculture Development Plan) marks the very beginning of promoting millet cultivation and consumption for nutritional security in India. The programme was aimed at supporting the states by providing financial assistance for critical areas in the millet value chain such as seed production, installing processing units and organising awareness camps. The scheme was implemented in 16 states-Arunachal Pradesh, Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttrakhand, West Bengal and Sikkim.

The scheme also provided financial assistance to set up three National Centres of Excellence (CoEs) in 2011:

- Chaudhary Charan Singh Haryana Agricultural University (CCS HAU), Hissar, for pearl millet[14]
- Directorate of Sorghum Research, Hyderabad for sorghum
- University of Agriculture Sciences, Bengaluru, for finger millet and small millets

Rain-fed Area Development Programme (RAPD)

RAPD[15] is a scheme implemented in 2011 under RKVY with a budget outlay of INR 250 crore (35 million USD). Although this scheme was not specifically on millets but on rainfed farming system in general, millet and sorghum cultivation forms the major part of rainfed farming. This scheme was aimed at maximising farmers' returns by increasing productivity and minimising risks in rain-fed cultivation.

11 https://www.smartfood.org/do-letter-mhrd-regarding-millets/
12 https://mumbaimirror.indiatimes.com/mumbai/other/state-boosts-mid-day-meals-with-millets/articleshow/70110875.cms
13 http://nfsm.gov.in/Guidelines/DRAFTguidelines%20of%20Initiative%20for%20Nutritional%20Security%20through%20Intensive%20Millets%20Promotion.doc-1.pdf
14 https://www.theindiapost.com/nation/haryana/centre-excellence-pearl-millet-ccs-haryana-agricultural-university/
15 http://agricoop.nic.in/sites/default/files/RADP5913.pdf

Accelerated Fodder Development Programme

This programme under RKVY provided financial support for cultivation of forage varieties and dual-purpose varieties of sorghum and millets[16].

Nutri-farms Scheme for districts with high malnutrition

With a budget of INR 200 crore (USD 28 million), the Nutri-farms Scheme was launched in 2013–14 promoting cultivation of nutrient-rich food crops in 100 high-burden malnutrition districts across nine states. Pearl and finger millet cultivation was promoted as part of this programme[17].

Sub Mission on Nutri-cereals under National Food Security Mission (NFSM)

In 2017, on the basis of the recommendations of NITI Aayog, GoI decided to create a submission on nutri-cereals instead of the existing NFSM-Coarse Cereals. NFSM-Coarse Cereals are divided into two components: NFSM-maize and barley and Sub Mission on Nutri-Cereals covering sorghum, pearl millet, finger millet, little millet, kodo millet, barnyard millet, foxtail millet and proso millet. In April 2018, the government termed sorghum, millets, buckwheat and amaranth as 'nutri-cereals' for production, consumption and trade. Subsequently, the sub-mission on nutri-cereals and inclusion of millets in the PDS under NFSM started with an outlay of INR 300 crore (USD 42 million) for the year 2018–19[18].

Karnataka Millet Mission

Karnataka was the first state to undertake major innovative initiatives to develop the millet and sorghum value chains. Before 2013, the Karnataka government was already supporting millet and sorghum production; and after discussions on the Smart Food initiative approach, it expanded to include strong consumer and processor advocacy and support. In 2013–14, the government of Karnataka initiated millet procurement and distribution through the PDS. In 2014–15, the state announced a bonus over the fixed MSP for sorghum and finger milet and the MSP was further increased in the year 2015–16. An International Organic and Millet Fair (Siridhanya Mela)[19] was initiated by the Karnataka State Department of Agriculture (KSDA) and the inaugural event was held in April 2017. The success of the Fair has resulted in it now being conducted annually. It highlighted the much-needed common platform and interactive interface for all the stakeholders in millet production, processing and consumption, including connecting farmers to markets. This platform helped with forming the basis for negotiating MOUs between large buyers (processors and retailers) and farmer groups for the direct purchase of millets and sorghum. The Fairs were promoted through a nationwide roadshow featuring discussion forums of key government and industry players. In 2018, the government introduced a competitive scheme to support incubation of SMEs in millets and sorghum[20].

Odisha Millet Mission

The Government of Odisha launched a Special Program for the Promotion of Millets in tribal areas for a period of five years starting 2017. A number of pilot projects are also underway to introduce millet-based diets in Integrated Child Development Schemes (ICDS) and MDMs. The programme focuses on inclusion of millets in the state nutrition programme, increase in household consumption, improved availability and productivity of millet seeds, and strengthening of farmer cooperatives and Farmer Producer Organizations (FPOs) for better marketing. The programme has been implemented in 72 blocks in 14 districts of Odisha[21].

16 http://nfsm.gov.in/Guidelines/Acceler150311.pdf
17 https://www.nfsm.gov.in/Guidelines/NutriFarms.pdf
18 https://www.nfsm.gov.in/Guidelines/NFSM12102018.pdf
19 http://itf2019.organics-millets.in/omitf2019/
20 https://www.newskarnataka.com/bangalore/first-incubation-centre-for-millets-within-a-month
21 http://www.milletsodisha.com/

The governments of Tamil Nadu, Kerala and, more recently, Maharashtra, are all developing millet and sorghum strategies.

Advancements by Research Institutions

Scientific research plays a critical role and has brought on-farm interventions, better seed varieties and low-cost processing technologies to facilitate this diversification on farm. Research interventions play an important role in addressing bottlenecks in various stages of the value chain.

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

ICRISAT[22] undertakes scientific research and development across the whole value chain, from breeding better varieties to on-farm practices to driving agribusiness, e.g., operating an incubator for SMEs and undertaking product development. The Institute is focused on the drylands, specialised in technologies that best suit these conditions and also with a specialisation of crops that best survive in these agro-ecologies, specifically millets, sorghum, pigeon pea, chickpea and groundnut. ICRISAT's gene bank serves as the world's largest repository for the collection of germplasm of for these crops. ICRISAT continues to develop better seed varieties, e.g., drought-tolerant, disease-resistant and high-yielding, that cater to the changing needs of the industry. One of the major interventions towards bridging the gap between agriculture and nutrition was under the bio fortification programme; ICRISAT and Mahatma Phule Krishi Vidyapeeth University jointly developed a high-iron variety of pearl millet, called Dhanashakti, which was released in 2012 in Maharashtra and in 2013 across India, making it the first bio fortified pearl millet released in India.

The Indian Council of Agricultural Research (ICAR)–Indian Institute of Millet Research (IIMR)–

ICAR-IIMR not only runs a breeding programme but also had the foresight to recognise the need to work across the whole value chain, supporting agribusinesses and promoting the value of millets and sorghum to consumers. As a result, they also provide a range of new technologies on millet value-added foods for commercialisation. Technologies for ready-to-eat and ready-to-cook millet products such as sorghum- and millet-based flakes, cookies, extruded snacks, vermicelli, pasta, idli mix, multi-grain flour, etc., has been licensed to food product manufacturers. IIMR has established an incubator for SMEs-Nutri-Hub[23].

Council of Scientific and Industrial Research (CSIR)

Central Food Technological Research Institute (CFTRI)-Post-harvest technologies and novel food ingredients brought about by CSIR-CFTRI, Mysore, also improved the market's access to smallholder farmers. Simple leg-operated millet dehulling machinery, finger millet dehusking machinery, cereal products such as sorghum flakes, foxtail millet flakes and shelf-stable roti from cereal and millet are some of the equipment developed for millet industry. In 2017, CSIR-CFTRI announced two of its millet technologies-composite finger millet bread and pedal-operated millet dehuller-free of charge to the entrepreneurs[24].

Indian Council of Agricultural Research (ICAR)

Central Institute of Agriculture Engineering (CIAE): ICAR-CIAE provides farm machinery such as manually operated pull type three-row planter for millets, bullock cart-drawn three-row planter with fertiliser drill for millets and tractor drawn six-row planter with fertiliser drill for millets. Processing equipment such as motorised multi-millet thresher, millet flaking machine and millet mill are also made available for licensing[25].

22 https://www.icrisat.org/
23 http://www.millets.res.in/
24 https://www.cftri.res.in/
25 http://www.ciae.nic.in/Content/index.aspx

M S Swaminathan Research Foundation (MSSRF)

MSSRF has been supporting and promoting millet cultivation in Kolli hills in Tamil Nadu and Koraput in Odisha. It has been instrumental in documenting traditional knowledge and dissemination of best cultivation practices among the tribal farmers for the revitalisation of millets. The success story of MSSRF in bringing about farmer-led value chain for millets offered several valuable lessons for developing a holistic value chain for millets and sorghum while taking into account the interconnected aspects such as conservation, consumption and marketing of local produce. Professor Swaminathan has also been a strong advocate for the government supporting millets and sorghum[26].

Nonprofit Organisations

Nonprofits also play a key role in demonstrating successful models on production, processing and consumption of millets and sorghum and in implementing the government schemes.

Deccan Development Society (DDS)

DDS is a grassroots organisation comprising more than 5,000 women members from the state of Andhra Pradesh. In 2007, the society inaugurated the Millet Network of India (MINI) to revive millet cultivation in the state. Currently, the MINI has over 120 members representing 15 rain-fed states in India. This network played a key role in developing the framework for central and state government schemes to revive millet cultivation encompassing concepts such as agrobiodiversity, nutrition security, climate-resilient cropping system and drought mitigation. The Society also ventured into setting up an Organic Millet Restaurant called Cafe Ethnic in Zaheerabad, a community production centre to produce millet-based ready-to-cook and ready-to-eat products in Pastapur village and a retail outlet, DDS Sangham Shop in Hyderabad[27].

Watershed Support Service and Activities Network (WASSAN)

WASSAN conducted a pilot study to introduce millets into the PDS in Anantapur district of Andhra Pradesh in 2009 with financial support from World Bank under Andhra Pradesh Drought Adaptive Initiatives project (APDAI) with the support from Department of Civil Supply, Government of Andhra Pradesh and District Administration of Anantapur district. The results brought out consumer acceptance, economic viability and administrative feasibility of introducing millets into the PDS and also highlighted the possibilities of surplus production through area expansion (into quality lands) within the district given a price incentive. WASSAN is currently the implementing agency for the Odisha Millet Mission[28].

Dhan Foundation

The Action Research Project 'Revalorising Small Millets in Rain-fed Regions of South Asia' supported by the International Development Research Centre, Canada, was implemented by DHAN Foundation in India. The project formed 292 experimental farmer groups of various forms across all the sites in South Asia. In India, the DHAN Foundation has undertaken project activities with the women Self-Help Groups (SHGs) and farmers' groups in Tamil Nadu and Odisha. The Foundation also implemented 'Scaling up Small Millet Post-harvest and Nutritious Food Products Project' along with McGill University from 2016–18. This project aimed to develop and apply ways for scaling up small millet processing and value addition technologies[29].

The North East Slow Food and Agrobiodiversity Society (NESFAS)

NESFAS also aimed at mainstreaming millet consumption in the states of Meghalaya and Nagaland. NESFAS organized Mei Ramew (Mother Earth) festivals and farmers' markets to promote indigenous crops including millets[30].

26 https://www.mssrf.org/
27 http://www.ddsindia.com/www/default.asp
28 https://www.wassan.org/
29 http://www.dhan.org/
30 http://www.nesfas.in/

Private Sector Millet Revolution

This renewed focus on millets and sorghum in India is nourishing the start-up revolution. Sorghum and millets fit some of the recent food trends such as gluten-free, organic, whole grains, high-fibre, diabetic-friendly, healthy snacking and sustainable diets. With the growing interest in avoiding refined carbohydrates, millets and sorghum offer a wide variety of options. The product range has also expanded in recent years with ready-to-cook and ready-to-eat convenience foods made with millets and sorghum. Starting from millet-based weaning food to millet-based workout diet, food and beverage brands are coming up with innovative millet products and making the most of the increased demand for health foods.

Farm-to-Fork restaurants

In India, farm-to-fork restaurants are gaining popularity. These restaurants with the ideology of sourcing locally grown foods and offering healthy and sustainable diets, find sorghum and millets more attractive than current staples. Restaurants such as Paaka Organic Café in Hyderabad, GoNative in Bangalore, Annamaya in New Delhi and The Bombay Canteen in Mumbai provide their customers with fine dining delicacies made from these traditional grains. Organic cafes are also coming up with variations of some of the commonly consumed food using millets. Rice-and wheat-based dish such as dosa, idli, khichdi, upma and roti are being made with different types of millets to provide healthier options for the consumers.

Product manufacturers

Top food-and-beverage companies are launching healthy alternatives that are millet based. A few years ago. Kellogg's introduced finger millet (ragi) Chocos. Recently, ITC's Aashirvaad Nature Superfood range has launched three types of gluten-free flour-sorghum and finger millet, multi-millet mix and finger millet flour. Early this year, MTR foods launched multigrain breakfast premix, iD Fresh launched finger millet idli or dosa batter and Heritage Foods launched finger millet lassi. 24Mantra is recognised as the largest organic company in India, with a wide range of millet grains and products. Apart from these big players, small-to-medium enterprises with brands such as Soulful, Slurrp Farm, Anil Foods, Manna Foods, InnerBeing, Rigdam Health Sutra and many more also offer a range of millet-based ready-to-cook and ready-to-eat products for the urban segment.

E-commerce platforms

Big Basket, Amazon and Grofers provide these SMEs with the required online platform for scaling up. Big Basket is the largest online supermarket in India and has witnessed a 200 percent growth in millet and sorghum product sales over the last 18 months.

Retailers

Several large and small retailers are also competing to showcase millet snacks and grains under healthy food options. Big Basket's organic store also showcases their BB Royal range of millet grains, making it available in over 30 cities in India. Traditions by Foodhall, a premium lifestyle food superstore also features unique ready-to-cook and snacks products made with millets in their nine retail outlets across Mumbai, New Delhi and Bangalore. Many organic and millet small retail outlets have been established just in the couple of years, e.g., FoodLife (Bangalore), go bhaarati (Hyderabad), Native Food Store (Chennai), Kiah Super Foods (Hyderabad) and so on.

Brewery

In the North-eastern states, a millet brew, chang, is one of the traditional drinks. Microbreweries are taking advantage of the increased interest in millets and sorghum and are experimenting with recreating traditional beer and crafting new varieties, including creating gluten-free beer. Great State Ale works from Pune, Biere Club from Bangalore and Toit Brewpub from Bangalore are among the top brewers testing and perfecting millet brews.

INTERNATIONAL EFFORTS

Smart Food Initiative

The initiative is led globally by the largest agricultural research associations in Asia and Africa[31], ICRISAT, and the millet and sorghum activities within India undertaken in collaboration with ICAR-IIMR. In 2017, the Smart Food initiative was selected as one of the top global food innovations[32]. Food Tank also listed the Smart Food initiative by ICRISAT as one of the 119 organisations up the food system in 2019[33].

A key objective of the Smart Food initiative is to mainstream selected Smart Foods (starting with millets and sorghum) as staples across Asia and Africa and to popularise them globally. The approach is to drive consumer demand while also encompassing all segments to ensure that the whole value chain is developed and connected back to farmers. The strategy adopted by the Smart Food initiative involves:

- Developing the Smart Food concept and messaging through science-backed information, marketing strategies and materials, and classification and accreditation of Smart Food.
- Creating a demand pull with consumers for Smart Food by undertaking a viral campaign with creative messaging, ambassadors and influencing the influencers; facilitating and advocating processing of modern convenience products with Smart Food; and facilitating engagement with the health, food service and media industries.
- Ensuring that smallholder farmers and rural communities in Asia and Africa benefit through a range of approaches facilitatingand advocating for on-farm support; connecting farmers to value chains; linking Smart Food messages with health activities on the ground; and policy support, research and development.
- Identifying and catalysing filling of knowledge gaps and scientific research needs on how these foods affect you (nutrition and health), the planet, the farmer and the whole value chain (cooking, processing and marketing).

The Smart Food initiative has run pilots in India[34], Myanmar[35], Kenya[36], Tanzania[37], Mali[38], Niger[39], and Nigeria[40] to show the acceptability and nutritional value of millets and sorghum when presented and marketed in the right way. This was achieved by a methodical approach of selecting the right combination of Smart Foods for specific nutritional needs, working with cooks and communities to design new, simple and culturally appropriate recipes and building awareness about the nutritional benefits of consuming Smart Food in fun ways that also impact the image of the foods.

One pilot study conducted by Smart Food, in association with the Akshaya Patra Foundation, brought out several lessons for large-scale introduction of millet-based meals under the MDM scheme and also validated the nutritional superiority of millets over fortified rice-based meals. Under this study, approximately 1,500 adolescent school children from peri-urban Bangalore, Karnataka, were provided with millet-based MDMs, balanced with pigeon pea and vegetables. The dietary intervention programme conducted for a period of three months showed significant reduction in the extent of undernutrition. A random sample of 10 percent of the children showed 50 percent faster growth than those eating fortified rice-based meals and the children rated the meals 4.5 or higher out of

31 https://www.smartfood.org/executive-council/
32 https://www.icrisat.org/smart-food-selected-as-a-global-launch-food-innovation/
33 https://foodtank.com/news/2019/01/119-organizations-to-watch-in-2019/
34 https://www.smartfood.org/activities/india/
35 https://www.smartfood.org/activities/myanmar/
36 https://www.smartfood.org/activities/kenya/
37 https://www.smartfood.org/activities/tanzania/
38 https://www.smartfood.org/activities/mali/
39 https://www.smartfood.org/activities/niger/
40 https://www.smartfood.org/activities/nigeria/

5 for taste, including eating little millet as rice[41].

In order to maximise the benefits of feeding programmes, it is not enough to just add millets to the food plan and assume that the meal is healthy. Incorporating millets to provide nutrition needs a comprehensive understanding of grain varieties, food combinations that provide a balanced meal, recipes and cooking methods that facilitate better absorption and help retain nutritional value.

Innovative marketing messages and methods are being trialed. For example, the Smart Food Culinary Challenge for student chefs across India was organised as part of the Organic and Millet Fair 2019 in association with Government of Karnataka and MS Ramaiah University of Applied Sciences. This competitive platform brought together 58 students from 16 culinary institutes across India to prepare innovative dishes for fine dining. This competition has been documented as a five-part reality video series[42].

Smart Food has also set up networking platforms to connect farmers, entrepreneurs, researchers and other stakeholders for developing the value chain. It has brought in celebrity chefs such as Chef Ranveer Brar and Chef Anahita Dhondy as Smart Food Ambassadors[43] to drive this campaign at the consumer end and help change the image of millets and sorghum. Smart Food SME clusters are now being established to help support and scale SMEs past the incubation level. This will also extend to certification of Smart Food and incorporation of traceability.

INITIATIVES AND LESSONS FROM OTHER COUNTRIES

Several initiatives are being made by different countries to link agriculture and nutrition taking into account various issues at both the production and the consumption end. On the production side, climate change, water scarcity and degraded soils affect the livelihoods of farmers and also pose a risk of food insecurity. At the consumption end, the focus has progressed from solving hunger issues to addressing nutrition and health issues. Some countries are at the forefront of linking the needs at both the ends for an effective and sustainable solution. Here are some examples:

National Food Strategy by UK

The National Food Strategy[44] body was established in 2019 to conduct a rigorous, evidence-based analysis of the current food system and derive a plan of action. One of the major principles of this review is to look at the wider inter-connected food system including health and well-being, livelihood and environment. In August 2019, a call for evidence was made to gather ideas from various stakeholders.

Kenya's Flour Blending Standards

In 2018, the government of Kenya published guidelines and standards governing the blending of maize and wheat flour using sorghum or millets. The policy developed six standards and three included millets and sorghum: maize flour with millet[45] (Kenya Standard number-KNWA 2839-3:2018); maize flour with sorghum[46]

41 Anitha, SKane-Potaka, Tsusaka, T.W., Tripathi, D., Upadhyay, S., Kavishwar, A., Jalagam, A., Sharma, N. and Nedumaran, S. (2019). 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, Nutrients. 1-16. doi:10.3390/nu11092077

42 https://www.smartfood.org/activities/india/

43 https://www.smartfood.org/smart-food-ambassadors/

44 https://www.nationalfoodstrategy.org/

45 bit.ly/2DPAbNl

46 http://onlinecatalogue.kebs.org/webquery.dll?v1=pbMarc&v4=955612&v5=3X&v8=955613&v9=5&v10=N&v11=139&v13=4C&v20=4&v22=4C@KNWA%202839-1:2018&v23=0&v25=67.060&v27=15009&v35=%7B]0[%7D%7B]0[%7D%7B]0[%7D%7B]0[%7D&v46=955613

(Kenya Standard number-KNWA 2839-2:2018) and wheat flour with sorghum[47] (Kenya Standard number-KNWA 2839-5:2018).

SUSTAINABILITY LABELLING

The impact of food items on a planet is significant and there is a severe gap when it comes to conveying the environmental footprint of a food product to its consumers. Labels such as Organic', 'Eco-friendly' and 'Naturally grown' do offer a synonymous connotation to sustainable food production, but are not comprehensive enough to measure the impact on water resource and the end-to-end carbon footprint. There are a few initiatives from private firms such as Unilever and P&G to implement ethical and sustainable production and sourcing of agriculture commodities. Even here, very rarely are these efforts transcribed as labels or certification in the final product and to the end-user. For example, Unilever, one of the largest Fast-Moving Consumer Goods (FMCG) companies has committed to produce crops with high yield and nutritional quality while keeping the resource inputs as low as possible through Unilever Sustainable Agriculture Code 2017[48]. The code elaborates a set of principles and lists them under three criteria—mandatory, expected or leading. Legal compliance such as license for the use of water quantities are listed as mandatory; while local sourcing and integrated pest management are listed as expected and reduction and reuse of water is listed as leading.

Sustainable Sourcing

Nestle has committed towards sourcing 100 percent raw materials locally and has partnered with International Fertiliser Development Centre to train more than 30,000 Nigerian farmers on millet and sorghum farming[49].

WAY FORWARD

India is in an interesting position: While it needs Smart Foods like millet and sorghum to tackle issues of malnutrition, environmental and farmer welfare issues, it also has the opportunity to be a world leader in such Smart Foods.

India is not unique in these challenges and many countries can benefit from the Smart Food approach through development of major new industries in millet and sorghum. This is a major business opportunity as well as a social and environmental need. India is the most advanced country in the world for product development of millets and sorghum and has the widest production of these crops, growing all the types of millets and sorghum.

There are also untapped strategic opportunities for India to collaborate with countries in Africa, to share technologies and expertise in millets and sorghum and jointly develop the industries and markets. Business joint ventures, government collaborations and more opportunities are at the fingertips of India.

The biggest challenge for global recognition is that traditional millet-growing countries have not focused enough on modernising millets, and in the West, very little is known by consumers about these grains. As a result, market awareness (consumer and industry) is one of the first steps needed to build markets. As mentioned earlier, millets and sorghum fit the largest global health food trends and there is a need for these crops to help cope with and contribute to combating climate change. Just like the 2013 UN International Year of Quinoa was the tipping point for quinoa becoming globally known, and the 2017 UN International Year of Pulses drove significantly more products onto the market, we now need to find the trigger to bring millets and sorghum onto the global stage.

47 http://onlinecatalogue.kebs.org/webquery.dll?v1=pbMarc&v4=592587&v5=3X&v8=592588&v9=4&v10=N&v11=184708&v13=4A&v20=4&v22=4A@KNWA%202839-4:2018&v23=0&v25=Joint%20Technical%20Committee.&v27=15018&v35={}0[} {}0[} {}0[} {}0[}&v46=592588

48 https://www.unilever.com/Images/sustainable-agriculture-code--sac---2017_tcm244-515371_en.pdf

49 https://www.nestle-cwa.com/en/csv/nestl%C3%A9-nigeria/our-projects