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WHITE PAPER ON
MILLETS

A Policy Paper on Mainstreaming Millets for
Nutrition Security in India

Excerpts from the
National Mega Multi Stakeholders Meet (Virtual)
28th September 2020

In Association with...

IDA | NSI | AFST(I) | IFCA | Eat Right India | NetProFaN

MILLETS CONSORTIUM

DAC&FW | APEDA | MoFPI | FSSAI | ICMR | CSIR | ICAR-IIMR | ICRISAT
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Dedicated to

"This Policy Note is dedicated to all the Dry Land Farmers across the world who are struggling in desperate poverty burdened by low yields, lack of value addition, lower prices and climate vagaries. We believe that this policy paper may help in bringing the Policy Frameworks towards the resurrection of millets in the country that would benefit the dry land farmers with a better share in consumer rupee, and both income and livelihood security"

Contents

अमिताभ कांत
Amitabh Kant
मुख्य कार्यकारी अधिकारी
Chief Executive Officer

सत्यमेव जयते

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Foreword

India is the largest producer of millets in the world. This humble cereal requiring minimal inputs to grow, has the potential of improving nutrition security and help our country fight malnutrition, given to its nutrients repository. More than ever, now we see an increased demand for nutritious diet all over the world. The ongoing pandemic has repositioned the importance of consuming healthy, wholesome and nutritionally balanced food for good health and a strong immune system.

Climate change at global level and depleting water resources at national level, emphasises the importance of dryland crops like millets which require less water to grow than majorly grown cereals- wheat and rice and leave behind low carbon footprint. While the proportion of millet based meals on our plates has reduced over the decades, its popularity is slowly rising and many efforts are going on to make them mainstream again. Further, Government and other organisations are putting efforts to increase the demand of millets in India. The Government of India celebrated 2018 as The National Year of Milletsto boost production of the nutrient-rich millets and encourage agro-industries involved in its production and value additions. There is a sub-mission on Nutri-cereals as part of National Food Security Mission (NFSM). Several State goverments are also implementing measures to promote production and consumption of Millets and include them under the umbrella of safety net schemes to ensure maximum utilisation. At the global level, United Nations General assembly declared 2023 as the International Year of Millets, following Indias proposal to the Food and Agriculture Organization.

I congratulate all stakeholders for their efforts and, would like to wish for their collaborative role in reviving the millets back to our diet for the nutritional security of the country. A balanced approach to bring this crop back in the public consciousness will go a long way to solve some of the major food issues in the country.

(Amitabh Kant)

Foreword

India is a country with semi-arid lands spanning over more than 34% of the total area. India is known for producing numerous traditional cereal crops such as Sorghum, Pearl Millet, Finger Millet, Foxtail Millet, Proso Millet, Little Millet, Barnyard Millet, Browntop Millet, etc. The people in arid and semi-arid regions of the country grow and consume millets as a staple food. In addition to their nutrition, millets provide food and fodder security to the dry land agricultural communities. They are the most secure crops to small farmers as they are the hardiest, resilient and climate-adaptable crops in harsh, hot (up to 50 Degree Celsius) and drought environments. In response to the current public health crises in terms of rising Non-Communicable Diseases and healthcare costs, governments and the public are looking at the traditional staple foods for balancing the daily recommended nutrition.

I appreciate the ICAR-IIMR for timely organizing a National Mega Multi Stakeholders Meeting for Positioning the Millets for Emerging Nutrition Markets that resulted in the preparation of a White Paper that would call for strategizing holistic framework advising the replication of the scalable models and scaling up the value chain, based on the ground level challenges as a run-up for the International Year of Millets in 2023. The expert members of this committee have successfully brought in the perspectives of diverse stakeholders groups such as Research, Academia, Farming, Private Industry, Regulatory, Policy, Startup and Professional fraternities. This White Paper on Millets is emphasizing the clear need for convergence between various departments of Central and state governments, R&D institutes, SAUs, Private Industry, Professional communities, etc. for working collaboratively on the Production-Consumption (PCS) value chain system approach.

I congratulate all the Committee members for this valuable policy framework document and my best wishes for the stakeholders who are inspired to take actions for millets. I believe that this Policy paper would sensitize the policy makers and other stakeholders for an inclusive millets promotion in the country and even globally by the IYM 2023.

(Dr Ashok Dalwai, IAS)
CEO, National Rainfed Area Authority (NRAA)

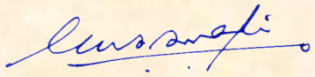
Foreword

Millets are a wide range of small-seed Nutri-cereals grown extensively in the semi-arid regions of our planet. Millets are traditionally grown for their nutritional richness, low water requirement, low inputs requirement and climate resilience. India produces all the nine commonly known millets and is the largest producer and second-largest exporter of millets in the world. The Government of India has realized the potential of millets and taken several steps in terms of gazetting millets as *Nutri-Cereals*, the celebration of the National Year of Millets in 2018, several small scale policies on millets and proposing the International Year of Millets to UNGA. Around 70 countries have supported India's constructive proposal and the United Nations General Assembly has passed the resolution to observe 2023 as the International Year of Millets. India being the largest producer of millets and proposer of IYM-2023, there is a great need for India to exercise the leadership in reviving millets through scaling up and replicating the millets value chain in other countries to leverage the emerging demand from global markets.

This White Paper on Millets has addressed the total millets landscape which will help in drawing several insights on the millets value chain. The well-diversified committee of this policy note has brought in expertise from various aspects of the value chain such as Research & Development, Agricultural ecosystem, Value Addition/processing, Consumer awareness creation, Marketing, Exports, Regulations, and Policy framework. The committee has furnished a comprehensive list of Challenges at the end of every section, followed by a Framework of Interventions required. Also, the Recommendations drawn at the end of this document are covering the entire millets value chain and will help various stakeholders working in this landscape.

This Policy note will help the Government of India, State Governments and Union Territories in understanding the importance of millets, challenges and solutions, for creating clear action plans for increasing their millets production, accelerating value addition, inclusion in Public Distribution System and other programs etc. as a run-up for the International Year of Millets-2023.

I congratulate the IIMR led Consortium and Stakeholders for bringing out this valuable document and laying a stone in the successful journey of reviving millets in the country.



(Dr Vilas A Tonapi)
Director, ICAR-Indian Institute of Millets Research,
Hyderabad

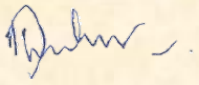
Preface

This "White Paper on Millets – A Policy Note" originated in the National Mega Stakeholders Meeting organized on 28th September 2020, by the ICAR-Indian Institute of Millets Research in association with Indian Dietetics Association (IDA), Nutrition Society of India (NSI), Indian Federation of Culinary Associations (IFCA), Association of Food Scientists and Technologists (AFST), Eat Right India and NetProFaN.

Mr. Amitabh Kant, IAS, CEO, NITI Aayog addressed the gathering and sought the experts from this diverse body of stakeholders to prepare and submit a White Paper to Mainstream Millets for the Nutritional Security of the country. He exhorted to come up with scalable models for future replication for millets promotion in the country. Post-Multi-Stakeholders National Virtual meet, ICAR-IIMR, Hyderabad, has initiated the process and formed a Taskforce Committee on 9th November 2020 constituting experts from diverse segments such as Research, Academia, Policy Makers, Food Processors, Startups, and Professional Communities/Societies.

At the outset, we would like to thank Shri Amitabh Kant, IAS, CEO, NITI Aayog for giving us a call to prepare a Policy Note during the National Mega Multi Stakeholders Meet organized by ICAR-IIMR on 28th September 2020. We are indebted to Dr Vilas A Tonapi, Director, ICAR-Indian Institute of Millets Research, Hyderabad, for encouraging us to form a Taskforce Committee and to work on bringing out this policy note. We acknowledge the members of the Taskforce Committee for their contributions in terms of bringing a diverse range of perspectives from their segments. We also acknowledge the R&D Institutes such as ICAR-IIMR, CSIR-CFTRI, ICMR-NIN, ICRISAT and APEDA for extending their R&D perspectives. The profound interest by the Industry partners such as ITC Ltd, Kellogg's, Britannia, Marico Ltd, 24 Mantra and Health Sutra is much appreciated. We are grateful for the Professional Communities such as the Indian Dietetics Association (IDA), Nutrition Society of India (NSI), Indian Federation of Culinary Associations (IFCA), Association of Food Scientists and Technologists (AFST), Eat Right India and NetProFaN for extending their contributions and also for wider popularization of millets. We also acknowledge the project staff at the ICAR-IIMR for their support in bringing this book to fruition.

Thus the committee has contributed this strategy paper from the proceedings of deliberations brainstorming sessions, reviews and discussions in such a way that the most pressing challenges and the effective interventions that are required for aiding Governments in developing an action plan which was compiled and put into the meaningful document. We thank all the members and project staff working at ICAR-IIMR for their contributions in bringing this valuable framework, especially, in the context of India's responsibility to exercise leadership in reviving millets by 2023-the International Year of Millets.



(**Dr B. Dayakar Rao)**
Convener & Principal Scientist, CEO, Nutrihub,
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Mr Prabodh Halde, Head, Regulatory Affairs, Marico Ltd.

List of Abbreviations

AICRP	All India Coordinated Research Projects
AP	Andhra Pradesh
APEDA	Agricultural and Processed Food Products Export Development Authority
B2B	Business to Business
CAGR	Compound Annual Growth Rate
CFTRI	Central Food Technology Research Institute
CSIR	Council of Scientific and Industrial Research
DAC&FW	Department of Agriculture, Co-operation and Farmers Welfare
DFI	Development Finance Institute
DFRL	Defense Food Research Laboratory
DNA	Deoxyribonucleic acid
DST	Department of Science Technology
FAO	Food and Agriculture Organization
FPO	Farmer Producer Organization
FSSAI	Food Safety and Standards Authority of India
GoI	Government of India
GST	Good Service Tax
HTST	High-Temperature Short Time
ICAR	Indian Council Agriculture Research
ICDS	Integrated Child Development Service
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IICT	Indian Institute of Chemical Technology
IIFPT	Indian Institute of Food Processing Technology
IIMR	Indian Institute of Millets Research
IIP	Indian Institute of Packaging
ILBS	Institute of Liver and Biliary Sciences
INSIMP	Initiative for Nutritional Security through Intensive Millet Promotion
ITC	Indian multinational conglomerate
KVK	Krishi Vigyan Kendra
MDM	Mid May Meal
MDRF	Madras Diabetics Research Foundation
MHRD	Ministry of Human Resource Development
MNC	Multi-National Company
MoA&FW	Ministry of Agriculture and Farmers Welfare
MoFPI	Ministry of Food Processing Industries
MSME	Ministry of Micro, Small and Medium Enterprises
MSP	Minimum Support Price
MT	Metric Ton
NAFLD	Non-alcoholic fatty liver disease
NAIP	National Agriculture Innovation Project
NARI	Nutri-sensitive Agricultural Resources and Innovations
NCD	Non-Communicable Disease
NFS	National Food Security
NFSM	National Food Security Mission
NGO	Non-government Organization
NHM	National Health Mission
NIFTEM	National Institute of Food Technology Entrepreneurship and Management
NIFTEM	National Institute of Food Technology Entrepreneurship and Management
NIN	National Institute of Nutrition
NITI	National Institution for Transforming India
NNMB	National Nutrition Monitoring Bureau
NNS	National Nutrition Strategy
NSSO	National Sample Survey Organization
PDS	Public Distribution System
PR	Public Relations
PUFA	Polyunsaturated fatty acid
R&D	Research and Development
RAFTAAR	Remunerative Approach for Agriculture and Allied sector Rejuvenation
RGSEAG	Rajiv Gandhi Scheme for Empowerment of Adolescent Girls
RKVY	Rashtriya Krishi Vikas Yojana
RTC	Ready-to-Cook
RTE	Ready-to-Eat
SAU	State Agriculture University
TBI	Technology Business Incubator
UAE	United Arab Emirates
UK	United Kingdom
UNGA	United Nation General Assembly
USA	United State of America
USP	Unique Selling Price
VATICA	Value Addition and Technology Incubation Centers in Agriculture
VC	Venture Capital
WCD	Women and Child Department
WCD	Women and Child Department

List of Annexures

Executive Summary

In India, millets were traditionally consumed but due to the push given to food security through Green Revolution in the 1960s, millets were rendered as 'orphan crops' – less consumed and almost forgotten. Before Green Revolution, millets made up around 40% of all cultivated grains, which has dropped to around 20% over the years compromising with agricultural, nutritional and environmental conditions.[1] Not only their consumption has declined, but their area under production has been replaced with commercial crops, oilseeds, pulses and maize. These crops are profitable and their production is supported by several policies through subsidised inputs, incentivised procurement and inclusion in the Public Distribution System. This has resulted in changes of dietary patterns with preferential consumption towards fine calorie-rich cereals. Due to reduced focus on millets, they suffered in getting required R&D and has resulted in lack of processing technologies for diversifying millets. During the thrust to food security, nutrition security took a back seat. Against the backdrop of rising malnutrition and Non-Communicable Diseases (NCDs), it becomes imperative to discuss the merit of millets in such issues.

The Government of India has realized the importance of millets in building Nutritional Security in the country and made several efforts such as gazetting millets as Nutri-Cereals, the celebration of the National Year of Millets in 2018, several small scale policies on millets and proposing the International Year of Millets to UNGA. The UNGA has passed the resolution to observe 2023 as the International Year of Millets (IYM 2023) for creating awareness on millets and popularizing them as the future foods in changing climatic conditions. The IYM 2023 is offing the mandate to scale up the interventions for increasing the millets area and production, and diversifying the processing machinery and technologies, and thus to cater to various segments in domestic and export markets. In the country, the ICAR-Indian Institute of Millets Research led consortium has assumed the challenge of reviving millets production and has piloted several value chain interventions. Currently, there are 400+ start-ups, and only a few big giant processors such as ITC, Britannia, Kellogg's, Marico, MTR Foods, 24 Mantra, etc. involved in the value addition.

However, there are many challenges along the value chain which need to be addressed for further scaling up, and expanding to International markets. In the National Mega Multi Stakeholders Meet organized by ICAR-IIMR on 28th September 2020, various stakeholders from Research, Academia, Farming, Private Industry, Regulatory bodies and Policy makers elaborated on several challenges such as low yields, lack of end-product specific cultivars and their seed chains, inefficient primary processing machinery, lack of grades and standards, the low shelf life of products, R&D on diversification of value addition, lack of clinical evidence for bioavailability and efficacy of nutrients, lack of awareness in public, lack of capacity building channels, slower incubation of start-ups, lack of policies for inclusion in public distribution and consumption programs, etc. These mainly pertain to the supply side, but to stir up the demand we need to focus on awareness and behaviour change towards the millets' consumption. Through modern processing techniques and R&D, millet varieties can be improved in texture, taste and nutritive values as well. This must be followed by branding the commodity. The key lies in bridging gaps between supply and demand chains, from connecting producers to aggregators to processors to consumers. Collaborative partnerships involving key stakeholders such as R&D institutes, FPOs, private players, regulatory bodies, Central and State departments will be crucial for capturing the export demand for millets value-added products in the coming years. This policy paper has envisaged a very important role in clearly laying out the various strategic interventions to address the above challenges in an integrated manner through the active participation of various stakeholders. Therefore, it's important to contextually replicate the scalable models, address the gaps and scale up the successful value chain interventions to leverage on the emerging demand for millet from the international markets.

[1] Source: https://www.icrisat.org/a-short-history-of-millets-and-how-we-are-recognising-their-importance-in-the-modern-context/

1. Introduction

1.1. Introduction

Millets are primarily categorized as major and minor/small millets. The nutritional superiority of millets compared to regular staples like wheat and rice has entitled them to be gazetted as the ***Nutri-Cereals*** by the Government of India. Millets are the stapled crops adapted to dry land agro-ecologies of the arid and semi-arid tropics. In India, millets are produced in most of the states characterized by low to moderate precipitation (200–800 mm rainfall). Major millet crops include Jowar or Sorghum (Sorghum bicolor), bajra or pearl millet (*Pennisetum typhoides*), mandua/ragi or finger millet (*Eleusine coracana*), and small millets comprising of kangni or foxtail millet (*Setaria italica*), *kutki* or *sama* or little millet (*Panicum miliare*), kodo millet (*Paspalum scrobiculatum*), *jhangora or sawan* or barnyard millet (*Echinochloa frumentacea*), *cheena* or proso millet (*Panicum miliaceum*), and *korale* or brown top millet (*Brachiaria ramosum*).

Millets are important in view of the shorter growing season, ability to adapt to a wide range of temperatures, moisture-regimes and input conditions, besides their ability to convert more carbon dioxide into oxygen as C4 crops. Also, the immense potential of the millets to provide food and feed for the smallholder farmers of drylands and domestic animals makes them a popular choice for ensuring food and nutritional security (Maitra and Shankar, 2019). India is the topmost producer of millets followed by Nigeria for the years 2000 and 2009. Millets are grown in about 12 million ha. with an annual production of 13.7 million tonnes and contribute 10% to the country's food grain basket (Dayakar Rao et al., 2017).

Despite the many benefits of growing millets, there has been a downward trend in the cultivation of millets in the country. In India, production of sorghum came down from 7.0 million tons during 2010–11 to 3.5 million tonnes during 2018–19; *bare* production has reduced from 10.4 million tonnes to 8.6 million tonnes; production of *ragi* reduced from 2.2 million tonnes to 1.2 million tonnes, while production of small millets came down to 0.33 million tonnes from 0.44 million tonnes during the same period (Dayakar Rao et al., 2018).

Reviewing the current scenario of millets cultivation, production, processing and consumption in the country is very essential for understanding the challenges and developing a framework for reviving these sustainable food crops for the goodness of the public, planet and economy.

1.2. Millets are Smart Foods

The smart food campaigning of ICRISAT and ICAR-IIMR is in the context of their goodness nutritionally, environmentally and to smallholder farmers (smartfood.org).

a. Good for You: Nutritional composition of millets

The protein content (Annexure 01) of millets ranges between 10% and 12% while the protein content in foxtail millet (12.3%) is higher than that of wheat and rice. Similarly, the dietary fibre (10–12%) content of millets is also higher compared to some of the staple cereals. The total polyunsaturated fatty acid (PUFA) content of Bajra (1984 mg/100 g) and Maize (1606 mg/100 g) are comparatively higher compared to other cereals. Noteworthy nutrient compositions of millets include the high calcium content of finger millet or ragi (364 mg/100 g) which is 10 times higher than that of wheat or rice. The iron content of Pearl millet or Bajra (6.42 mg/100 g) and Barnyard millet (5.0 mg/100 g) is also higher compared to other staple cereals (Longvah et al., 2017). Millets also contain phytochemicals like phytates, polyphenols, tannins and other phenolic compounds. These phytochemicals exert therapeutic properties owing to their anti-inflammatory and anti-oxidative properties.

b. Good for the planet

Low Water Footprint – Millets are often the only crops that can grow in arid regions, requiring only 300– 400 mm of water (Asmat Ullah, 2017) compared to 1400–1500 mm for rice cultivation (Annexure 02).

Zero Carbon Footprint – Millets are the Carbon Neutral Crops by virtue of carbon absorption from the environment equivalent to their carbon emissions of 0.1–0.2 CO2eq kg per kg of production, compared to 0.4 CO2eq kg per kg of Rice production and 0.35 CO2eq kg per kg of Wheat production.

Energy Footprint – Millets are also energy-efficient crops by virtue of less fertilizer and irrigation requirements which are totalling 0.48–0.71 kWh per kg production compared to 1.05 kWh per kg for rice production.

c. Good for the farmer

Short Crop Duration – Millets help small farmers with efficient crop rotation as many millets need only 60–90 days to mature while fine cereals take 100–140 days.

Resource Efficient – Millets are efficient in utilizing the available nutrients and also respond well for improved farm conditions and additional application of inputs, and result in increased yields up to 3 fold.

Climate Resilience – Millets are the most secure crops to small farmers as they are the hardiest, resilient and climate adaptable crops in harsh, hot (up to 64 degrees Celsius) and drought environments. They are often the last standing crops in drought seasons and will be the sustainable future food source amidst worsening climatic conditions (Vadez et al., 2012, Schill, 2012, World Bank, 2013)

1.3. Health Benefits of Millets

Millet grains are rich sources of nutrients like carbohydrate, protein, dietary fibre, good-quality fat and have substantially higher amounts of minerals like calcium, potassium, magnesium, iron, manganese, zinc and B complex vitamins, making them a preferable choice over the cereal grains.

- Millets also contain several bioactive phytochemicals including feraxans, lignans, β-glucan, inulin, resistant starch, sterols and phenolic compounds (e.g., ferulic acid, caffeic acid and quercetin). Studies have supported the role of polyphenols in antioxidant, anti-carcinogenic, anti-inflammatory, antiviral and neuroprotective activities which in all have shown to be beneficial against diseases like cancer and cardiovascular disease, diabetes, high blood pressure, high cholesterol, inflammatory diseases, metabolic syndrome and Parkinson's disease (Dayakar et al., 2018).
- The millets are also regarded to have antimicrobial and DNA damage protection activities due to their phytochemical content (Aknabi et al., 2019 and Kaur et al., 2014). A very high proportion of the millet grain comprises dietary fibre and non-starch polysaccharides which help in weight regulation. Due to the slow release of glucose, millets are an excellent choice of food for diabetics (Dayakar Rao et al., 2017).
- Millets are an excellent source of slow digestive starch and fibres which are good for the gut cohabited with trillions of bacteria, namely *Lactobacillus acidophilus*, *rhamnosus GG*, Actinobacteria and *Bifido* species. The nonstarch polysaccharides found in millets form a major part of dietary fibre which produce short-chain fatty acids by fermentation of resistant starch and serve as excellent Prebiotics.
- Fermentation of millets using various cultures promotes the growth of Gram-negative bacteria that makes millets an effective probiotic food in the gut.
- Millets have lower glycaemic properties owing to higher fibre content. Though the glycaemic properties of foods vary with the nature of the processing, food matrices, ingredient

composition, food form (grain or flour form), etc., most of the millet recipes can be managed to have a low glycaemic index.

1.4. Millets and Malnutrition

The presence of 65% of carbohydrates and around 6.0 –12.5% protein along with 1.5–5.0% fat makes them energy-dense, thereby making them an excellent choice for fortification for under-nutrition. A study conducted in peri-urban areas of Karnataka evaluated the acceptance and the impact of incorporating millets into the mid-day meal of the school children. It was found that the mid-day meal was a major contributor to the daily calorie intake of the child. Also, the introduction of millets into the diet had resulted in a statistical improvement of the stunting and body mass index of the children (Anitha et al., 2019). Thus, the millets can be used as a potential fortificant for combating malnutrition and at the same time, exerting health-promoting benefits.

1.5. Anti-nutritional Factors in Millets and Mitigation Process

However, these phytochemicals, along with the dietary fibre can hinder the absorption of minerals by binding to them and rendering them unavailable. Food processing methods such as milling/decortication, soaking, germination, malting, fermentation, roasting, grinding and autoclaving are commonly used to eliminate the anti-nutritional factors, thereby improving the nutritional quality of the millets (Aknabi et al., 2019; Kaur et al., 2014; Vinoth and Ravindran, 2017; Nkhata et al., 2018 and Kumar et al., 2018).

Germination resulted in improvement of the sugars, better protein digestibility, increased trypsin inhibitor activity, increased crude fibre, minerals and vitamins, and decreased polyphenols, oxalates, tannins, and phytates. The effects of fermentation include decreased phytic acid, trypsin inhibitors and tannins, and improved protein digestibility (Vinoth and Ravindran, 2017 and Nkhata et al., 2018).

The process of malting was shown to improve the bio-accessibility of nutrients like iron (300%) and manganese (17%) whereas soaking, boiling and pressure cooking results in the reduction of the tannin content. The processes like irradiation, extrusion and cooking at high temperature for short time (HTST) improve protein digestibility, the bioavailability of minerals, and decrease phytates and tannins (Nkhata et al., 2018)

Bio-fortification – reduction in anti-nutrients at the initial stage, i.e., at the time of growth and development is a newer strategy that can be established with the view to improving the bioavailability of the nutrients and improving the overall nutritional status (Kaur et al., 2014).

2. Area, Production, Productivity, Climate Resilience and Post-Harvest Processing of Millets

2.1. Global Scenario of Millets

According to FAO, the world production of millets is 94.3 million metric tonnes from an area of 76.18 million ha (Annexure 03). Sorghum and Pearl millet are the major millet crops grown, constituting 92.06% of the world millets production followed by Finger millet, Foxtail millet, Proso millet, Barnyard, Little millet and Kodo millet which altogether constitute about 7.94%. Furthermore, Foxtail millet predominates all millets in terms of productivity, yielding about 2166 kg/ha followed by Finger millet (1623 kg/ha), Proso millet (1535 kg/ha), Sorghum (1426 kg/ha), Barnyard millet (1034 kg/ha), Pearl millet (850 kg/ha), Little millet (469 kg/ha) and Kodo millet (419 kg/ha).

Sorghum is the major millet grown globally constituting 55.66% of total millets. During 2010–18, the Sorghum area is near stable between 42.16 million hectares to 42.14 million hectares while production between 60.18 million metric tonnes to 59.34 million metric tonnes (Annexure 04). During the same decade, the area under other millets showed a declining trend from 36 million hectares during 2010 to 33.56 million hectares during 2018, while production decreased from 32.79 million metric tons in 2010 to 31.02 million metric tonnes in 2018.

2.2. Indian Scenario of Millets

In India, millets are cultivated in an area of 12.09 million hectares, producing 13.71 million tonnes with a yield of 1134 kg/ha (Annexure 06). Sorghum is the fourth most important food grain in India after rice, wheat and maize in terms of area (4.09 Mn. ha) and production (3.47 Mn. MT) (Annexure 05). India is the top most producer of Barnyard (99.9%), Finger (53.3%), Kodo (100%), Little millet (100%) and pearl millet (44.5%), producing about 12.46 million metric tonnes from an area of 8.87 million ha.

Rajasthan has the highest area under millets cultivation (31.3%) followed by Maharashtra (18.9%), Karnataka (13.3%), Uttar Pradesh (8.9%), Tamil Nadu (4.2%) and Madhya Pradesh (3.9%). However, the highest yields were recorded in Tamil Nadu (2137.60 kg/ha), Delhi (1579.50 kg/ha) and Madhya Pradesh (1420.50 kg/ha) (Annexure 06)

Production of all the millets recorded a high negative growth rate (-3.23%) backed by a decline in area under cultivation of sorghum at CAGR of -5.13%, pearl millet (-2.85%), Ragi (-2.77 %) and small millets (-6.01%). Though there is a decline in area and production, at the overall level, the yield has shown growth with a CAGR of 0.31% in the last eight years. Also, in Bajra and small millets, the yield has witnessed growth with a CAGR of 1.28% and 4.34% respectively.

Competing Crops varied across the states; however, major competing crops identified are cotton, sunflower, pulses, soybean, maize and groundnut.

I. Major Reasons for the decline in Millets Cultivation

1. Supply-side Factors

a. Less remunerative cultivation backed by lower yields.
b. Declining prices due to vulnerable quality to environmental factors, as in the case of Kharif Sorghum.
c. Lower profitability and lack of commercialization.
d. Government's policy favouring irrigated crops with input subsidies such as irrigation, fertilizers etc.

2. Demand-side Factors

a. Inconvenience in preparation: The absence of gluten content in millets makes the preparation very difficult and needs skill. The laborious preparation process in sight of readily available fine cereal alternatives made a shift towards other convenient grains.
b. Changing consumer tastes and preferences: Over the decades, consumer preferences have shifted to tastier and convenient foods either by demonstration effect of western culture or "indigenous misconception that millets are poor man's foods".
c. Availability of other fine cereals at incentivized prices: Fine cereals such as Rice and Wheat have been made available at incentivized prices through PDS, MDM, WCD and other public-funded feeding programs.

d. Lack of processing machinery and diversification of processing technologies.
e. Lack of awareness about the nutritional merits of millets: Despite the other factors, the very nutritional merits of millets were unpopular among people, industry and governments.

3. Policy Interventions

a. Lack of adequate policy support: Post Green revolution, the country's focus was to increase food production through encouraging the high-yielding crops to achieve food security. In that process, it was witnessed that all the policy support was in terms of incentivizing cultivation, procurement security, MSP and inclusion in PDS, MDM, etc.
b. Inadequate support to research efforts for improving the millets cultivation: While aligning more resources for the improvement of fine cereals, millets were not given adequate importance in research and development on improved varieties, productivity, diversification of processing technologies and marketing.

2.3. Cost of Cultivation of Millets

The cost of cultivation of Jowar ranged from Rs 30712/ha to Rs 58063/ha among the states with net returns ranged from Rs 1203/ha to Rs 9043/ha among the states (Annexure 07). The cost of cultivation of Bajra ranged from Rs 29169/ha to Rs 48486/ha among the states (Annexure 08) with net returns over operational cost ranged from Rs 650/ha to Rs 17580/ha among the states. The cost of cultivation of Ragi ranged from Rs 47650/ha to Rs 70516/ha among the states (Annexure 9) while the net returns recorded negative in all states. Among operational costs, the human labour recorded as major cost contributing 50–75%, followed by machine/animal labour (13–21%), and fertilizers and manures (5–19%) among the states for all millets (Dayakar, 2016).

2.4. Consumption Pattern

There has been a decline in the consumption pattern of millets during the last few decades. The annual per capita intake of sorghum at the national level decreased drastically from 8.50 kg to 1.58 kg in urban areas and from 19.20 kg to 2.42 kg in rural areas between 1972–73 and 2011–12; while pearl millet intake also declined rapidly from 4.00 kg to 2.82 kg in urban areas and from 11.50 kg to 0.97 kg in rural areas (Annexure 10) (Rao et al., 2009; Basavaraj et al., 2010; NSSO, 2012). According to the NNMB 2011–2012 rural survey, the consumption of millets was found to be higher in Gujarat (156 g/CU/day) followed by Maharashtra (79 g/CU/day) and Karnataka (61g/CU/day) (NNMB, 2012).

3. The Current R&D Scenario of Millets in India

3.1. Status of R&D in Millet Crops Improvement

3.1.1. Crop improvement status of millets

There are substantial improvements made in sorghum and pearl millet wherein more than 100 cultivars were developed under the AICRP system (Annexure 11). In these two crops, a large number of hybrids yielding 30–50% more varieties were released. Hybrids were successfully developed in Sorghum (often cross-pollinated crop) and Pearl millet (cross-pollinated crop) due to the availability of the male sterility system for hybrid seed production. Hybrids have enhanced the yield potential in these crops as realized by yield levels of 5–7 tonnes/ha in summer cultivation under irrigated conditions. Hybrids developed for low input production regions were not popular due to the low adaptation and non-preference. Varieties have been largely successful in sorghum due to higher seed and grain potential. Kharif sorghum dual-purpose (grain + stover) varieties have become popular due to high grain and stover yield potential; however, productivity gains in rabi sorghum

varieties have been limited due to the resource-limiting conditions. In finger millet, genetic diversification and introgression of elite genes through recombination breeding has led to the release of varieties with substantial genetic gain over the local landraces.

In the other five small millets, genetic improvement has been limited due to lack of genetic diversity, difficulty in recombination breeding and lack of serious crop improvement programmes with requisite funding support. Though varieties have been developed, no male sterility/other systems are available for producing hybrids while most of the varieties are selections.

With the cultivation of most of these crops confined to India alone, no supporting international programmes exist. In all the 8 millet crops, crop production and management technologies have been standardized, including for season, region and commodity-based cultivation under AICRPs.

3.1.2. Seed production status

The hybrids developed in sorghum and pearl millet in the 1960s and onwards led to the birth and expansion of the private seed industry in India. In the present hybrid seed market, 90% of the grain and forage pearl millet, 40–60% of grain sorghum and 70–80% forage sorghum are catered by private hybrids and the rest by public sector hybrids.

The varietal seed requirement (excluding the farmer-saved seed), is almost fully catered by public varieties produced by ICAR institutes and SAUs. This constitutes about 40–60% of the sorghum seed market, 10–15% of pearl millet varieties/ composites and 100% of all other millets. Seed production in millet crops by public agencies including state and national seed corporations is about 70 to 85 thousand quintals each year, which is being fully met by the current system.

3.1.3. Cultivars in seed chain

Except for pearl millet where private hybrids are predominantly cultivated, all other millets recently released (up to 15 years old) cultivars are in the seed production chain, thus augmenting productivity in farmer's cultivation. However, some golden varieties are also in the seed chain due to their unique traits such as adaptation, culinary properties and broader resistance to pests and diseases, etc. In small millets, state-specific varieties dominate the scenario, since the area under these millets has shrunk to few pockets. Moreover, most of the improved varieties are not in the seed chain as there is no significant demand for quality seeds from states. Therefore, the national average yields of small millets have not increased incommensurate with the release of new varieties.

3.1.4. Biofortified varieties

Concerted efforts in collaboration with other national and international initiatives have led to the development of 12 varieties of pearl millet (8), finger millet (3) and small millet (1) (Devendra Kumar, 2020).

Recently, the Prime Minister of India has dedicated 3 biofortified varieties of 2 millet crops to the nation on the occasion of the 75th Anniversary of the Food & Agriculture Organization (FAO), and the United Nations. The Finger varieties CFMV 1 and 2 are rich in calcium, iron and zinc, and the Small Millet variety-CCLMV1 is rich in iron and zinc.

Special efforts are being made to popularize these biofortified varieties among the masses. Quality seeds of biofortified varieties are being produced and made available for commercial cultivation. The Extension Division of ICAR has also launched two special programmes viz. Nutri-sensitive Agricultural

Resources and Innovations (NARI) and Value Addition and Technology Incubation Centers in Agriculture (VATICA) for up-scaling the biofortified varieties through its Krishi Vigyan Kendras (KVKs).

3.1.5. Challenges to be addressed

I. Low productivity of millets

Compared to wheat, rice and maize, millets have lower productivity in the country. This is attributed to their cultivation in marginal lands in rainfed farming and non-adoption of improved cultivars. The yield gap in millets is largely a reflection of farmers' cultivation technologies that offer ample room for improvement.

II. Resistance to pests and diseases

Though millets have minimal pests and diseases, some pests and diseases often cause significant losses in sorghum (shoot fly, stem borer, grain mold), pearl millet (downy mildew and blast) and finger millet (blast). No productive cultivars with highly significant resistance to these pests and diseases are available and management options are mostly limited to agronomic and chemical methods.

III. Area Stabilization

Despite several efforts for decades, sorghum with an average compound growth rate of -5.13%, pearl millet (-2.85%), ragi (-2.77 %) and small millets (-6.01%) have witnessed a declining area trend. The need for stabilization and increasing the area under millets cultivation is a major need for attaining sufficient production.

IV. Area expansion in non-traditional areas

Bringing the additional lands under millets cultivation is another important factor in increasing the production, especially the fallow and wastelands and the non-traditional areas are more sustainable without competing with the high remunerative crops.

V. Nutritional profiling of various cultivars across all major millet growing areas

VI. End-product specific cultivars

Geometrical and nutritional evaluation of several cultivars available in all the major millet growing areas and mapping them to the suitable end-use is essential for better end-product quality and scaling up the value addition by the giant processors.

VII. Seed hubs & breeder seed production

There are is a huge need for identifying various product-specific cultivars and establishing the seed hubs for breeding and producing such seeds so as to establish demand-driven production. The development of seed hubs that can deliver quality seed at high production levels is an important intervention.

3.2. Processing/Value Addition of Millets

Despite the high nutritional content and climate resilience, millets production has declined drastically over the decades. One of the reasons for this has been the non-availability of suitable processing technologies and machinery for providing convenience in the form of the Ready-to-Cook (RTC) and Ready-to-Eat (RTE) products to consumers, similar to major cereals. The absence of R&D activities towards processing for value addition, enhancing the shelf-life of the products and also

diversification of the millets towards substituting rice and wheat were the main reasons for them to remain confined to the traditional consumers till recent years. Lack of gluten in millets limited their usage in bakery products, and characteristics such as odours and hardy texture are also the roadblocks for positioning them as a substitute for rice. It is important to note that ICAR-IIMR has pioneered in the development of value chain from 2008 to 2017, being supported by NAIP funded by the World Bank addressing various backward integration and forward integration and the pilot attempt was sealed. Interventions such as on-farm end product-specific cultivation, aggregation, processing, machinery development, nutritional evaluation, entrepreneurship development, commercialization, policy advocacy, promotional campaigning and incubation in a consortium mode involving both private and public institutional partners are essential. A brief account of these and the interventions of ICAR-IIMR, CFTRI and other R&D institutes in each of these unit operations are given below:

3.2.1. Pre-processing of Millets

The harvesting process followed for millets is mostly carried in a traditional manner wherein a lot of refractions such as immature grains, chaffs, mud particles, stones, admixed gains as well as obnoxious material, dust, etc. will be mixed. For this, de-stoners, graders and aspirator systems suitable for millets are available and millet processors are using them effectively.

3.2.2. Primary processing

The primary processing of millets is a vital step to convert the grain into edible form and thereby enhancing their quality and consumer acceptability. Among the millets, sorghum, pearl millet and finger millet are naked grains as almost all the glumes get detached from the grains during harvesting; however, a few traditional varieties do contain glumes randomly that can be detached by mild abrasion in cereal (emery) pearler. On the other hand, the processing of Little, Proso, Kodo, Barnyard, Browntop and Foxtail millets are complicated as they have an inedible husk that needs to be removed, followed by the de-branning to a desirable extent through primary processing. It was noticed that Barnyard, Little, Browntop and Kodo millets need multiple passages whereas Foxtail and Proso could be dehusked in a single stage. Even small-scale millet milling machinery has been developed in Japan and Hong Kong and is gaining popularity in the country. The current machinery is available in small capacities up to 2 tonnes/hour which needs to be scaled up for bulk processing by food manufacturers. Though the higher capacity machines are available from MNC companies like the Buhler group, they are of high cost and unviable for micro, small and medium enterprises.

3.2.3. Secondary Processing and Product Development

It involves the conversion of the primary processed raw material into different Ready-to-Eat (RTE) and Ready-to-Cook (RTC) millet products. Although the dehulled and de-branned millets are largely used for cooking and consumption similar to milled rice, they are pulverized into flour and *suji* and for use as *roti* and other foods similar to rice/wheat flour and semolina. Several R&D institutes, especially ICAR-IIMR have been diversifying the value addition technologies such as puffing, baking, popping, flaking, cold and hot extrusion, expanded millets, instant/convenience foods, etc. (Dayakar, 2016) (Annexure 12). Through these technologies, millet products with enhanced taste, convenience and nutritional quality have become a possibility. Millet-based RTE foods – puffs, flakes, muesli, extruded snacks, cookies, *murukus*, etc., and RTC foods – vermicelli, pasta, millet semolina (medium, fine & coarse), instant mixes, etc., were developed, including millet-plus-milk-based beverages (Dayakar, 2016, Krishnan, 2012).

During processing, some nutrient losses will also occur. To overcome this problem, fortified products (cookies, vermicelli, pasta, khichidi mix and bread) are also developed by adding natural nutrient-rich ingredients like garden cress (rich in iron), gingelly seed (rich in zinc), spinach (rich in iron), etc., to enhance the iron and zinc content and thus enhance the iron and zinc proportions in them. Various processing methods such as germination (Grewal and Jood 2006,) or malting (Kannan et al., 2010, Najdi Hejazi et al., 2017, Platel et al., 2010), thermal processing, soaking, and fermentation (Makokha, 2002) minimize the nutritional loss and increase the physiological and chemical accessibility of micronutrients in the body and also decrease the antinutrients like phytates (Annexure 13). The efforts towards developing novel foods such as plant-based vegan protein, express foods, analogue rice, nutraceutical and functional foods are taking place by premier institutes and startups. Other institutes such as CFTRI, NIFTEM, IIFPT, SAU's and ICRISAT followed suit in strengthening value addition in millets. Thus these combined R&D efforts are further widened with private players such as Britannia, ITC, etc., for novel technologies and the startups who obtained technology licenses from ICAR-IIMR and other institutes have been marketing them with improved shelf life.

3.2.4. Shelf-life of Millet-based Products

The shelf-life of any raw millet flour is about 1–2 months and it is only 5 to 7 days for pearl millet because they are easily prone to oxidative rancidity due to the free fats and sugars. If the millets are expanded into different value-added products, the technologies like parboiling, irradiation and germination can enhance the shelf-life to 6–12 months. Consistent R&D programs for enhancing the shelf-life of processed millets and their products with the aid of inactivating lipases, use of natural and permitted antioxidants, and also suitable packaging approaches are being explored at IIMR, CFTRI, etc.

The shelf-life of grain is normally above 6–8 months for FAQ grain, with 10–12% moisture. The shelf life deterioration of processed products especially flour is a big challenge; however, some startups have come up with 6 months' shelf-life of flour. Other RTC/RTE technologies as mentioned above especially extrusion provides a shelf-life of 6–8 months. Irradiation technology and proper packaging structures enhance substantially the shelf-life; however, the former form is not easily saleable among the Indian population. Pearl millet with more than 5% fat with rancidity issues is the biggest challenge today with the largest production mainstreaming in public-funded programs and for export purposes needing integrated shelf-life management of processed products which needs a focused R&D attempt from institutions such as IIMR, DFRL and CFTRI.

3.2.5. Challenges to be addressed

i. Preprocessing

1. Fabrication of primary pre-processing machinery for small millets at farm level to minimize transportation of refractions and to improve the efficiency of dehulling, separation and polishing.

ii. Primary Processing

1. The efficiency of current machinery is very low with the recovery of 70–80% of grain and the remaining being the un-hulled and broken grains.
2. This inefficiency is posing another difficulty in terms of separating un-hulled grains from the de-hulled grains. As of now, no machine can effectively segregate unhulled grains from the dehulled

grains. In the absence of such a machine, the millet processing industries are equipping themselves with highly capital-intensive colour sorters for that purpose which is increasing the product price.

3. One type of dehuller unit is not suitable for all the millets, as their morphological features differ mainly in size, shape and husk content and nature. Development of integrated processing equipment for operating under different processing conditions to process multiple millets is necessary.
4. The shelf-life of processed grain is low compared to un-hulled grains, and thus some studies are required for the optimization of polishing, milling, etc. for attaining the maximum shelf-life.
5. Currently, there are no standards on the degree of polishing of grain, as in the case of rice. Some studies for preparing the grades, standards and degree of polishing are essential for preserving the quality of the grain, nutrition, etc., and to avoid the malpractices of indiscriminate polishing.

iii. Secondary Processing

1. Due to lack of gluten, gelatinization of starch through hydrothermal treatment, extrusion, etc., is being employed for the diversification of value addition but making some products like bread, buns, etc., with 100% millets is still a challenge.
2. Shelf-life above 6 months is a challenge but needs to be explored for tapping the potential export markets.
3. The current diversification of product technology is limited to local tastes and preferences. More technologies for continental and export market-specific recipes are necessary for pushing the demand.
4. Diversification into emerging trends such as plant protein, nutraceuticals, etc., for better positioning millets on par with rice and wheat.
5. Lack of comprehensive data on the effect of various processing technologies on nutritional characteristics and a framework of best processing technologies for enhancing the availability of nutrients and decreasing the anti-nutritional contents.
6. The measure of physiologically active bio compounds in altered foods compared to raw millets-polyphenols and antioxidant capacity; Resistant starch, exploring medical benefits of anti-inflammatory properties of millets; Prebiotic and Probiotics of Millets

3.3. Nutritional Evaluation, Bioavailability and Efficacy of Health Benefits

Consumer preferences are important before the products are launched by the industry. Modern consumers are conscious of the labelling of evidence-based claims. As of now, the nutritional-epidemiological information is limited and is making the private players less confident of facing the customer claims. It is also widely discussed that the well-established data on nutrition, health claims, bioavailability will help in shaping the whole positioning strategy, labelling, branding, awareness creation, consumer education and informed choices.

In past, there were no strategic research efforts in this direction except a few studies by ICAR-IIMR and ICMR-NIN on the glycaemic index, efficacy on child growth, diabetic patients, etc. Now the convergence of these institutions should develop the broad-based clinical studies that would benefit the labelling of millets and their products (Madhrapakkam, 2014).

Challenges to addressed

1. **Clinical trials for evaluation of bioavailability of nutrients**
   The bioavailability of nutrients present in the food is one key factor in claiming any health benefits or therapeutic properties. So the studies on the bioavailability of various nutrients such as protein, fat, fibre, vitamins and minerals are to be undertaken for scaling up the millets.
2. **Studies on the efficacy of therapeutic properties of nutrients**
   Millets are rich in nutrients compared to the regular fine cereals but the data on their clinical or therapeutic properties for tackling various lifestyle diseases and NAFLD are not yet made available. Researching the therapeutic properties and ability to cure several diseases will generate valuable and authentic data required for branding, positioning, marketing and customer claims response of millet foods.
3. **Supplementation trials for functional properties**
   The trials for knowing the effect of supplementation of millet foods on the growth and well-being of children of different age groups is essential for triggering the potential of positioning and marketing of millet foods.
4. **Research on the degree of polishing**
   Establishing Standards and Guidelines to optimize milling based on the nutritional values of small
   millets after polishing is vital to optimizing the shelf-life, sensory qualities and marketing
   grains transparently.
5. **Evaluation of the effect of various processing techniques on nutrition**
   The impact of processing such as soaking, germination, malting, fermentation, extrusion, etc., on the nutritional properties of millets is a key factor in value addition, branding, positioning and marketing of products. The data on change of, either increase/decrease of, various nutrients and effect on anti-nutritional properties will provide sufficient insights for setting up of regulations on type and level of processing also.
6. **The measure of physiologically active bio-compounds in altered foods compared to raw millets**
   Polyphenols and antioxidant capacity; Resistant starch, exploring medical benefits of anti-inflammatory properties of millets; Prebiotic and Probiotics of Millets

3.4. Commercialization of Millet Products

Commercialization of millet products was absent till a decade ago when ICAR-IIMR realized that no millet-based product was available on market shelves but was just lying in the laboratories. Although the entire millets value chain was broken and unorganized, the demand-side pull was in a very pathetic state such that consumers didn't even know the existence of millet-based products or their possibilities.

ICAR-IIMR has launched the first-ever millet brand in the country to prove consumer acceptability for the millets so as to attract aspiring entrepreneurs. The brand name *Eatrite* with the tagline of Eat Millets–Stay Healthy was an instant success. It is still continuing in the market with 30 value-added products (Annexure 09) and has been the inspiration for the birth of 400+ millet brands in the country today.

After many years of sensitization, the food industry has started recognizing the unique nutritional qualities of millets and has been building a sizeable product portfolio with millets. Today, there are many products ranging from millet rice to multi-grain mixes, instant mixes, breakfast and snack items.

Millet product technologies have been diversified into various Ready-to-Cook forms such as Vermicelli, Pasta, Instant *Dosa*, *Upma, Kheer* mixes, etc., and into various Ready-to-Eat forms such as Cookies, Muffins, Ready-to-eat cereals, Flakes, *Murukus, Chikki*, Extruded Snacks, etc. Consumer demand also seems to be high. As reported by India's largest online grocery store – Big Basket – they are offering 50+ millet-based products and continuously working towards bringing new alternatives to meet the needs of diverse and wellness-seeking consumers.

Mainstreaming by Private Food Industry: Popular brands such as ITC, Kellogg's, Britannia, MTR Foods, Big Basket, etc., have already diversified into millet-based products and have been planning for the long-term with millets. The industry is very optimistic about meeting the nutritional needs of consumers through millets in the coming days and has been laying plans to develop numerous commercially viable products. However, millet foods are still only a niche market considering the marketable production.

Nutrihub–Technology Business Incubator, ICAR-IIMR: This has materialised as 400-plus millet-based start-ups in the last 5 years. The investments in the millets landscape have been estimated to be above Rs 2000 crore and the coming days are likely to see an exponential rise in market size. However, there are many challenges in scaling up the millets from niche to mainstream category.

With FAO declaring the year 2023 as the International Year of Millets, our country being the largest producer and consumer of millets should be ready with the integration of backward linkages, sufficient production, a strong value chain, a diverse range of value-added product technologies, clear standards and guidelines, USPs in place, consumer awareness and communication, policy support, branding, incubation of startups, etc., for tapping both the domestic and export market potential and passing the heritage of India to the world community as future cereal foods that are on trend with nutritional benefits and offer functional health benefits.

3.5. Awareness Creation and Promotion

There is a vox populi that *Millets are poor man's foods*. Despite the diverse and highly bioavailable nutrients, millets are seen as the poor man's staple as they are cultivated and consumed domestically by the rural poor for decades. Over the decades of efforts and unprecedented situations like the Covid-19 pandemic, there is a shift in perceptions and millets are increasingly sought as healthy and nutritious alternatives to fine cereals. As the hidden hunger led lifestyle diseases are surging irrespective of rural or urban areas, millets are now more pronounced in the diets of many segments of the population. The strategic promotion will lead to setting the proper awareness in people and place the millets as better choice foods in terms of nutrition and health. The challenge is that only a few R&D Institutes, NGOs and state governments are involved in awareness creation.

3.6. Training and Capacity Building

Training and capacity building needs to take place at different levels across the value chain such as farming, farm-gate processing, value addition, commercialization, etc. Currently, the several institutes engaged in millets cultivation are engaged in training the farmers, women groups, etc., on various farming activities. There are very limited efforts going into training the public on various product technologies and recipes with millets. ICAR-IIMR being nodal institutes have been organizing

some training programs such as value addition, cooking with millets, entrepreneurship opportunities, etc. Odisha, Karnataka, Madhya Pradesh, etc., have been engaged in training women, tribals, etc., on value addition, and then including them in public distribution. Recently, MoFPI has launched the ODOP program under the PMFME scheme where training and incubation for various commodities are being planned. Total 17 districts from 11 states were selected for millet-based products, where training on some millet products like vermicelli, pasta, flours, etc., are being implemented. The major challenge is that several capacity-building efforts by various stakeholders such as state governments, NGOs, institutes are taking place with their limited expertise on products, as there is no central framework for collating the innovative technologies and training on them.

3.7. Entrepreneurship in Millets Landscape

3.7.1. Role of Nutrihub, Technology Business Incubator and Building Up Ecosystem of Millets Startups

Nutrihub–TBI's success in building up an ecosystem of millet-based startups is recognised across the country as they have established last mile connectivity with consumers which was missing otherwise. ICAR, DST and RKVY-RAFTAAR should be credited for funding this initiative of ICAR-IIMR, providing infrastructure for their day-to-day manufacturing of various millet-based products with technology backstopping, mentoring, market facilitation and financial facilitation, which has become a blessing to startups in the grey area of millets commercialisation.

Over 400+ millet startups have emerged in 4 years' span. This incubation centre has contributed much to this figure while the TBI at ICAR-IIMR has incubated 175+ millet specific startups (Annexure 14, 15). Some of the notable startups performing well in the industry are Health Sutra, InnerBeing, Ahobilam Foods, M for Millet, Millenova, Perfura Technologies, Kamakshi Foods, Eatmillet, Boinapally's, Rigdam Foods, Go Bhaarati, Health Basket, Hope Foods, DMR Foods, Me Go, Millet Break, etc. These startups are into Ready-to-Eat, Ready-to-Cook foods, Processing Machinery, Restaurants, Bakery, etc., while marketing their products through their e-commerce platform, physical retail channels, government captive markets, Online Retail Stores such as Amazon, Flipkart, First Cry, Big Basket, etc. However, the millet incubation ecosystem is still at a nascent stage in India. Though Nutrihub is striving it needs more concerted efforts to make a more cohesive and vibrant platform where mentors, angel investors, and startup accelerators are readily available for startups to refine and hone their early endeavours. Incubators provide a support system to the new entrepreneurs including mentoring, business development connections, seed/angel fundraising, evolving business models, proof of concept, etc. The entrepreneur–investor–incubator–government-corporate network still has a few missing links, where incubators can play an important role.

The Nutrihub vision with a focus on millets and closely working with CFTRI, NIFTEM should be encouraged to support more millet-based startups.

With regard to funding, the total investment in early-stage agritech startups as per the ThinkAg report in the last ten years is about $ 1.9 bn but millet startups got a very small fraction of it. There are only two notable deals in the millet ecosystem – Soulfull (an investment by Aavishkar Capital of about INR 350 Mn in 2018) and Health Sutra (an investment by Ankur Capital of INR 22 Mn in 2017). Clearly, millet startups have a long way to go to scale and build investible models to attract more capital. However, under RKVY-RAFTAAR, Nutrihub has already supported 40 startups with grant-in-aid up to Rs 370 Lakhs during the past year. The growth of startups is phenomenal with a double-digit CAGR. The startups' markets must be well established and should be linked up with FPO's for continuous supply chain management to strengthen backward integration. The government captive markets through linking with welfare programs will augur well the sustenance of these startups.

3.7.2. Private Sector Initiatives

- **ITC Foods and ITC ABD:** has launched a new range comprising Gluten-free flour, Jowar flour, Ragi flour, Multi millet mix flour and *Khatta Meetha* Poha under the umbrella of Aashirvaad Nature's Super Foods.
- **Britannia Industries Ltd:** has launched Ragi cookies and 5-grain Digestive biscuits under the brand name of Nutri Choice for diabetic people, claiming the high digestive fibre and low glycaemic Index. IIMR did contribute through a joint R&D initiative with Britannia Ltd.
- **MTR foods**: has launched 3 new products – Multi grain Dosa mix and ragi Idli under its DeLite brand.
- **24 Mantra Organics**: has launched the Multi-grain flour, Bajra flour, Sorghum flour, Ragi flour, Millet Dosa and Ragi Idli mix and is marketing over various e-commerce platforms.
- **Soulfull Industries**: The breakfast segment and their aggressive posture gave competition to Kellogg's.
- **Terra Greens Ltd**: A brand with organic millets with an export focus came up with various staples and other RTC products.
- **Big Basket:** is offering 50+ millet-based products and continuously working towards bringing new alternatives to meet the needs of diverse and wellness-seeking consumers. The industry is very optimistic about meeting the nutritional needs of consumers through millets in the coming days and has been laying plans to develop numerous commercially viable products. However, millet foods are still only a niche market considering the marketable production.
- **Kellogg's India:** Kellogg launched Ragi Chocos, a new delicious and nourishing breakfast for growing children, and many more are in the offing.
- **Tata Foods:** New wing has acquired Soulfull with breakfast snacks, beverages.

3.7.3. Challenges to be addressed

Though there is a significant increase in the number of startups in the last 4–5 years, the quantum is still very small and this number has to be increased to meet the growing demand in domestic and export markets. In addition, the number of startups/private players will add to the volume of promotion and awareness creation in public. However, the challenges across the value chain need to be solved for scaling up entrepreneurship in millets.

a. Production and Sourcing

i. Consistent supply of Raw material of desired variety not yet available
ii. FPOs focusing on millets are still few
iii. Farming of millets is being driven by MSPs announced by the policymakers
iv. Logistics support to connect the farming point and the distribution point needs more attention
v. Lack of knowledge about best cultivars and policies supporting millets in the farming community
vi. Lack of fully developed Grades and Standards for the sale of millets at a better price

b. R&D in Processing Technologies

i. Standardized technologies that enable processing at a scale not readily available
ii. Varied quality of machinery from different manufacturers
iii. Different types of millets need different techniques for processing
iv. Amenability of different millets to varied food processes not fully known
v. Suitability of millets in modern processing techniques like extrusion not fully evaluated

vi. Millets-based alternatives to existing popular food categories are still in the early stages of development
vii. Consumer experience of millet products not yet close to rice/wheat/corn-based alternatives
viii. The shelf-life of some millets, especially pearl millet, is still a major challenge
ix. The central government and some funding agencies should provide fellowships and scholarships for higher studies for increasing the research and development in millet-based products

c. Marketing Aspects

i. Nutritional claims haven't been validated fully
ii. High entry barriers in modern retail – high margins, listing fees and marketing spend
iii. Low market awareness for both the ingredients & product formats – Moderate awareness in the states of Tamil Nadu, Karnataka, Odisha, AP and Telangana states. Low awareness in the rest of the country.
iv. Low repeatability – Users lapsing after using millet rice as a replacement to white rice
v. "Millets" are not a strong enough differentiator yet
vi. New startups should be given a marketing budget for millet-based products

d. Regulatory Challenges

i. Millet based products are not covered under standard foods and thus it will go through an approval process so that FSSAI should consider these innovative products and come out with standard
ii. Taxation for millet-based products should be nil (no GST) to push the use of millets based products and to enhance its marketing as well as consumer acceptability.
Millet based product claim should be part of the approved claim list of FSSAI so companies who are interested can use it in PR.
iii. Lack of knowledge about export policies and understanding about the markets in different countries
iv. Quality standards and their certification is still a major drawback for export

e. Fundraising

i. There is considerable change in investment by the Angel investors and VC's. This has to be stepped up in millet sectors
ii. The grant in aid must be infused with greater emphasis
iii. Major funding agencies still consider millets to be a small niche
iv. Lack of strong business models that can create exponential value to investors
v. The sourcing of CSR funds to support incubators for scaling up infrastructure will strengthen the cause of millets startups.

3.8. Market-wise Wholesale Prices of Millets

The wholesale price of Sorghum in major markets of Karnataka, Gujarat, Maharashtra, Rajasthan and Tamil Nadu from 2010 to 2020 reveals the average prices are in the range of Rs 2252 to Rs 2022 per quintal respectively (Annexure 16).

The wholesale price of Bajra in major markets of Karnataka, Gujarat and Maharashtra during 2010 and 2020 is in the range of Rs. 1704 to Rs. 1392 per quintal (Annexure 17).

The wholesale price of Ragi in major markets of Karnataka and Tamil Nadu for the period 2010 to 2020 reveals the average price ranged between Rs 1958 and Rs 1539 per quintal (Annexure 18).

3.9. Trend of Minimum Support Price

During 2007–2020, the MSP has witnessed a steady rise for all the crops year after year. However, the average annual rise in Ragi was growing at 12.6% followed by Jowar hybrid (11.2%), Jowar maldandi (11.1%) and Bajra (8.6%) (Annexure 19).

The current trend of price realization by millet farmers is showing the level of real appreciation in millet cultivation. Though the price for Sorghum during 2010–2020 doubled from Rs. 1224/quintal to Rs. 2542/quintal, this appreciation is just compensation for the inflation and the real gain by the farmer is just Rs. 181 per quintal. This real appreciation in the case of Finger millet is Rs. 744/quintal, and it is negative for Pearl millet with Rs. 169/quintal.

Today, millets are being procured at Rs 25–30 per kg, and final price realization from the consumer after value addition is anywhere from Rs 100–150 per kg, based on the level of processing. Even after significant value addition and price appreciation, the farmer is still receiving an insignificant portion of the consumer rupee. This is happening because of the lack of linkages between producers and the market backed by the disrupted value chain, where more intermediaries play a role. Not all price gain is being eaten by intermediaries but the inefficient processing machinery is also playing a significant role in it. The primary processing alone results in 20–30% wastage as broken grains are difficult to separate from the husk and also has no alternative use.

3.10. Exports Scenario of Millets

India is the world's leader in the production of millets with a share of around 15% of the world total production. India produces around 15 Million MT of millets annually. India has exported millets of 28.5 Mn USD in 2019–20, including to the top 10 destination countries – Nepal, Saudi Arabia, Pakistan, UAE, Tunisia, Sri Lanka, Yemen, Libya, Namibia and Morocco. India exports sorghum to 55 counties and bajra to 60 countries. India is the second-largest exporter of millets. The millets' market is projected to grow from its current value of more than $9 billion to over $12 billion by 2025, based on current trends and extrapolation.

However, the exports of Indian Jowar and Bajra witnessed a steady decline with an overall negative growth rate of -8.18% and -4.93% respectively during 2010–11 and 2019–20, while the export of Ragi grew steadily at an average rate of +5.78 % (Annexure 20).

During 2019–20, India exported sorghum mostly to the Philippines, Saudi Arabia, Kuwait, United Arab Emirates, Japan and Taiwan. During 2019–20, India exported Bajra mostly to Saudi Arabia, followed by UAE, Namibia, Tunisia and Yemen. The major export destinations of ragi from India are Nepal, Sri Lanka, Malaysia, United Arab Emirates and the USA (Annexures 22, 23, 24).

Considering the UNGAs resolution to observe 2023 as the International Year of Millets and a subsequent spike in export demand for Indian millets, APEDA and ICAR-IIMR have started a joint project for fine-tuning and strengthening the value chain with a focus on export market trends. These efforts are targeted to address the formation of export raw material clusters, profiling of cultivars and mapping to end product characteristics, diversifying value addition into export market food trends, promotion for increasing exports, strengthening millet startups, etc. Funding for large scale efforts for strengthening the above aspects for catching the export demand effectively is necessary.

3.11. Policy Interventions

With over six decades of the Green Revolution focusing on attaining food security in the country, India has significantly improved in terms of food production and productivity. The need of the hour was solved sufficiently with the focus on increasing the quantity of food production while not factoring in the quality of the food, i.e., the nutrition security which led to the birth of Hidden Hunger or Micronutrient Malnutrition. Today, India is suffering the triple burden of under- and over-malnutrition and hidden hunger, which have manifested in multiple micronutrient deficiencies.

The efforts for attaining food security in terms of inputs subsidy, price support, procurement, inclusion in PDS and other incentives for highly productive crops like rice and wheat have decreased the millets cultivation area and thus deprived the consumers of the myriad benefits of millets.

These Supply–Demand changes have placed the millet prices high and thus have limited their accessibility.

The focus is realigning towards mainstreaming millets and is reflecting in terms of various policy interventions from 2012 to 2021 (FAO, 2020).

- 2012 – Initiative for Nutritional Security through Intensive Millet Promotion (INSIMP)
- 2013 – National Food Security (NFS) Act covers 'coarse grains'
- 2017 – NITI Aayog of Government of India releases the National Nutrition Strategy (NNS) for 'Nourishing India' and recommends that the MoA & FW strengthen cereal productivity and production diversity – including the production of 'coarse' cereals such as millets
- 2018 – Millets officially declared as "Nutri-cereals" (Annexure 1)
- Millets made part of the National Food Security Mission (NFSM)
- 2018 – GoI has declared as the 'National Year of Millets' (NITI Aayog, 2018)
- 2018 – The Indian government launched the Sub-mission on Nutri-cereals under NFSM with an outlay of INR 300.00 crore for 2018–19
- 2018 – GoI has sent a proposal to United Nations for declaring 2023 as the 'International Year of Millets', to promote greater production and consumption of millets
- 2021 – UNGA has approved and declared 2023 to be observed as the 'International Year of Millets'
- Many state governments are piloting the mainstreaming of millets (Annexure 25)

All these interventions are piloting in nature and a national level integrated policy framework for enhancing the production, processing, consumption and exports is yet to be rolled out by the Government of India. Several stakeholders such as Farmers, R&D institutes, Food processors, Export traders, State Government departments, etc., have to be sensitized and guided to intensify their role in mainstreaming millets. Unless the intense policy efforts come into play, there will not be much progress even after various promotional efforts such as the National Year of Millets, International Year of Millets, etc.

4. Important Learnings from State Governments' Initiatives

4.1. Scalable Models – State Government Initiatives

Based on the study in Karnataka, Maharashtra and Odisha states (FAO, 2020), FAO and DAC&FW have recommended the following interventions to be considered by the GoI for accelerating the promotion of millets in India:

1. Establish a national millet-focal point to oversee all aspects of 'Nutri-cereals'.

2. Organize a public campaign to promote awareness of the benefits of millets amongst consumers, both urban and rural.
3. Build synergy between MoA&FW and other ministries and departments running nutritional programmes or activities related to climate-resilient food and farm systems. Promote consumption by including millets in ICDS, MDMS and PDS, where they have not yet been integrated.
4. Develop strategies to strengthen millet ecosystems, based on learnings from this study. Facilitate processing by establishing hubs, necessary infrastructure in millet corridors and set standards, supported by a national study on the bioavailability of nutrition from millets.
5. Strengthen R&D support for specific needs. Strengthen R&D on various technical needs, particularly processing technologies and diversify into alternative uses through stronger linkages with research institutions and relevant authorities such as CFTRI, IIMR, IIFPT, NIFTEM and FSSAI.
6. Ensure assured returns to farmers for producing and processing 'Nutri-cereals' with incentives and disincentives for the same. Synergize existing programmes, such as those on human nutrition and climate preparedness; dovetail the efforts to improve farm incomes with the DFI strategy, by primary and secondary processing and B2B sale.
7. Develop standards for all millets and their products, notified under appropriate regulations, such as those on food nutrition labelling and display.
8. Develop millet corridors: Millet corridors should have several processing hubs that will provide backward linkages to producers for procurement (as well as supply of millet rice for local consumption) and also value addition for marketing to consumers.
9. Business Incubation: Entrepreneurs play a crucial role in risk-taking and market development. Business incubation facilities should be available in each Millet Corridor addressing all aspects of business development – technical, financial, marketing and managerial, human resources, etc.

Stages of Ecosystem Development in Karnataka, Maharashtra and Odisha States

Stage	Karnataka	Maharashtra	Odisha
Early Movement	NGOs promote millets to farmers in the early 2000s. Seeds, better PoP, etc.	Early 1960's, the first Bhagar mill set up in Nashik to process minor millets for upvaas market.	Millet revival starts with RRA Network in 2012–13. Focus on seeds, PoP, etc.
Supporting Factor	Millets gain prominence under GoK organic cultivation. PGs and Farmer Co-ops are set up in the late 2000s	More units set up, mostly within the same community. Cone polishers used to provide white millet rice.	
Social Change Factor	Increased production, but no market. Lifestyle issues force urbanites to look for healthier and more nutritious food. Millet is promoted heavily by key influencers IN the 2010s	Irrigation enters millet areas in a big way in the early 1990s. Rice takes over as the crop of the first choice and also food. Ragi, however, continues to be consumed as a staple. Other millets fall away.	In addition, focus shifts to local consumption of millets for nutrition security with local processing.

Prominent Intervention	IIMR and GoK hold International Trade Fairs which helped bring producers, processors and consumers on a common platform. Provides access to Co-ops to large buyers. Several Co-ops integrate backwards to do primary processing.	Absent	OMoM enters in a big way in 11 districts with select NGO partners and rolls out a Millet Mission focusing on better productivity, local consumption through Public Distribution and Commercial outlets.
Current Level of Activities	The market-led production system is getting set in place. Several farmers turn entrepreneurs and enter the B2C space. GoK introduces ragi and jowar in PDS from 2013.	Nashik remains the processing hub of minor millets. Non-upvaas, health-conscious urban consumer emerge in the early 2010s. GoM and Nasik processors do not address it.	GoO focusing on nutrition security for tribals through millets and making millets profitable by linking them to ICDS/PDS.

5. An Integrated Framework for Mainstreaming Millets

This framework recommends various interventions across the value chain for building and strengthening the sustainable demand-driven supply chain. It covers various aspects of production, procurements, processing, consumption, awareness creation, entrepreneurship development, exports, etc.

A sustainable approach for mainstreaming millets is building the demand/market-driven production system, which ensures solid supply chains while delivering mutual satisfaction to both side players – the producer and consumer – alike. For increasing the demand for millets, developing a framework, action plan and implementation of interventions (mentioned section 5.1) is very necessary, and the below-mentioned demand pillars will help in understanding the need for such interventions.

1. Household Consumption

This household consumption is one key pillar that can be strengthened through the inclusion of millets in the Public Distribution System. For implementing this on the ground level, the decentralized or localized food system may b e efficient, as the current millets production varies from region to region, and season to season. Considering the low shelf-life of millets, the localized procurement and distribution can be efficient while supplying the excess grain to other locations. In addition, the SHGs and FPOs can be encouraged to perform the pooling, cleaning, farm-gate processing, etc., for supplying to state/central grain procurement departments. So that the benefits of demand security, price security and high price realization through value addition can be passed on to the millet farmers, which eventually result in increasing cultivation area. This will boost the rural consumption of millets.

2. Captive/Mass Government Markets

The second pillar is the captive/mass markets which are aggressively looking for mainstreaming nutritious millets foods and fortified foods as supplementing current recipes based on rice/wheat etc., for solving various public health challenges such as nutrition for pregnant and lactating mothers' health, low mortality rate, child growth, anaemia in adolescent girls and women, etc. Undoubtedly, the inclusion of millets in ICDS, MDM, RGSEAG, NHM, etc. (Annexure 26) is a sustainable solution, besides aiding in mainstreaming the millets.

3. Niche/Emerging Markets

The major consumer motivations for food choices are taste, convenience and price. In recent times, especially after the Covid-19 pandemic, awareness about health, wellness, nutrition and immunity has significantly increased, leading to a new trend among health-conscious urban strata opting for RTC/RTE foods with a tag of health and nutrition, as an alternative to rice and wheat-based foods. It was an obvious choice that millets are naturally positioned to be healthy and immune-rich foods. Encouraging the consumption of millet products made of major secondary processing technologies such as baking, hot extrusion, cold extrusion, puffing, flaking, fermentation, germination, malting, pasteurization, etc., will aid in balancing the diversity of cereal diet. For strengthening and transforming the niche market into the main segment, a collaborative framework to join various stakeholders such as doctors, nutritionists, chefs, housewives, etc., is essential.

4. Export Markets

Similar to the Indian scenario, there are potential emerging trends such as gluten-free, weight management, health and wellness foods, etc. There are around 14 emerging food trends (Annexure 21), and to capture those opportunities, export markets can be mapped in relevance to those food trends and a strategic export promotion can be undertaken to develop and direct the relevant products and start-ups towards them. Currently, India is exporting millets mainly to Nepal, Saudi Arabia, Pakistan, UAE, Tunisia, etc. In future, India may be able to target the market segments in top millet-importing countries such as Japan, Indonesia, Germany, Belgium, The Netherlands, Italy, UK, etc. There is a huge export demand for millets value-added products among the Indian diaspora and various countries.

5.1. The Framework

The five pillars of this framework refer to five different directions of focus for covering the above-mentioned value chain components.

1. Focus on Policy Interventions

Policy Intervention	Description	Expected Outcomes	Stakeholders
Production Incentives	Providing incentives for millets cultivation through subsidized farming inputs, equipment, minor infrastructure, etc.	• Increase in Area and Production	• Central Government • State Governments
Minimum Support Price (MSP)	The Minimum Support Prices for all the major and minor millets to be declared.	• Increase in Area and Production	• Central Government • State Governments
Procurement of Grains	Procuring Millets under the FAO, State Govt. departments at the MSP	• Increase in Area and Production	• Central Government • State Governments
Development of FPOs	A policy for encouraging the millet FPOs in developing infrastructure, value addition, marketing, etc.	• Increase in Profitability to millet farmers	• Central Government • State Governments
Inclusion of Millets in ICDS, MDM, PDS, etc. programs	Guidelines for all state govt. to include millets in ICDS, MDM, PDS programs.	• The captive market for millet farmers • Nutrition-rich diet to beneficiaries	• Central Government • State Governments
State Millet Missions	Guidelines for all state govt. to design and implement the Millet Mission covering the farming aspects such as FPOs, infrastructure, seed hubs, farming incentives, farm-gate value addition, capacity building, etc., towards increasing the cultivation area under millets	• Increase in millets cultivation area and production	• Central Government • State Governments
Promotion of Processing Units	Policy for encouraging the millet processing units	Increased entrepreneurship, marketing efforts and thus promotion	• Central Government • State Governments

2. Focus on Research and Development Efforts

Intervention	Description	Expected Outcomes	Stakeholders
Yield	Fast-tracking the funding for R&D projects for developing the varieties and hybrids with high yield and	• Remunerative Cropping • Drop in prices	• DAC & FW • R&D Institutes (ICAR-IIMR, AICRP

	nutritional parameters		Centres)
Biofortification	Fast-tracking the funding for R&D projects for developing the fortified varieties and hybrids with multiplied nutritional parameters	• Diversified use of millets in foods, medicine, etc.	• DAC & FW • R & D Institutes (ICAR-IIMR, AICRP Centres)
End-Product Specific cultivars	R&D on analysis of cultivars from major growing areas and identification of cultivars for end products based on physical and nutritional properties	• Improved product diversification and quality • Increased processing units	• DAC & FW • R & D Institutes (ICAR-IIMR, AICRP Centres)
Primary Processing Machinery	Development of primary processing machinery with high efficient, scaled-up capacities, range of capacities (micro, small, medium, big, etc.) and capability of processing different grains.	• Drop in product prices • Increased processing units	• ICAR-IIMR • CSIR-CFTRI • IICT • DFRL • MDRF • Other premier Institutes
Scaling up of Secondary Processing Machinery	Development of high-capacity value addition machinery on par with fine cereals	• Drop in product prices • Increased processing units	• ICAR-IIMR • CSIR-CFTRI • IICT • DFRL • MDRF • Other premier Institutes
Diversification of Value Addition	R&D on developing a diverse range of products and recipes, specific to the i. Local food habits of Indian states, ii. Export segments, and iii. Emerging trends such as plant-based protein, nutraceuticals, biofuel, etc.	• Improved Product diversification and uses • Increased processing units	• ICAR-IIMR • CSIR-CFTRI • IIT-Kharagpur • Other premier Institutes
Shelf-life improvement	R&D for increasing the shelf-life on par with rice and wheat, using various processing, packaging, etc., techniques	• Higher Marketability • Higher Export demand	• ICAR-IIMR • CSIR-CFTRI • IIFPT • IIP-Mumbai • ICT-Mumbai
Clinical Studies	R&D on conducting the studies for generating the authentic data for i. Nutritional profiling ii. Bioavailability of nutrients iii. In-vitro digestibility and glycaemic index iv. Functional and therapeutic characteristics of various millet products	• Consumer Safety and awareness • Transparent Marketing efforts • Increased Exports	• ICMR-NIN • ICAR-IIMR • MS Ramaiah Hospital • MDRF

3. Focus on Regulatory Measures and Export Strategies

Intervention	Description	Expected Outcomes	Stakeholders
Standards and Grades	Establishing the Standards and Grades for small millets, and also for the degree of polishing, for transparent marketing	• Consumer safety • Increased processing units	• FSSAI • ICAR-IIMR • CSIR-CFTRI • IIT-Kharagpur • Other premier Institutes
HS Codes	Establishing HS Codes for small millets for exporting	• Increased Exports	• APEDA • ICAR-IIMR
Export Demand Mapping	Identifying Export market trends and potential for various millet value-added products	• Clear positioning Strategies	• ICAR-IIMR • APEDA
Positioning Strategies	Framing the USPs for various product segments of domestic and international markets	• Better penetration of products	• ICAR-IIMR
Export Promotion Forum	Creation of a Millet Export Promotion Forum with all concerned stakeholders for integrated export promotion nationally	• Strong Sourcing linkages • Increased export traders, start-ups	• ICAR-IIMR • DAC&FW • APEDA

4. Focus on Awareness Creation and Promotion

Intervention	Description	Expected Outcomes	Stakeholders
Websites and Logo	Launching an International Website with Dashboard of Progress, Information on Malnutrition, Nutrition of Millets, Recipes, Technologies, Publications, etc.	• Global Reach • Updates on various efforts	• DAC&FW • ICAR-IIMR
Launch event of International Year of Millets by GoI	Launch event of International Year of Millets by GoI, for calling the attention of all countries to Millets	• The international fame of passing India's heritage • Awareness in other countries	• DAC&FW • ICAR-IIMR • All other Stakeholders
International Museum/Centre of Excellence	Establishing an International Museum/Centre of Excellence showcasing the ancient collection, advanced technologies, products, etc.	• Promotion • Capacity Building • Value Addition Research • Market Linkages • Showcasing	• DAC&FW • ICAR-IIMR

Nutrition Literacy of Stakeholders	Mass communication programs relating the benefits to existing health issues, the importance of nutrients, etc.	• Promotion of millets	• DAC&FW • ICAR-IIMR • ICMR-NIN • State WCD, School, etc., departments
Top Parity Comparison	Developing standard material with top parity comparison of millets' nutrition with other grains	• Better Decision making by public	• DAC&FW • ICAR-IIMR • ICMR-NIN
Documentary Films	Preparation of documentary films on various aspects of millets and culture	• Awareness on various aspects	• DAC&FW • ICAR-IIMR • Other Stakeholders
Ambassadors-Celebrities	Hiring the National and State Ambassadors from film or sports field for promotion of millets through several promotional channels	• More Attention • Promotion of Millets	• DAC&FW • ICAR-IIMR • Other Stakeholders
Public Ambassadors	Devising and Implementing a campaign for registering 10,000+ ambassadors from the public to engage them in popularization through social media, with a recognition certification	• Inclusiveness and Awareness creation	• DAC&FW • ICAR-IIMR • National and International agencies
Launching the Millets Challenge	Launching the Millets Challenge for trying out the millet products, by the hired ambassadors	• Active public participation • Increased Consumers	• DAC&FW • ICAR-IIMR
TV Ads	Campaigning for the benefits of millets on TV channels and other platforms for increasing the consumption	• Promotion of millets	• DAC&FW • Ministry of Public Affairs • ICAR-IIMR
Social Media Campaigning	Campaigning for the benefits of millets on TV channels and other platforms for increasing the consumption	• Inclusiveness and Awareness creation	• DAC&FW • ICAR-IIMR • ICRISAT • Other Stakeholders
Ads in Railway	Awareness through display ads in railway stations and railway coaches	• Promotion of millets	• DAC&FW • Ministry of Railway • ICAR-IIMR
Champion Millets	Identification of two or three millets as Champion millets, and positioning them for a particular nutrient (iron, calcium, zinc, fibre, etc.)	• Export Demand • Image of Heritage of India	• DAC&FW • ICAR-IIMR • ICMR-NIN • CFTRI • NIFTEM
Publication of	Publication of books on Millets	• Awareness Creation	• DAC&FW • ICAR-IIMR

Books	i. Millet Recipes ii. Nutrition and health benefits iii. Compendium of Technologies, etc. in Hindi, English and local languages		• Other Stakeholders
Events:			
National Millet Festivals/Fairs	Conducting the annual National Millets Festival for showcasing the millet recipes, technologies, wet sampling, etc.	• National reach • Promotion • Awareness • Entrepreneurship • Stakeholder Linkages	• DAC&FW • ICAR-IIMR • ICRISAT • APEDA • MoFPI • State Governments • D/o of School, WCD, etc.
International Conferences	Organizing the Annual International Conferences on i. Scientific Advancements ii. Business Interactions and export promotion iii. Stakeholder Meets with Doctors, Nutritionists, Chefs, Processors, Farmers, FPOs, Exporters, etc.	• International reach • Promotion • Awareness • Entrepreneurship • Stakeholder Linkages	• DAC&FW • ICAR-IIMR • ICRISAT • APEDA
National Conferences	Organizing the Monthly National Conferences for i. Scientific Advancements ii. Business Interactions and export promotion iii. Stakeholder Meets with Doctors, Nutritionists, Chefs, Processors, Farmers, FPOs, Exporters, etc.	• Knowledge transfer • Awareness • Entrepreneurship • Stakeholder Linkages	• DAC&FW • ICAR-IIMR • ICRISAT • APEDA
Public Events	Organizing public events such as Marathons, Cyclathons, Wet Sampling counters, Cooking with Millets, etc.	• Inclusiveness and Awareness creation	• DAC&FW • ICAR-IIMR

5. Focus on Training and Entrepreneurship Development

Intervention	Description	Expected Outcomes	Stakeholders
Millet Incubation Centres	Replication of millets specific incubation centres across the country for generating an adequate number of startups for meeting the domestic and export demand	• More Startups • More processing and exports	• DAC&FW • ICAR-IIMR
Grant-in-aid	Allocation of larger fund for supporting the millets startups with	• More Start-ups • More processing and exports	• DAC&FW • ICAR-IIMR

	grant-in-aid		
Sensitization Events	Organizing the sensitization of aspiring entrepreneurs through physical and online events	• More Startups	• DAC&FW • ICAR-IIMR

5.2. The Way Forward

Consumption of millets as direct food has significantly declined in India due to policies centred around Green Revolution–led food security from the 1960s onwards. The decline in the area resulted from the decrease in millets consumption, and the area taken over by maize, pulses, oilseeds and other commercial crops. This dramatic shift is mainly due to the lack of profitability, policies such as the promotion of fine cereals through incentivized production, MSP, procurement, inclusion in the public distribution system and export promotion, and shift in consumer preferences towards fine cereals backed by drudgery in millets cooking. In addition, the lack of processing technologies for diversifying millets and lack of awareness on nutritional merits of millets are also some consumption side factors. It is obvious that millets are widely grown in underdeveloped countries like India and African countries and the lack of western interest in technological advancements is an important reason behind the millets lacking enough processing technologies. During the journey towards food security, nutritional security was not the primary focus, which has resulted in the current state of malnutrition and the rise of Non-Communicable Diseases (NCDs).

The transformative role of millets in tackling lifestyle diseases, the benefits of mainstreaming millets in public-funded programs and the growing realisation of huge potential for export markets, especially, in midst of the Covid-19 pandemic are projecting them as *immune boosters* owing to their rich nutritional profile.

Millets are coming to the global forefront, and the recent resolution by the United Nations General Assembly to observe the year 2023 as the International Year of Millets for emphasizing the importance of nutrition-rich crops in climate-changing conditions is one step in that direction. It is an obvious prediction that the awareness creation about millets would take place in 70+ countries that supported India's proposal, and many other countries, and thus the demand for such foods too would increase.

It is presumed that the world is looking towards India's traditional foods and it turned to be the mandate of the Government of India to scale up the interventions for increasing the millets area and production, diversifying the processing machinery and technologies, expanding the private food processing ecosystem and thus to cater to the various segments in domestic and export markets. The following recommendations drawn from various challenges and solutions discussed in this paper will help you comprehend the task before us and the way forward for developing a strategic action plan for exercising India's leadership in replicating the domestic success in the International community.

Recommendations

I. Value Chain Development for Millets

- **Expansion of millets cultivation** across the country including in non-traditional areas and enhancing their yield levels with clear cut goals by leveraging ICAR network of millets coordinating centres and ICRISAT. This would happen when farmers get a higher share in the consumer rupee in the value addition process.

- **Scaling up the Value Chain on Millets** by replicating the pioneering efforts by ICAR institutes which have paved a pathway for reviving millets in the country through addressing backward integration related to supply chain, retrofitting processing machinery, diversification of processing technologies for bringing the convenience and increasing shelf-life, nutritional evaluation, awareness creation, commercialization for proving consumer acceptability, Entrepreneurship development, Involvement of private sector through niche markets, etc., for transforming the traditional crops grown for farmers' *"domestic consumption"* to an emerging role as "*commercial crop"*.
- **Resolving the critical gaps**, as there are many gaps still scaring the scaling up efforts for millets promotion in the country. Strengthening R&D for an advanced primary processing machinery, enhancing shelf-life from current levels, studying secondary processing techniques for impact on nutrition, and diversification into emerging food trends play a crucial role in competing with other fine cereals. The clinical studies on the efficacy of health benefits, and establishing the millets' role as prebiotic, immunity builders, gut microbiome, etc. with ICMR-NIN, ILBS, New Delhi, private medical institutes, etc. will strengthen the cause of defining the USP around nutrition and health benefits.
- **Involving various stakeholder**s such as R&D institutes, farmers, FPOs, private food processors, state and central government departments would aid in effectively capturing and aligning the efforts with the consumer preferences in terms of emerging food trends.
- ICAR-IIMR being pioneers in the development of the value chain on millets can bring all the stakeholders on board in delivering the outputs that are needed for envisioned millets promotion in the domestic market.

II. Policy-Specific Interventions

- **A paradigm shift in Government Policy** from food security to nutritional security is going to have a greater bearing on the future of millets. The Government of India's sub-missions for promoting millets and piloting of millets missions by some state governments would serve as scalable models. Speeding up of some major policy decisions and rolling out in an urgent manner such as procurement of millets, the announcement of MSP for small millets, public distribution and WCD programs, determining HSN codes for certain millets, determining grades and standards for small millets, export promotion, etc. NITI Aayog may coordinate the kick-start process with the involvement of state governments and would eliminate the roadblocks and pave way for millet promotion in the country
- **Convergence of various departments** such as NITI Aayog, APEDA, MHRD, MOFPI, MSME, etc., with DAC&FW and ICAR, can enlarge the mandate of millets promotion in the country, while connecting with other public institutions, premier institutions, private sector, NGO's, farmer groups, chefs, dieticians, doctors, nutritionists, startups, etc., would become a possibility.

III. Popularization and Strategic Awareness Creation

- **Leveraging the International Year Millets** for global level awareness creation and popularization by organizing various kinds of events till 2023 and in 2023 is very essential, as India is the largest producer of millets and also the prime beneficiary of millets promotion. It's important to get ready with calendar activities for organizing as a run-up for the International Year of Millets, 2023.

- **Building USP** around individual millets and also positioning 2–3 selected millets as *champion millets* by tying with a unique proposition such as milk for calcium, egg for protein, etc. for effective marketing in both domestic and export markets.
- **Taking millets closure to people** through various awareness creation programs such as advertising in print media, electronic media (TV Channels, Radio), social media, Indian Railway, Anganwadi, etc., should be exercised by the Government, as in the case of eggs and milk promotion.
- **Hosting the international and national conferences,** food festivals, trade fairs, etc., for creating dialogue on various policy, scientific, promotional and consumption aspects while acting as a platform for developing linkages would expand the millets reach among various communities.

IV. Building the Private Processing Industry

- **Accelerating the Incubation of Millet Startups** is an essential forward linkage for catering to various dynamic segments in domestic and global markets. Increasing the millets-specific incubation centres, in collaboration with state governments to be exercised with handholding support from ICAR-IIMR, CFTRI, IIFPT, etc.
- **Incentivizing the Processing and Export** of millet products for encouraging the big private companies such as ITC, Britannia, Marico, Kellogg's, MTR, etc., to aggressively adopt millets into their product portfolio.
- **Strengthening the Small and Medium Enterprises** would play a pivotal role in pushing the millet products in local markets, and supply to government programs.

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Annexures

ANNEXURE 01 - Table 1 Nutrient composition of Millets and Other Cereals

Source	Name of Food	Protein (g)	Fat (g)	Ash (g)	Crude Fibre (g)	Carbo-hydrates (g)	Energy (kcal)	Calcium (mg)	Iron (mg)	Thiamine (mg)	Ribo-flavin (mg)	Nia-cin (mg)
IFCT	Rice, Brown	9.16	1.24	1.04	4.43	74.8	353.7	10.93	1.02	0.27	0.06	3.4
IFCT	Wheat, Whole	10.59	1.47	1.42	11.23	64.72	321.9	39.36	3.97	0.46	0.15	2.68
IFCT	wheat, Flour	10.57	1.53	1.28	11.36	64.17	320.3	30.94	4.1	0.42	0.15	2.37
IFCT	Maize, Dry	8.8	3.77	1.17	12.24	64.77	334.1	8.91	2.49	0.33	0.09	2.69
IFCT	Sorghum (Jowar)	9.97	1.73	1.39	10.22	67.68	334.1	27.6	3.95	0.35	0.14	2.1
IFCT	Pearl millet (Bajra)	10.96	5.43	1.37	11.49	61.78	348.0	27.35	6.42	0.25	0.2	0.86
IFCT	Finger millet (Ragi)	7.16	1.92	2.04	11.18	66.82	320.7	364	4.62	0.37	0.17	1.34
NVIF	Foxtail millet (Italian Millet)	12.3	4.3	0	8	60.9	331.0	31	2.8	0.59	0.11	3.2
IFCT	Proso Millet (Varagu)	8.92	2.55	1.72	6.39	66.19	331.7	15.27	2.34	0.29	0.2	1.49
IFCT	Little millet (Samai)	10.13	3.89	1.34	7.72	65.55	346.3	16.06	1.26	0.26	0.05	1.29
NVIF	Barnyard Millet (Sanwa Millet)	6.2	2.2	0	9.8	65.5	307.0	20	5	0.33	0.1	4.2
NVIF	Pannivaragu	12.5	1.1	0	2.2	70.4	341.0	14	0.8	0.2	0.18	2.3

*NRC, US	*Kodo millet	9.8	3.6	3.3	5.2	66.6	353	35	1.7	0.15	0.09	2.0

Courtesy: IFCT, 2017;NVIF, 2004 and *NRC, 1982.

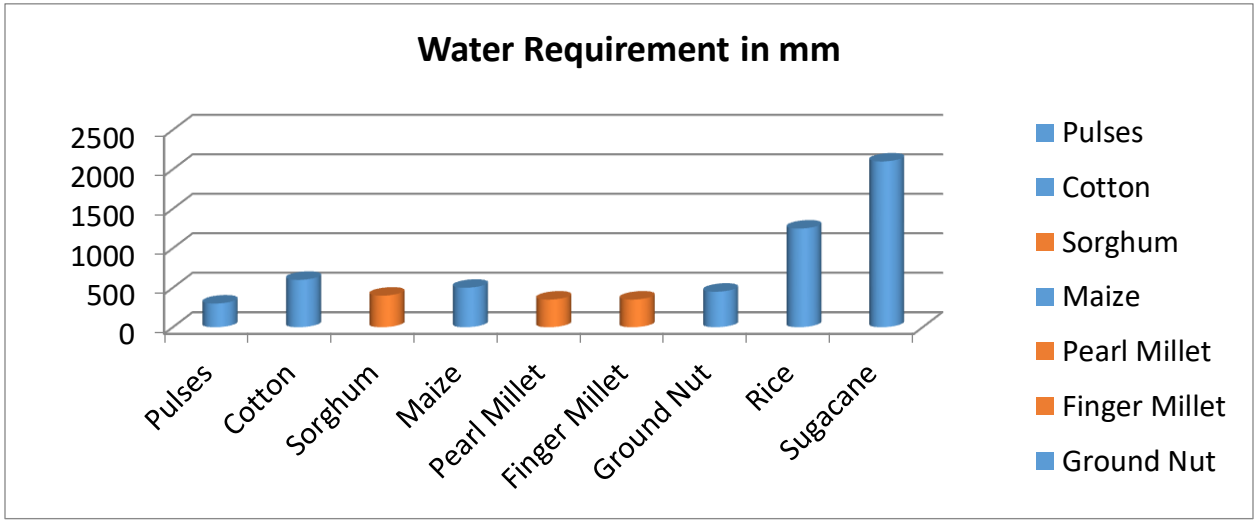
Table 2 Mineral composition of Millets and Other Cereals

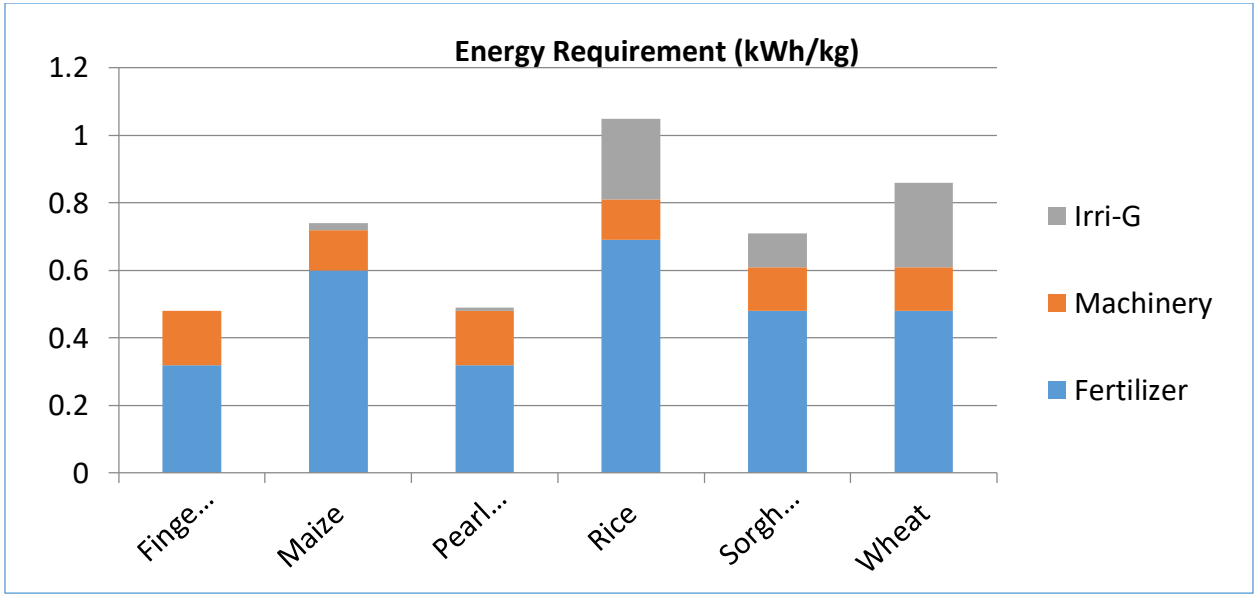
Source	Name of Food	Phospho-rous (mg)	Magne-sium (mg)	Calcium (mg)	Iron (mg)	Zinc (mg)	Copper (mg)	Manganese (mg)	Molybdenum (mg)	Chromium (mg)
IFCT	Rice, Brown	267	93.91	10.93	1.02	1.68	0.37	1.7	0.053	0.005
IFCT	Wheat, Whole	315	125	39.36	3.97	2.85	0.49	3.19	0.07	0.006
IFCT	wheat, Flour	315	125	30.94	4.1	2.85	0.48	2.98	0.02	0.006
IFCT	Maize, Dry	279	145	8.91	2.49	2.27	0.45	0.71	0.03	0.01
IFCT	Sorghum(Jowar)	274	133	27.6	3.95	1.96	0.45	1.19	0.04	0.01
IFCT	Pearl millet (Bajra)	289	124	27.35	6.42	2.76	0.54	1.12	0.05	0.02
IFCT	Finger millet (Ragi)	210	146	364	4.62	2.53	0.67	3.19	0.01	0.03
NVIF	Foxtail millet (Italian Millet)	290	81	31	2.8	2.4	1.4	0.6	0.07	0.03
IFCT	Common Millet (Varagu)	101	122	15.27	2.34	1.65	0.26	0.33	0.02	0.02
IFCT	Little millet (Samai)	130	91.41	16.06	1.26	1.82	0.34	0.23	0.02	0.01
NVIF	Barnyard Millet	280	82	20	5	3	0.6	0.96	0	0.09

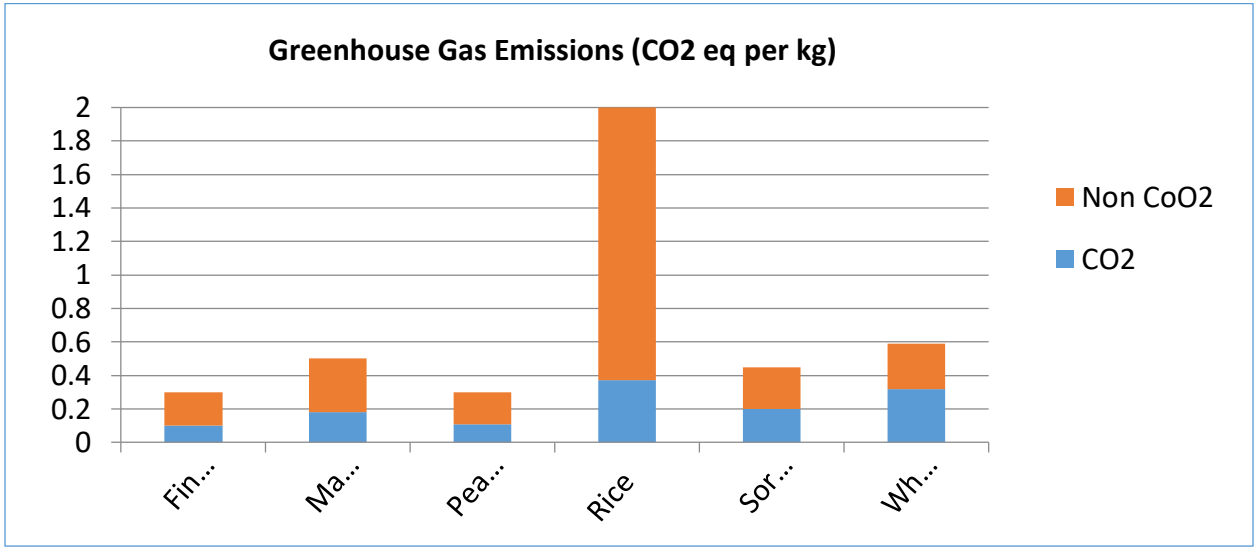
	(Sanwa Millet)									
NVIF	Pannivaragu	206	153	14	0.8	2.4	1.6	0.6	0.07	0.03
**Sankara Rao	**Kodo millet	161	82	20	0.5	0.7	1.6	1.1	-	0.02

Courtesy: IFCT, 2017;NVIF, 2004; Rao and Deosthale, 1980; Rao and Deosthale, 1983 and Rao and Deosthale (unpublished data)

ANNEXURE 02




Energy Requirement (kWh/kg)
1.2
1
0.8
0.6
0.4
0.2
0
Finge...
Maize
Pearl...
Rice
Sorgh...
Wheat
Irri-G
Machinery
Fertilizer


Greenhouse Gas Emissions (CO2 eq per kg)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Fin...
Ma...
Pea...
Rice
Sor...
Wh...
Non CoO2
CO2

ANNEXURE 03 - Area harvested, Production and Yield of millets in the world (2016)

Sl. No	Millet crop	Area (000 ha)	Production (000 tonnes)	Yield (kg/ha)	Per cent contribution to total millets production	No. of major production countries
1	Barnyard millet	146.3	151.2	1034	0.16	2
2	Finger millet	2106.3	3417.7	1623	3.62	9
3	Foxtail millet	1057	2290	2166	2.42	3
4	Kodo millet	200	84.2	419	0.09	1
5	Little millet	255.5	119.9	469	0.13	1
6	Pearl millet	27161	23092	850	24.43	40
7	Proso millet	944.1	1449.5	1535	1.53	36
8	Sorghum	44771	63931	1428	67.63	91
	Total millets	**76185.7**	**94331.4**	**1238**	**100**	**131**

Source: IIMR Estimates Based on FAO Data

ANNEXURE 04 – Trends in global millets area, production and yield

Year	Sorghum			Other Millets		
	Area harvested (ha)	Production (tonnes)	Yield (kg/ha)	Area harvested (ha)	Production (tonnes)	Yield (kg/ha)
2010	42165485	60181382	1427.3	36009885	32799461	910.8
2011	42204230	56808009	1346	33970117	27052401	796.4
2012	39257797	57321036	1460.1	31259615	26638358	852.2
2013	43901003	61894990	1409.9	31231919	26427459	846.2
2014	44643058	68277810	1529.4	32214021	28417591	882.1
2015	42064949	66002575	1569.1	29579078	28209639	953.7

2016	46131027	63660983	1380	31645267	27705316	875.5
2017	41563622	57727910	1388.9	31508009	28369607	900.4
2018	42143146	59342103	1408.1	33560087	31019370	924.3

Source: FAO Data

ANNEXURE 05 – Area, Production and Yield of Millet Crops in India from 2010–11 to 2018–19

Year	Sorghum			Bajra			Ragi			Small millets			Total millets		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
2010-11	7381.73	7003.15	948.71	9612.34	10369.90	1078.81	1286.19	2193.45	1705.38	774.93	269.69	554.84	19055.19	19836.19	1040.99
2011-12	6245.08	6006.47	961.79	8776.70	10276.00	1170.83	1175.78	1929.24	1640.81	798.78	300.80	565.28	16996.34	18512.51	1089.21
2012-13	6214.36	5281.48	849.88	7297.42	8741.98	1197.96	1131.00	1574.40	1392.04	753.39	270.68	577.72	15396.17	15868.55	1030.68
2013-14	5793.44	5541.81	956.57	7810.72	9250.09	1184.28	1193.60	1982.90	1661.28	686.86	289.94	630.09	15484.61	17064.73	1102.04
2014-15	6161.39	5445.30	883.78	7317.95	9184.22	1255.03	1208.10	2060.90	1705.90	596.56	235.81	654.47	15284.00	16926.23	1107.45
2015-16	6077.03	4238.02	697.38	7128.61	8066.63	1131.59	1138.20	1821.90	1600.69	655.58	259.65	601.48	14999.42	14386.20	959.12
2016-17	5624.42	4567.90	812.15	7458.50	9729.84	1304.53	1016.10	1385.10	1363.15	619.11	441.94	713.84	14718.13	16124.79	1095.57
2017-18	5024.45	4803.38	956.00	7480.60	9208.85	1231.03	1194.29	1985.24	1662.27	546.27	438.99	803.60	14245.61	16436.45	1153.79
2018-19	4093.27	3475.41	849.05	7105.03	8664.13	1219.44	890.94	1238.70	1390.34	453.75	333.00	733.88	12542.99	13711.24	1048.1775
CAGR	-5.13	-6.50	-1.44	-2.85	-1.60	1.28	-2.77	-4.15	-1.42	-6.01	4.86	4.34	-3.80	-3.23	0.31

Source: Directorate of Economics and Statistics, GOI, Area in '000 Ha, Production in '000 Tonnes and Yield in Kg. / Ha

ANNEXURE 06 – **State-wise Area, Production and Productivity of Millets in India (2018–19)**

States	Sorghum			Bajra			Ragi			Small millets			Total Millets		
	Area (,000 hectares)	Production (,000 tonnes)	Yield (kg/ha)	Area (,000 hectares)	Production (,000 tonnes)	Yield (kg/ha)	Area (,000 hectares)	Production (,000 tonnes)	Yield (kg/ha)	Area (,000 hectares)	Production (,000 tonnes)	Yield (kg/ha)	Area (,000 hectares)	Production (,000 tonnes)	Yield (kg/ha)
Andhra Pradesh	156.00	230.09	1474.92	22.00	22.68	1031.00	32.00	43.14	1348.00	13.00	6.00	461.54	223.00	301.91	1078.87
Assam										5.21	3.06	587.00	5.21	3.06	587.00
Bihar	0.72	0.76	1066.00	3.11	3.53	1134.00	2.88	3.09	1071.00	9.32	7.00	751.00	16.03	14.37	1005.50
Gujarat	75.50	96.47	1277.70	391.58	892.80	2280.00	11.99	9.64	804.00	1.30	1.24	955.00	480.37	1000.15	1329.17
Haryana	40.30	21.28	528.00	424.70	878.28	2068.00							465.00	899.56	1298.00
Himachal Pradesh							1.72	1.82	1060.00	5.01	4.06	810.00	6.73	5.88	935.00
Jammu & Kashmir				24.36	13.59	558.00				4.99	1.70	341.00	29.34	15.29	449.50
Karnataka	943.35	891.69	945.23	184.30	176.38	957.00	527.25	677.52	1285.00	18.81	16.59	882.00	1673.71	1762.17	1017.31
Kerala							0.22	0.27	1208.00	0.05	0.03	726.00	0.27	0.31	967.00
Madhya Pradesh	75.00	164.18	2189.00	327.00	628.17	1921.00	0.00	0.00	909.09	89.00	59.00	662.92	491.00	851.34	1420.50
Maharashtra	1631.60	872.48	534.74	609.60	332.23	545.00	80.30	93.48	1164.10	46.60	21.12	453.30	2368.10	1319.31	674.29
Meghalaya										2.90	2.74	945.00	2.90	2.74	945.00
Orissa	7.19	4.56	634.00	2.16	1.34	622.00	36.66	25.30	690.00	32.78	16.98	518.00	78.79	48.18	616.00
Punjab				1.10	0.72	651.00							1.10	0.72	651.00

Rajasthan	564.39	469.57	832.00	4180.20	3808.16	911.00				10.42	10.60	1018.00	4755.01	4288.34	920.33
Tamil Nadu	385.85	464.48	1203.80	46.88	118.00	2517.00	78.60	256.00	3257.00	22.25	34.99	1572.58	533.58	873.47	2137.60
Uttar Pradesh	147.00	183.31	1247.00	877.00	1779.43	2029.00	92.00	109.85	1194.00	6.00	4.53	755.00	1122.00	2077.12	1306.25
West Bengal				0.07	0.03	402.00	3.27	2.93	895.00	5.42	4.61	850.00	8.77	7.57	715.67
Delhi	3.16	3.04	961.00	1.48	3.25	2198.00							4.64	6.29	1579.50
All India	4093.27	3475.41	849.05	7105.03	8664.13	1219.44	890.94	1238.70	1390.34	453.75	333.00	733.88	12542.99	13711.24	1048.18

ANNEXURE 07 – Cost Components and Returns of Jowar in Major Jowar-producing States (2017–18)

Particulars	**Value (Rs/ha)**					
	Andhra Pradesh	**Karnataka**	**Madhya Pradesh**	**Maharashtra**	**Rajasthan**	**Tamil Nadu**
I. Operational Cost						
Human Labour	21736.62	10738.74	13726.61	17720.27	18351.93	23507.50
Animal Labour	3053.72	3463.32	0.00	3853.39	360.22	0.00
Machine labour	5333.31	4601.53	6789.37	6263.77	4580.65	5499.11
Seed	856.78	518.00	1457.29	476.53	968.57	3188.69
Fertilizers and Manure	6085.76	1938.03	5343.92	3528.98	1305.21	4657.95
Insecticides	2338.30	27.84	0.00	11.53	0.00	45.20
Irrigation charges	269.43	144.88	250.25	2828.39	302.58	417.68
Miscellaneous	64.20	81.08	20.85	30.84	29.23	43.64
Interest on working capital	895.88	521.85	582.97	847.22	361.85	734.96
Total Operational cost	40634.00	22035.27	28266.20	35761.77	26260.24	38094.73
II. Fixed cost	17429.40	8676.33	9264.52	14480.70	6446.82	12993.37
III. Total cost of cultivation (I+II)	58063.38	30711.60	37530.72	50242.47	32707.06	51088.10
IV. Yields (Qtl/ha)	25.83	10.84	18.72	11.26	6.20	8.18
V. Gross returns (Rs/ha)	49676.82	30636.87	29469.09	40090.67	28614.42	36370.67
Net return over operational cost	9042.82	8601.60	1202.89	4328.90	2354.18	-1724.06

Net return (Rs/ha)	-8386.56	-74.73	-8061.63	-10151.80	-4092.64	-14717.43
B:C ratio (over operational cost)	1.2	1.4	1.0	1.1	1.1	1.0

Source: Directorate of Economics and Statistics, GOI,

ANNEXURE 08 – Cost Components and Returns of Bajra in Major Bajra-producing States (2017–18)

Particulars	**Value (Rs/ha)**				
	Gujarat	**Haryana**	**Maharashtra**	**Rajasthan**	**Uttar Pradesh**
I. Operational Cost					
Human Labour	17477.57	13846.82	16445.36	17355.34	12819.18
Animal Labour	1015.70	5.00	2240.36	113.13	22.39
Machine labour	5270.91	6692.75	10476.54	3884.42	5429.87
Seed	2108.40	816.66	1058.86	954.40	1069.45
Fertilizers and Manure	3506.41	2103.61	1878.39	820.56	959.57
Insecticides	123.52	131.25	0.00	0.00	100.08
Irrigation charges	4324.22	746.79	1236.05	332.47	977.69
Miscellaneous	0.00	0.00	29.68	8.21	0.00
Interest on working capital	807.51	482.95	897.15	281.86	449.83
Total Operational cost	35109.62	24973.84	34787.53	23750.39	22045.62
II.Fixed cost	12473.03	15702.25	13698.67	5418.72	12418.18
III.Total cost of cultivation (I+II)	47582.65	40676.09	48486.20	29169.11	34463.80
IV. Yields (Qtl/ha)	26.11	19.48	21.41	10.24	21.56
V. Gross returns (Rs/ha)	52689.64	30036.67	41597.95	24400.33	29149.13

Net return over operational cost	17580.02	5062.83	6810.42	649.94	7103.51
Net return (Rs/ha)	5106.99	-10639.42	-6888.25	-4768.78	-5314.67
B:C ratio (over operational cost)	1.5	1.2	1.2	1.0	1.3

Source: Directorate of Economics and Statistics, GOI

ANNEXURE 09 – Components of Costs and Returns of Ragi (2017–18)

Particulars	**Value (Rs/ha)**				
	Karnataka	**Maharashtra**	**Odisha**	**Tamil Nadu**	**Uttarakhand**
I. Operational Cost					
Human Labour	25850.57	29566.25	12299.32	24822.34	27059.51
Animal Labour	5929.94	9609.41	2228.03	0.00	9448.15
Machine labour	8150.78	2735.91	2046.71	7647.97	0.00
Seed	801.90	217.65	233.72	1284.95	774.14
Fertilizers and Manure	5393.81	10733.87	2370.99	7937.03	21.95
Insecticides	0.00	0.00	0.00	596.78	0.00
Irrigation charges	619.55	97.93	0.00	830.39	0.00
Miscellaneous	124.91	4370.29	10.70	39.20	0.00
Interest on working capital	1189.02	1282.96	316.94	1123.93	354.05
Total Operational cost	48060.48	58614.27	19506.41	44282.59	37657.80
II.Fixed cost	12138.25	11901.88	6009.12	14031.50	9992.29
III.Total cost of cultivation (I+II)	60198.73	70516.15	25515.53	58314.09	47650.09

IV. Yields (Qtl/ha)	17.48	16.69	6.71	10.65	10.54
V. Gross returns (Rs/ha)	47470.12	45410.15	12936.11	35532.84	34698.91
Net return over operational cost	-590.36	-13204.12	-6570.30	-8749.75	-2958.89
Net return (Rs/ha)	-12728.61	-25106.00	-12579.42	-22781.25	-12951.18
B:C ratio (over operational cost)	1.0	0.8	0.7	0.8	0.9

Source: Directorate of Economics and Statistics, GOI

ANNEXURE 10Monthly per capita quantity and value of consumption and incidence of consumption all-India

	Rural								Urban							
	Jowar		Bajra		Ragi		Small Millets		Jowar		Bajra		Ragi		Small Millets	
State	quantity per 30 days (kg)	value (Rs)	quantity per 30 days (kg)	value (Rs)	quantity per 30 days (kg)	value (Rs)	quantity per 30 days (kg)	value (Rs)	quantity per 30 days (kg)	value (Rs)	quantity per 30 days (kg)	valu e (Rs)	quantity per 30 days (kg)	value (Rs)	quantity per 30 days (kg)	value (Rs)
1977-78	1.74	1.93	0.75	0.89	0.5	0.57	0.21	0.23	0.75	0.93	0.23	0.31	0.15	0.18	0.02	0.04
1986-87	1.02	1.89	0.53	1.07	0.33	0.6	0.06	0.11	0.46	1.03	0.17	0.36	0.09	0.18	0	0.01
1987-88	1.20	2.20	0.50	1.10					0.60	1.20	0.10	0.40				
1991	0.80	2.70	0.50	1.80					0.30	1.30	0.10	0.30				
1992	0.80	3.20	0.50	1.80					0.30	1.60	0.10	0.70				
1993	0.80	2.50	0.50	1.50					0.40	1.60	0.10	0.50				
1993-94	0.84	2.50	0.48	1.70	0.24	0.76	0.02	0.08	0.39	1.50	0.13	0.50	0.09	0.30	0.00	0.01
1994-95	0.70	2.51	0.40	1.72					0.40	1.45	0.20	0.80				
1995-96	0.70	3.50	0.50	2.10					0.30	2.00	0.10	0.50				
1997	0.67	3.40	3.35	2.20					0.30	1.60	0.10	0.70				
1999-00	0.50	3.56	0.38	2.56	0.15	0.90	0.01	0.08	0.22	1.89	0.09	0.70	0.07	0.45	0.00	0.01
2000-01	0.39	2.27	0.33	1.98	0.15	0.84	0.02	0.09	0.26	1.90	0.11	0.70	0.06	0.40	0.00	0.02
2001-02	0.44	2.62	0.36	1.80	0.14	0.72	0.02	0.11	0.31	2.31	0.13	0.83	0.08	0.44	0.00	0.02
2002	0.43	2.78	0.35	2.20	0.14	0.69	0.02	0.10	0.28	2.10	0.12	0.85	0.07	0.42	0.00	0.01
2003	0.44	2.74	0.37	2.17	0.15	0.88	0.01	0.11	0.24	1.82	0.12	0.80	0.09	0.59	0.00	0.03
2004	0.47	3.11	0.45	2.57	0.14	0.84	0.02	0.13	0.27	2.13	0.13	0.85	0.05	0.36	0.00	0.05
2005-06	0.33	2.36	0.31	2.17	0.13	0.72	0.01	0.07	0.22	1.95	0.11	0.88	0.07	0.50	0.00	0.03
2006-07	0.42	0.33	0.35	2.71	0.11	0.70	0.02	0.18	0.21	2.05	0.10	0.90	0.06	0.50	0.00	0.02

2007-08	0.37	3.75	0.39	3.07	0.10	0.69	0.01	0.07	0.22	2.71	0.11	0.98	0.06	0.54	0.00	0.04
2009-10	0.29	3.42	0.26	2.64	0.09	0.97	0.01	0.08	0.18	2.47	0.09	1.11	0.07	0.92	0.00	0.05
2011-12	0.20	4.46	0.24	2.56	0.08	0.93	0.01	0.11	0.13	3.44	0.08	1.12	0.06	0.88	0.00	0.05

ANNEXURE 11 – Hybrids and Varieties Developed in Millets

Particulars	Grain Sorghum	Pearl millet	Finger millet	Small millets*
Area under the crop (000 ha, 2019–20)	4480	6770	970	460
Production of the crop (000 ton, 2019–20)	4730	10280	1740	40
Grain yield (kg/ha)	978	1265	1662	804
No. of national hybrids developed	52	175	Hybrids not available	Hybrids not available
No. of national varieties developed	113	62	72	125
No. of hybrids developed during last 10 years	12 (6 from the private sector)	73 (48 from the private sector)	Hybrids not available	Hybrids not available
No. of varieties developed during last 10 years	27	8	28	31

* Consisting of little millet, foxtail millet, barnyard millet, proso millet and kodo millet

ANNEXURE 12 – List of Value Added Products Developed by Various R&D Institutes

Sl. No	Institute Name	Location	Main Millet Ingredient	Product Name	Category (RTE/RTC/Others)*	Special Features	Shelf-Life of Product (Months)
1	ICAR-Central Institute of Agricultural Engineering	Bhopal	NA	Multi-nutrient biscuits	RTE	Free from refined wheat flour. Rich in proteins valuable for combating protein deficiency. Rich in fibre, minerals, anti-oxidants, phenolics and flavonoids sourced from natural food materials. No artificial flavouring or added preservatives. Ideal for consumption as any-time snack	4
2	ICAR-Central Institute of Agricultural Engineering	Bhopal	NA	CIAE Nutri bar	RTE	High in energy and proteins. Good source of minerals, phenolics and antioxidants. Easy to store and consume. High satiety value. Healthy substitute to sweet and savoury snacks. No artificial/synthetic/chemical based binders	6
3	ICAR-Central Institute of Agricultural Engineering	Bhopal	NA	Multi-grain porridge mix	RTC	The product is crafted from premium quality natural ingredients like cereals, millets, pulses, oilseeds, dairy ingredient, protein isolates and fruit. Rich in protein, minerals and vitamins, this product is free from artificial colours, flavours or preservatives. The porridge mix is ready instant and needs addition of hot water.	6
4	ICAR-Central Institute of Agricultural Engineering	Bhopal	NA	Gluten-free eggless cake	RTE	Egg-less, Gluten-free. Good source of protein, minerals, phenolics and antioxidants. Healthy substitute to commercially available cake. No artificial/synthetic preservatives	10 days
5	ICAR-Central Institute of Agricultural Engineering	Bhopal	Kodo Millet	Kodo halwa mix	RTC	• Better availability of nutrients • Better taste – low tannin content • Vitamin-B and antioxidants rich • Gluten-free • Rich in minerals • No artificial flavouring or added preservatives • Adequate shelf-life (more than 6 months)	6

6	ICAR-Central Institute of Agricultural Engineering	Bhopal	Kodo Millet	Kodo kheer mix	RTC	• Better availability of nutrients • Better taste – low tannin content • Vitamin-B and antioxidants rich • Gluten-free • Rich in minerals • No artificial flavouring or added preservatives • Adequate shelf-life (more than 6 months)	6
7	ICAR-Central Institute of Agricultural Engineering	Bhopal	Sorghum	Sorghum upma mix	RTC	• Higher bio-accessible nutrients • Better palatability • Lower tannin and phytic acid • Gluten free • Lower glycaemic index • Rich in fibre, minerals and vitamins • No artificial flavouring or added preservatives • Adequate shelf-life (3 months) • Diabetic and cardiovascular friendly product	3
8	ICAR-Central Institute of Agricultural Engineering	Bhopal	Sorghum	Masala sorghum	RTC	• Higher bio-accessible nutrients • Better palatability • Gluten-free • Lower glycaemic index • Rich in fibre, minerals and vitamins • Lower tannin and phytic acid • No artificial flavouring or added preservatives • Adequate shelf-life (3 months)	3

9	ICAR-Central Institute of Agricultural Engineering	Bhopal	Sorghum	Fermented sorghum flour	Other	• Higher vitamin B • Higher bio-accessible nutrients (Amino acid) • Lower glycaemic index • Improved taste • Lower tannins and other phytic acid • Higher shelf-life (1½ months) • Rich in fibre, minerals and vitamins • Gluten-free • No artificial flavouring or added preservatives	1.5
10	ICAR-Central Institute of Agricultural Engineering	Bhopal	Pearl Millet	Fermented pearl millet flour	Other	• Higher vitamin B • Higher bio-accessible nutrients (Amino acid) • Lower glycaemic index • Improved taste • Lower tannins and other phytic acid • Higher shelf-life (21 days) • Rich in fibre, minerals and vitamins • Gluten-free • No artificial flavouring or added preservatives	0.75
11	ICAR-Central Arid Zone Research Institute	Jodhpur	Pearl Millet	Pearl millet health cookies (Sweet)	RTE	• Gluten-free food • Low glycaemic index • High in fibre • Nutraceutical rich cookies High in iron, calcium, phosphorus	1.00
12	ICAR-Central Arid Zone Research Institute	Jodhpur	Pearl Millet	Pearl millet health cookies	RTE	• Gluten-free food • Low glycaemic index • High in fibre • Nutraceutical rich cookies • High in iron, calcium, phosphorus	1.00

13	ICAR-Central Arid Zone Research Institute	Jodhpur	Pearl Millet	Pearl millet flakes	RTC	• Gluten-free food • Omega-3, omega-6, omega-9 fatty acid abundance • More dietary fibre • Less sugars • Low glycaemic index • Suitable for secondary processing • Very Low cooking time (5–7 min) • High in iron, calcium, phosphorus	6.00
14	ICAR-Central Arid Zone Research Institute	Jodhpur	Pearl Millet	Pearl millet Chocolates	RTE	• Nutraceutical rich chocolate with unique taste • Ready to eat, high in energy and protein • Contains benefits of pearl millet and cocoa • Pearl millet is gluten free, immune- boosting, detoxifying, anticarcinogenic and cognition enhancing ingredients • ω- 6 fatty acid, ω- 9 fatty acid, PUFA and MUFA	6.00
15	ICAR- Directorate of Mushroom Research	Solan	NA	Mushroom -millet Cookies	RTE	Rich in Vitamin D, proteins, fibre and minerals	6.00
16	ICAR- Directorate of Mushroom Research	Solan	NA	Mushroom -millet Nutribar	RTE	Rich in protein, Calcium and Vitamin D	3.00
17	ICAR- Directorate of Mushroom Research	Solan	NA	Mushroom millet multigrain Bread	RTE	Rich in Vitamin D, protein and minerals	5 days
18	ICAR- Directorate of Mushroom Research	Solan	NA	Mushroom -millet Pasta	RTC	Rich in Vitamin D, protein and fibre	-
19	ICAR- Directorate of Mushroom Research	Solan	NA	Mushroom millet Vermicelli	RTC	Rich in Vitamin D, protein and fibre	-
20	ICAR – National Research Centre on Meat	Hyderabad	Finger Millet	Chicken Patties (formulated with Ragi flour)	RTE	Chicken patties formulated with Ragi flour (up to 5% level) forms good source of dietary fiber and minerals (Calcium) and also had acceptable sensory scores.	21 days

21	ICAR – National Research Centre on Meat	Hyderabad	Sorghum	Chicken nuggets extended with sorghum flour	RTE	Good source of dietary fibre and suitable for gluten allergy susceptible populations	21 days
22	ICAR – National Research Centre on Meat	Hyderabad	Sorghum	Chicken slices extended with sorghum flour	RTE	Chicken slices made with sorghum flour had better overall acceptability score (good to very good)	21 days
23	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	All Millets	Grain puffing machine (for millets & Rice)	Machinery	Capacity: 7 kg/hr Easily transportable Compact in design	NA
24	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet idly / dosa dry mix	RTC	Convenient food, high in fibre, protein, energy and minerals	6
25	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet ice-cream	RTE	Non-dairy, lactose free	6
26	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	All Millets	Multi-millet thresher	Machinery	Suitable for multi-millet grains Electrical cum PTO operator	NA
27	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Shelf-life enhancement in millets	Other	Modified atmosphere packaging of millets (Hermetic storage)	6
28	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Gluten free Millet Bar	RTE	Millet starch annealed using dual technique to produce Resistance Starch – Gluten-free	3
29	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Decorticator for Millets (Foxtail Millet)	Machinery	Double stage decortication with cleaning and grading	NA

30	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet flakes	RTC	High WAC, high in minerals with functional properties	6
31	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet edible film	RTC	Low GI, high antioxidants and good functional properties	6
32	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet starch	Ingredient	High in water solubility, emulsion stability, viscosity with intermediate amylose	6
33	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet nutria-bar	RTC	Convenient food, high in fibre, energy and minerals	3
34	Indian Institute of Food Processing Technology (IIFPT)	Thanjavur	NA	Millet milk powder	RTC	Higher protein, energy with a significant amount of amino acids	3
35	CCS HAU	Hisar	Pearl Millet	Pearl Millet Shelf Stable Flour	RTC	Good source of protein and energy	3
36	CCS HAU	Hisar	Pearl Millet	Pearl Millet Grits	RTC	Good source of protein and energy	3
37	CCS HAU	Hisar	NA	Cakes	RTE	High energy	3 days
38	CCS HAU	Hisar	NA	Biscuits/Melting moments	RTE	High energy, high protein	3
39	CCS HAU	Hisar	NA	Breads	RTE	Good source of fibre	3 days
40	CCS HAU	Hisar	NA	Buns	RTE	Good source of fibre	3 days

41	CCS HAU	Hisar	NA	Kulcha	RTE	Good source of fibre	3 days
42	CCS HAU	Hisar	NA	Ladoo	RTE	Traditional Products – Good source of protein, energy, dietary fibre	3
43	CCS HAU	Hisar	NA	Sev	RTE	Traditional Products – Good source of protein, energy, dietary fibre	3
44	CCS HAU	Hisar	NA	Matar	RTE	Traditional Products – Good source of protein, energy, dietary fibre	3
45	CCS HAU	Hisar	NA	Shakarpara	RTE	Traditional Products – Good source of protein, energy, dietary fibre	3
46	CCS HAU	Hisar	NA	Suhali	RTE	Traditional Products – Good source of protein, energy, dietary fibre	3
47	CCS HAU	Hisar	NA	Mathri	RTE	Traditional Products – Good source of protein, energy, dietary fibre	3
48	CCS HAU	Hisar	NA	Idli	RTE	Traditional Products – Good source of protein and energy	1 day
49	CCS HAU	Hisar	NA	Dhokla	RTE	Traditional Products – Good source of protein and energy	1 day
50	CCS HAU	Hisar	NA	Noodles	RTC	Easy to make and nutritious	3

51	CCS HAU	Hisar	NA	Vermicelli	RTC	Easy to make and nutritious	3
52	CCS HAU	Hisar	NA	Pasta	RTC	Easy to make and nutritious	3
53	CCS HAU	Hisar	NA	Crispies	RTE	Nutritious	3
54	CCS HAU	Hisar	NA	Puffs	RTE	Nutritious	3
55	CCS HAU	Hisar	NA	Halwa mix	RTC	Easy to make, Good source of protein and energy	3
56	CCS HAU	Hisar	NA	Ladoo mix	RTC	Easy to make, Good source of protein and energy	3
57	CCS HAU	Hisar	NA	Dhokla mix	RTC	Easy to make, Good source of protein and energy	3
58	CCS HAU	Hisar	NA	Idli mix	RTC	Easy to make, Good source of protein and energy	3
59	CCS HAU	Hisar	NA	Upma mix	RTC	Easy to make, Good source of protein and energy	3
60	CCS HAU	Hisar	NA	Kheer mix	RTC	Easy to make, Good source of protein and energy	3

61	CCS HAU	Hisar	NA	Khichri mix	RTC	Easy to make, Good source of protein and energy	3
62	CCS HAU	Hisar	NA	Popped mixtures	RTE	Nutritious	3
63	CCS HAU	Hisar	NA	Biscuits	RTE	Gluten-free Products – Suitable for wheat allergy patients	3
64	CCS HAU	Hisar	NA	Burfi	RTE	Gluten-free Products – Suitable for wheat allergy patients	1
65	CCS HAU	Hisar	Sorghum	Instant Sorghum Porridge	RTC	Sorghum	3
66	CCS HAU	Hisar	Sorghum	Fermented Instant Sorghum Porridge (FISP)	RTC	Fermented sorghum & green gram along with pineapple powder	3
67	CCS HAU	Hisar	Sorghum	Germinated Instant Sorghum Porridge (GISP)	RTC	Germinated sorghum & green gram along with pineapple powder	3
68	Main Agricultural Research Station, UAS, Dharwad	Dharwad	NA	DHFt-109-3 parboiled rice	RTC	Increase nutrient (minerals) and Dehulling efficiency	6
69	University of Agricultural Sciences	Dharwad	Sorghum	Red sorghum snack bar	RTE	Gluten free, high in protein (17.5) and energy (450)	6
70	University of Agricultural Sciences	Dharwad	Sorghum	Low GI Red sorghum snack bar	RTE	Gluten free, high in dietary fibre (29.13), protein (14.66) and energy (447)	6

71	University of Agricultural Sciences	Dharwad	Sorghum	Red sorghum cookies	RTE	Gluten-free, rich in protein (6.20), energy (477), Fat (21.38) and antioxidants	1
72	University of Agricultural Sciences	Dharwad	Sorghum	Red sorghum upma Mix	RTC	Gluten-free, high in protein (9.55) and energy (144), minerals (4.78).	2
73	University of Agricultural Sciences	Dharwad	Sorghum	Iron rich red sorghum snack bar	RTE	Gluten-free, rich in iron (11.86), protein (17.93) and energy (440)	6
74	University of Agricultural Sciences	Dharwad	Sorghum	Red sorghum snack bar (strawberry / pineapple flavored)	RTE	Gluten-free, rich in energy, protein (17.5) and minerals (1.82)	6
75	University of Agricultural Sciences	Dharwad	Sorghum	Seasoned pop sorghum	RTE	Gluten-free, easily digestible, rich in protein (12.45) and crude fibre (1.5)	1
76	University of Agricultural Sciences	Dharwad	Sorghum	Methi flavoured pop sorghum	RTE	Gluten-free, easily digestible, rich in protein (10.98), fibre (2.19) and minerals (0.93)	1
77	University of Agricultural Sciences	Dharwad	Sorghum	Popped sorghum breakfast cereal	RTE	Gluten-free, easily digestible, rich in protein (10.6) and dietary fibre (10.3)	1
78	University of Agricultural Sciences	Dharwad	Sorghum	Sorghum based supplementary sports food	RTC	Gluten-free, easily digestible, high protein-energy ratio (20.44), protein (12.81) and suitable for athletes	3
79	University of Agricultural Sciences	Dharwad	Sorghum	Pop sorghum health mix	RTC	Gluten-free, easily digestible, rich in iron, protein (16.71), poly phenols (40.25) and antioxidant activity (76.09%)	6

80	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet noodles	RTC	Rich in protein (8.49), energy (346), dietary fibre (7.23), and calcium (284). IVPD (66.96%), Rich in bone forming minerals with optimum Ca:P ratio, with better bioavailability of minerals	1 year
81	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet dosa	Recipe	Rich in calcium (178.80)	Fresh
82	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet thalipattu	Recipe	Rich in calcium (188.20)	Fresh
83	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet shankarpol e	Recipe	Rich in energy (734), calcium (126.30) and good source of protein (6.13)	Fresh
84	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet halwa	Recipe	Rich in energy (364), calcium (259.80) and good source of protein (5.18)	Fresh
85	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet and foxtail millet based symbiotic drink	Beverage	Rich in probiotics and good source of calcium (36.35)	4 days
86	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet cookies (butter, coconut, chilli, groundnut)	RTE	Rich in calcium (172) and poly-phenols	1
87	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet hurihittu	RTC	Rich in energy (328), protein (7.30) and calcium (344)	Fresh
88	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet lavang chur -spicy	RTE	Rich in energy (470), protein (25.12), calcium (232.31) and iron (14.05)	1

89	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet lavang chur-sweet	RTE	Rich in energy (472), protein (23.98), calcium (217) and iron (13.67)	1
90	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet burfi	RTE	Rich in energy (341), protein (24.24), calcium (251.48) and iron (7.31)	1
91	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet Cookies	RTE	Rich in energy (481), protein (13.74), calcium (208.43) and iron (10.94)	1
92	University of Agricultural Sciences	Dharwad	Finger Millet	Finger millet vermicelli	RTC	Rich in calcium (258.37) and product is useful for obese, hyper cholesterolemic, diabetic subjects and constipation problems	Storage in progress
93	University of Agricultural Sciences	Dharwad	Foxtail Millet	Extruded snack (Foxtail millet, peas and finger millet)	RTE	Rich in protein (15.72), fibre (102), carbohydrate (75) and has good expansion ratio of 3.63	3
94	University of Agricultural Sciences	Dharwad	Multi-grain	Millet based Composite Mix (Little millet, Foxtail millet & finger millet)	RTC	Rich in protein (13.74), energy (388) and good source of crude fibre (3.57)	6
95	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet pasta	RTC	Rich in iron (5.36) with 70% bio-accessibility	-
96	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet flakes	RTC	Rich in dietary fibre (13.40), iron (48.13) and zinc (2.85) Beneficial in diabetics, obesity and hypercholesterolemic patients	3
97	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet health mix	RTC	High in protein (11.99), dietary fibre (37.00), β-carotene (36703.00 µg/100 g) and low in carbohydrates (49.60)	3

98	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet rice	Others	Good source of protein (12.28), minerals (3.20) and dietary fibre (13.02). Potential role in formulation of diets for diabetics, obese, hypercholesterolemic and hypertensive patients	Fresh
99	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet dosa	Recipe	Rich in protein (15.78) and dietary fibre (13.56)	Fresh
100	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet idli	Recipe	High in protein (18.32) and dietary fibre (15.04)	Fresh
101	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet roti	Recipe	Rich in protein (14.2) and dietary fibre (16). Suitable for diabetics, obese, hypercholesterolemic and hypertensive patients.	Fresh
102	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet chakli	Recipe	Rich in protein (18.84), iron (3.51) and dietary fibre (12.39)	Fresh
103	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet (polished) cookies	RTE	Rich in energy (446), dietary fibre (9.16) and iron (8.04)	1
104	University of Agricultural Sciences	Dharwad	Barnyard Millet	Omega-3 fatty acids enriched barnyard millet (polished) cookies	RTE	Cookies are rich in Omega-3 fatty acids (6.61%), protein (6.34), fat (23.76) and dietary fibre (16.18). Omega-3 fatty acids are proved to exert beneficial effects in functioning of brain, heart and eyes	-
105	University of Agricultural Sciences	Dharwad	Barnyard Millet	Isoflavones, fibre and protein enriched barnyard millet (polished) cookies	RTE	Maximizes health benefits of its nutraceutical components such as dietary fibre (9.69 g/100 g), isoflavones (8.00 mg/100 g) etc.	-
106	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet (polished) choco cookies	RTE	Rich in energy (436), fat (21.51), iron (8.44) and dietary fibre (9.56). Contains health promoting components such as flavanols, which is proven to reduce the risk of cardiovascular disease	-

107	University of Agricultural Sciences	Dharwad	Barnyard Millet	Nutraceutical enriched barnyard millet (polished) cookies	RTE	Provides macro- and micro-nutrients and several nutraceutical components. Rich in energy (461), dietary fibre (9.79), protein (5.46) and minerals (2.20)	-
108	University of Agricultural Sciences	Dharwad	Barnyard Millet	Iron enriched barnyard millet (polished) cookies	RTE	Exceptionally rich in iron (21.21), dietary fibre (9.34), antioxidants and phenolic components	3
109	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet instant dosa mix	RTC	Dosa can be prepared instantly, reduces the time and laborious process involved in preparation. Good source of energy (365), protein (12.67), fibre (1.81) and iron (4.93)	4
110	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet instant idli mix	RTC	Idli can be prepared instantly, reduces the time and laborious process involved in preparation. Good source of energy (362), protein (11.11) and fibre (1.74). Beneficial for obese subjects, heart patients and diabetic subjects	4
111	University of Agricultural Sciences	Dharwad	Barnyard Millet	Barnyard millet based custard powder mix	RTC	Good source of energy (385), protein (11.32), fibre (2.66) and calcium (112.75). Beneficial for obese subjects, heart patients and diabetic subjects	3 (refrigerated condition)
112	University of Agricultural Sciences	Dharwad	Kodo Millet	Kodo millet breakfast cookies	RTE	Gluten-free, fibre-rich, low trans fat and prepared from jaggery	5
113	University of Agricultural Sciences	Dharwad	Kodo Millet	Kodo millet choco chip cookies	RTE	Gluten-free, rich in protein (7.71), fibre (9.55), minerals (1.14), low trans fat and prepared from jaggery	5
114	University of Agricultural Sciences	Dharwad	Kodo Millet	Kodo millet coconut cookies	RTE	Gluten-free, rich in protein (7.43), fibre (8.16), minerals (1.00), low trans fat and prepared from jaggery	5

115	University of Agricultural Sciences	Dharwad	Kodo Millet	Kodo millet butter cookies	RTE	Gluten-free, rich in protein (8.71) fibre (8.87), minerals (1.00), low trans fat and prepared from jaggery	5
116	University of Agricultural Sciences	Dharwad	Kodo Millet	Ready to cook kodo millet pasta	RTC	Requires 6 minutes to prepare. Rich in energy (369), protein (10.50) and fibre (1.25)	4.5
117	University of Agricultural Sciences	Dharwad	Kodo Millet	Beetroot enriched kodo millet pasta	RTC	Contains high fibre (1.62), energy (362) and antioxidants. Easy to cook, highly acceptable product with appealing colour	4
118	University of Agricultural Sciences	Dharwad	Browntop Millet	Browntop millet laddu	RTE	Ready-to-eat convenient snack. Rich in protein (6.76) and energy (486), good snack for children and adolescents	3
119	University of Agricultural Sciences	Dharwad	Browntop Millet	Browntop millet breakfast cookies	RTE	Gluten-free, rich in protein (8.72), fibre (10), low trans fat and prepared from jaggery	5
120	University of Agricultural Sciences	Dharwad	Browntop Millet	Browntop millet choco chip cookies	RTE	Gluten-free, rich in protein (7.71), fibre (9.5), low trans fat and prepared from jaggery	5
121	University of Agricultural Sciences	Dharwad	Browntop Millet	Browntop millet coconut cookies	RTE	Gluten-free, rich in protein (10.63), fibre (8.51), low trans fat and prepared from jaggery	5
122	University of Agricultural Sciences	Dharwad	Browntop Millet	Browntop millet butter cookies	RTE	Gluten free, rich in protein (11), fibre (10.56), low trans fat and prepared from jaggery	5
123	University of Agricultural Sciences	Dharwad	Browntop Millet	Proso millet dosa mix drumstick leaves enriched	RTC	Good source of protein (13.52), fibre (2.66) and zinc (18.41)	4
124	University of Agricultural Sciences	Dharwad	Proso Millet	Proso millet	RTC	Good source of protein (16.68), fibre (2.29), zinc (17.50) and other minerals	5.5

				instant dosa mix			
125	University of Agricultural Sciences	Dharwad	Proso Millet	Proso millet chakli	RTE	Rich in energy (513), protein (9.51) and minerals. Delicious snack liked by all age groups	1
126	University of Agricultural Sciences	Dharwad	Little Millet	Little millet toasted flakes	RTE	Well suitable for entrepreneurship development. Rich in protein (7.45), dietary fibre (24.10) and iron (61.42)	3
127	University of Agricultural Sciences	Dharwad	Little Millet	Little millet flakes	RTC	Beneficial in diabetes, obesity and hypercholesterolemic patients & also suitable for elderly. High in protein (7.5) and dietary fibre (18.33)	3
128	University of Agricultural Sciences	Dharwad	Little Millet	Little millet Diabetic mix	RTC	Manages blood glucose, improves lipid profile and helps in weight management. Low glycaemic index (50 to 54). Good source of protein (13) and dietary fibre (23)	6
129	University of Agricultural Sciences	Dharwad	Little Millet	Little millet upma mix	RTC	Rich in protein (15.57), dietary fibre (17.93), polyphenols (151.42) and antioxidant activity (84.05)	2.5
130	University of Agricultural Sciences	Dharwad	Little Millet	Little millet sports food	RTC	Highly acceptable, enhances endurance capacity. Improves hemoglobin status and physical fitness. Contains quality protein (14.29), minerals (2.76) and energy (375)	6
131	University of Agricultural Sciences	Dharwad	Little Millet	Little millet supplementary food	RTC	Rich in energy (393) and protein (14.76). Better protein quality, helps in growth, improves nutritional status	6
132	University of Agricultural Sciences	Dharwad	Little Millet	Little millet nippattu	RTE	Good source of energy (587), protein (9.97) and calcium (82)	15 days
133	University of Agricultural Sciences	Dharwad	Little Millet	Little millet chakli	RTE	Delicious snack. Rich in energy (797), protein (12), and calcium (42.5)	15 days
134	University of Agricultural Sciences	Dharwad	Little Millet	Little millet sour dough bread	RTE	Convenience food, improves nutritional profile, enhances therapeutic properties. Rich in protein (11.95) and fibre (7.6)	5 days
135	University of Agricultural Sciences	Dharwad	Little Millet	Little millet butter cookies	RTE	Rich in energy (450), protein (13) and dietary fibre (2.4)	1
136	University of Agricultural Sciences	Dharwad	Little Millet	Little millet butter cookies (jaggery)	RTE	Rich in energy (450), protein (13), dietary fibre (2.4) and prepared using jaggery	1

137	University of Agricultural Sciences	Dharwad	Little Millet	Little millet coconut cookies	RTE	Rich in lauric acid, energy, protein and fibre	1
138	University of Agricultural Sciences	Dharwad	Little Millet	Little millet choco chip cookies	RTE	Contains flavanols, proven to reduce the risk of cardiovascular disease	1
139	University of Agricultural Sciences	Dharwad	Little Millet	Little millet chilli biscuits	RTE	Convenience food, rich in energy, protein and fibre	1
140	University of Agricultural Sciences	Dharwad	Little Millet	Little millet groundnut cookies	RTE	Rich in energy, protein and fibre	1
141	University of Agricultural Sciences	Dharwad	Little Millet	Little millet jaggery muffin	RTE	Rich in energy (445), protein (15), dietary fibre (2.91) and prepared using jaggery	3 days
142	University of Agricultural Sciences	Dharwad	Little Millet	Little millet chilli papad	RTC	Rich in energy, protein. Prepared using traditional technology. Little millet blends well with spices and gives unique taste	6
143	University of Agricultural Sciences	Dharwad	Little Millet	Little millet tomato papad	RTC	Rich in energy (379), protein (8.6), fibre (8.4) and iron (9.94). Prepared using traditional technology and gives unique taste	6
144	University of Agricultural Sciences	Dharwad	Little Millet	Little millet palak papad	RTC	Prepared using traditional technology. Rich in energy (388), protein (9.99), fibre (8.88) and iron (10.9).	6
145	University of Agricultural Sciences	Dharwad	Little Millet	Little millet sandige	RTC	Prepared using traditional technology. Rich in energy (344), protein (7.74), fibre (7.64) and iron (9.69)	-
146	University of Agricultural Sciences	Dharwad	Little Millet	Little millet rice	Others	Suitable for moderate and heavy workers. Rich in protein (3.42) and fibre (3.38)	Fresh
147	University of Agricultural Sciences	Dharwad	Little Millet	Little millet roti	Recipe	Suitable for moderate and heavy workers. Rich in protein (6.42), dietary fibre (6.3) and energy (284)	Fresh
148	University of Agricultural Sciences	Dharwad	Little Millet	Little millet vegetable upma	Recipe	Helps in weight reduction, improves lipid profile. Contains protein (3.7), fibre (2.12), energy (122), calcium (106) and iron (2.64)	Fresh
149	University of Agricultural Sciences	Dharwad	Little Millet	Little millet kichadi	Recipe	Balanced and nutritious product. Suitable for children and elders. Contains protein (4.23), energy (113) and calcium (20.36)	Fresh

150	University of Agricultural Sciences	Dharwad	Little Millet	Little millet pulav	Recipe	Nutritious food suitable for all age groups. Contains protein (3.29), fibre (2.73) and calcium (34.9)	Fresh
151	University of Agricultural Sciences	Dharwad	Little Millet	Little millet garlic flavored vegetable pulav	Recipe	Helps to manage diabetes, hypercholesterolemia and improves palatability. Contains protein (3.36), fat (8.47), fibre (2.16), energy (131) and iron (2.53)	Fresh
152	University of Agricultural Sciences	Dharwad	Little Millet	Little millet vangibath	Recipe	Suitable for all age group, except infants. Contains protein (3.54), fat (5.77), fibre (2.78), energy (161) and iron (2.8)	Fresh
153	University of Agricultural Sciences	Dharwad	Little Millet	Little millet pudina rice	Recipe	Improves palatability and adds nutrition to the diet. Contains protein (4.14), fat (6.43), fibre (2.95), energy (173) and iron (4.73)	Fresh
154	University of Agricultural Sciences	Dharwad	Little Millet	Little millet rice huggi	Recipe	Easily digestible, suitable for children and elderly. Contains protein (4.67), fat (4.47), fibre (6.64), energy (181) and iron (4.33)	Fresh
155	University of Agricultural Sciences	Dharwad	Little Millet	Little millet bisibelebath	Recipe	Adds nutrition to the diet. Rich in protein (6.87), fat (9.96), fibre (2.66), energy (233) and iron (3.45)	Fresh
156	University of Agricultural Sciences	Dharwad	Little Millet	Little millet curd rice	Recipe	Improves taste and easily digestible. Contains protein (3.75), fat (5.84), fibre (2.0), energy (147) and iron (2.59)	Fresh
157	University of Agricultural Sciences	Dharwad	Little Millet	Little millet dhokla	Recipe	Easily digestible. Rich in protein (8.32), fat (8), fibre (2.65), energy (241) and iron (4.13)	Fresh
158	University of Agricultural Sciences	Dharwad	Little Millet	Little millet uttappa	Recipe	Beneficial for diabetes management. Contains protein (4.56), fat (13.85), fibre (2.24), energy (175) and iron (3.38)	Fresh
159	University of Agricultural Sciences	Dharwad	Little Millet	Little millet thalipattu	Recipe	Contains protein (4.37), fat (5), fibre (4.5), energy (202) and iron (5.2)	Fresh
160	University of Agricultural Sciences	Dharwad	Little Millet	Little millet dosa	Recipe	Easily digestible, suitable for all age groups except infants. Contains protein (4.5), fat (6.77), fibre (1.7), energy (177) and iron (2.35)	Fresh
161	University of Agricultural Sciences	Dharwad	Little Millet	Little millet idli	Recipe	Nutritionally superior, easily digestible, contains protein (6.85), fat (3.03), fibre (3.19), energy (218) and iron (5.13)	Fresh
162	University of Agricultural Sciences	Dharwad	Little Millet	Little millet paddu	Recipe	Addition of little millet enhances nutritional value of paddu. Rich in protein (7.54), fat (12.68), fibre (4.0), energy (292) and iron (5.25)	Fresh
163	University of Agricultural Sciences	Dharwad	Little Millet	Little millet sev	RTE	Nutrient dense snack. Rich in protein (15.1), fat (36.76), fibre (5.47), energy (635) and iron (8.3)	-

164	University of Agricultural Sciences	Dharwad	Little Millet	Little millet kodubale	RTE	Energy-dense snack. Rich in protein (8), fat (64.9), fibre (8), energy (889) and iron (9.6)	-
165	University of Agricultural Sciences	Dharwad	Little Millet	Little millet mirchi	Recipe	Rich in protein (12.3), fat (44.7), fibre (5.3), energy (653) and iron (7)	Fresh
166	University of Agricultural Sciences	Dharwad	Little Millet	Little millet tengulu	RTE	Convenience and energy-dense snack. Rich in protein (13.2), fat (53.62), fibre (5.43), energy (798) and iron (8.13)	15 days
167	University of Agricultural Sciences	Dharwad	Little Millet	Little millet payasa	Recipe	Delicious energy-dense food. Contains protein (3.7), fat (6.6), fibre (1.22), energy (262) and iron (3.4)	Fresh
168	University of Agricultural Sciences	Dharwad	Little Millet	Parboiled Little millet	RTC	Improved milling efficiency with iron bioavailability (10.22). Rich in iron (6.72), dietary fibre (10.26) and protein (8.73)	3
169	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Diabetic mix	RTE	Low glycaemic index (49.64). Suitable for diabetics and hyper-lipidemics. Rich in fibre and slowly digestible carbohydrates	6
170	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Vermicelli	RTC	High in dietary fibre (20.96) and protein (15.42)	6
171	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet upma mix	RTC	Rich in protein (15.79), dietary fibre (18.36), polyphenols (128.86) and anti oxidant activity (86.66)	3
172	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet papad	RTE	Rich in fibre (13) and nutritious snack	3
173	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet besan laddu	RTE	Nutritious and calorie-dense (471.60) product. Rich in protein (11.61), calcium (9.34) and iron (2.72)	2.5
174	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Hurakki holige	RTE	Culturally accepted traditional food. Remunerative entrepreneurial activity. Rich in energy (487), protein (8.74), and calcium (42.33)	7 days
175	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Muffins	RTE	Rich in energy (415), protein (7.84) and calcium (42.06)	4 days
176	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet	RTE	Rich in energy (563), protein (11.37) and fibre (13.02)	15 days

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177	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet butter biscuits	RTE	Rich in energy (347), protein (19.46) and calcium (33.01)	1
178	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet coconut biscuits	RTE	Rich in energy (440), good source of protein (4.99) and calcium (53.62)	1
179	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet ground nut biscuits	RTE	Rich in energy (504) and protein (8.25)	1
180	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet plain bread	RTE	Rich in energy (290), protein (9.5), fibre (12), calcium (79) and iron (12)	3 days
181	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet rusk	RTE	Good source of protein (9.33) and energy (321)	1
182	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Dosa	Recipe	Rich in protein (17.03) and energy (509)	Fresh
183	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Talipattu	Recipe	Rich in energy (849), protein (20.29) and fibre (6.6)	Fresh
184	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Upma	Recipe	Rich in energy (684), protein (17.03) and fibre (10.10)	Fresh
185	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Kichadi	Recipe	Rich in energy (759) and protein (18.69)	Fresh
186	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet bisibelebath	Recipe	Rich in energy (671) and protein (18.67)	Fresh
187	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Khakra	Recipe	High energy (396), protein (14.1) and fibre (20.94)	15 days
188	University of	Dharwad	Foxtail	Foxtail	Recipe	Rich in protein (49.2), energy (561) and calcium (330.99)	15 days

	Agricultural Sciences		Millet	millet Kodubale			
189	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet Nippattu	Recipe	Rich in protein (15) and energy (214)	15 days
190	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet vermicelli upma	Recipe	Foxtail millet incorporated vermicelli is high in dietary fibre (20.96) and protein (15.42)	Fresh
191	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet flakes	Recipe	Low starch digestibility (63.13) and low glycaemic index (67.16). Suitable for diabetics	3
192	University of Agricultural Sciences	Dharwad	Foxtail Millet	Foxtail millet parboiled rice	Others	Nutrient-dense, rich in antioxidants (52), protein (11.45) and has good milling efficiency	3
193	University of Agricultural Sciences	Dharwad	Pearl Millet	Pearl millet Papad (whole grain)	RTE	Rich in protein, fibre, micro minerals and phytochemicals. Lowers cholesterol, and high amount of antioxidants	6
194	University of Agricultural Sciences	Dharwad	Pearl Millet	Pearl millet Sandige (whole grain)	RTC	Rich in protein, fibre, iron, magnesium, copper, zinc and phytochemicals that lowers cholesterol	6
195	University of Agricultural Sciences	Dharwad	Pearl Millet	Pearl millet (GHB) groundnut cookies	RTE	High in energy (519), fibre (0.43), protein (12.00), fat (26.50), and iron (2.25)	1
196	University of Agricultural Sciences	Dharwad	Pearl Millet	Pearl millet (GHB) spicy cookies	RTE	High in energy (507), fibre (1.34), protein (9.90), fat (25.40), and iron (2.70)	1
197	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar Atta	RTC	Gluten-free food recommended for celiac patients, Rich in Dietary Fibre & slow releasing carbohydrates	3
198	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar rich multigrain atta	RTC	Rich in protein, Dietary Fibre and low glycaemic food, rich in vitamins and minerals	3

199	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Finger millet atta (ragi atta)	RTC	High in clacium, fibre and antioxidants, gluten-free food	4
200	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar idli rawa	RTC	Rich in minerals, gluten-free food & slow releasing carbohydrates	4
201	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar Rawa (Upma rawa)	RTC	Rich in minerals & contains slow-releasing carbohydrates and gluten-free food	4
202	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar khichidi rawa	RTC	Gluten-free food recommended for celiac patients, contains slow-releasing carbohydrates	4
203	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Multi grain	Millet rawa	RTC	Rich in protein and slow-releasing carbohydrates, low calorie diet and gluten-free food	3
204	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar Flakes (thin)	RTE	Rich in minerals, gluten-free food & slow-releasing carbohydrates	3
205	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar flakes (thick)	RTE	Rich in minerals, gluten-free food & slow-releasing carbohydrates	4
206	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Finger millet flakes (thin)	RTE	High in clacium, fibre and antioxidants, gluten-free food	4
207	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Finger millet Vermicelli	RTC	Rich in calcium, protein and iron. Regular consumption of ragi reduces the risk of diabetes	6
208	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar Vermicelli	RTC	Rich in protein and minerals	6
209	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar pasta	RTC	Rich in protein and minerals	6
210	ICAR-Indian Institute of Millets Research	Hyderabad	Sorghum	Jowar cookies	RTE	Packed with carbohydrates, ricch in fibre and gluten-free food	6

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211	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Finger millet cookies	RTE	Rich in calcium and Gluten-free Products	6
212	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Proso Millet	Proso millet rice	RTC	Rich in protein & zinc, gluten-free food	4
213	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Barnyard Millet	Barnyard millet sweet puffs	RTE	Rich in protein & zinc, gluten-free food	3
214	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Little Millet	Little millet rice	RTC	Rich in protein, iron and gluten-free food	4
215	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Kodo Millet	Kodo millet rice	RTC	Rich in protein & zinc, gluten-free food	4
216	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Barnyard Millet	Barnyard millet rice	RTC	Rich in protein & zinc, gluten-free food	4
217	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Foxtail Millet	Foxtail millet rice	RTC	Rich in protein, iron & zinc, gluten-free food	3
218	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar instant idli mix	RTC	Rich in protein and minerals, gluten-free food	6
219	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Multi grain	Millet instant idli mix	RTC	Rich in protein, Gluten free food, lowers the risk of cancer, diabetes and heart diseases	6
220	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Joawar instant pongal mix	RTC	Rich in protein and minerals, gluten-free food, lowers the risk of cancer, diabetes and heart diseases	12
221	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar instant upma mix	RTC	Rich in protein, gluten-free food, lowers the risk of cancer, diabetes and heart diseases	6
222	ICAR-Indian Institute of Millets Research	Hyderabad	Finger Millet	Ragi veg. soup mix	RTC	Rich in calcium, fibre and antioxidants, gluten-free food	4

	(IIMR)						
223	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar puffs	RTE	Rich in minerals & contains slow releasing carbohydrates and gluten-free food	1
224	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Pearl Millet	Pearl millet puffs	RTE	Rich in protein and dietary fibre, helps in reducing the blood sugar levels	1
225	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Multi grain	Multi Millet laddo	Recipe	Rich in minerals & dietary fibre	5 days
226	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar muruku	RTE	Rich in protein, iron & dietary fibre	1
227	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar Museli	RTE	Rich in minerals and proteins, gluten-free food	6
228	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Pearl Millet	Pearl millet flakes (thin)	RTE	Rich in minerals and gluten-free food	3
229	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar Lassi	RTS	Rich in minerals	7 days
230	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Ragi cake	RTE	Rich in calcium and gluten-free food	3 days
231	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Ragi pizza base	RTC	Rich in calcium and gluten-free food	3
232	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Zinc rich jowar pasta	RTC	Rich in zinc and iron	6
233	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Iron rich jowar pasta	RTC	Rich in iron	6
234	ICAR-Indian Institute of Millets Research	Hyderabad	Finger Millet	Ragi Bread	RTE	Rich in calcium	5 days

	(IIMR)						
235	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar bread	RTE	Rich in minerals, Dietary fibre	5 days
236	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jeera based jowar cookies	RTE	Rich in minerals & contains slow-releasing carbohydrates and gluten-free food	6
237	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Ragi muffins	RTE	Rich in calcium	5 days
238	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Foxtail Millet	Foxtail millet vermicelli	RTC	Rich in protein, iron & zinc, gluten-free food	6
239	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Foxtail Millet	Foxtail millet pasta	RTC	Rich in protein, iron & zinc, gluten-free food	6
240	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar khakhra	RTE	Rich in minerals & contains slow-releasing carbohydrates and gluten-free food	6
241	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Multi grain	Multi millet bread	RTE		5 days
242	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar choco chip cookies	RTE	Rich in protein and minerals, gluten-free food	6
243	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar instant khichidi mix	RTC	Rich in minerals & contains slow-releasing carbohydrates and gluten-free food	6
244	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Multi-grain	Multi millet cookies	RTE	Rich in protein	6
245	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar extruded snack	RTE	Rich in protein and minerals	6

246	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar cake	RTE	Gluten-free & contains slow releasing carbohydrates	5 days
247	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Finger Millet	Ragi based energy bar	RTE	Rich in calcium, and gluten-free food	4
248	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Zinc rich jowar vermicelli	RTC	Rich in zinc and iron	6
249	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Zinc rich jowar cookies	RTE	Rich in zinc and iron	6
250	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Iron rich jowar vermicelli	RTC	Rich in iron content and dietary fibre	6
251	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Jowar muffins	RTE	Rich in dietary fibre and minerals, gluten-free food	5 days
252	ICAR-Indian Institute of Millets Research (IIMR)	Hyderabad	Sorghum	Almond based Jowar cookies	RTE	Loaded with good amounts of minerals and fibre	6
253	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Pasta	RTC	Millet-based convenience food	6
254	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Vermicelli	RTC	Millet-based convenience food	6
255	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Noodles	RTC	Millet-based convenience food	6

256	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Coarse Rawa	RTC	Gluten-free	3
257	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Fine Rawa	RTC	Gluten-free	3
258	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Idli Rawa	RTC	Gluten-free	3
259	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Biscuits (Coconut, Peanut)	RTE	Millets featured as snacks	6
260	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Biscuits (Salt, Sweet)	RTE	Low GI	6
261	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar/Ragi /Bajra flour	RTC	Gluten-free	3
262	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Finger Millet	Ragi Malt	RTC	Gluten-free	3
263	PROFESSOR JAYASHANKAR TELANGANA STATE	Hyderabad	Sorghum	Jowar Flakes	RTE	Gluten-free	3

	AGRICULTURAL UNIVERSITY						
264	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar Extruded Snacks	RTE	Low GI food	5
265	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Multi-grain	Multi-grain Flour	RTC	Medium GI food	3
266	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Foxtail Millet	Foxtail millet rice	RTC	Good cooking quality with less solid loss	3
267	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Foxtail Millet	Foxtail millet rava	RTC	Good cooking quality with less solid loss	3
268	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Bajra rava	RTC	Good cooking quality with less solid loss	3
269	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Finger Millet	Ragi rava	RTC	Low GI	3
270	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Finger Millet	Ragi vermicelli	RTC	Better sensory quality than regular vermicelli	6

271	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Foxtail Millet	Foxtail millet vermicelli	RTC	Better sensory quality than regular vermicelli	6
272	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Sonipat	Finger Millet	Ragi cookies	RTE	Low GI	6
273	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Pearl Millet	Bajra cookies	RTE	Low GI	6
274	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Foxtail Millet	Foxtail millet cookies	RTE	Low GI	6
275	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Foxtail Millet	Gluten free foxtail cookies	RTE	Low GI	6
276	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar muruku	RTE	Better sensory quality than regular murukku Low oil absorption	1.5
277	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Proso Millet	Proso millet rice	RTC	Better cooking quality with less solid loss	3
278	PROFESSOR JAYASHANKAR TELANGANA STATE	Hyderabad	Little Millet	Little millet rice	RTC	Better cooking quality with less solid loss	3

	AGRICULTURAL UNIVERSITY						
279	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Kodo Millet	Kodo millet rice	RTC	Better cooking quality with less solid loss	3
280	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Barnyard Millet	Barnyard millet rice	RTC	Better cooking quality with less solid loss	3
281	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Finger Millet	Ragi Flakes	RTE	Comparable to rice flakes	3
282	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Kodo Millet	Kodo Flakes	RTE	Comparable to rice flakes	3
283	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Yellow jowar Flakes	RTE	Comparable to rice flakes	3
284	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Little Millet	Little Millet Flakes	RTE	Comparable to rice flakes	3
285	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Foxtail Millet	Foxtail Millet Flakes	RTE	Comparable to rice flakes	3

286	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Barnyard Millet	Barnyard Millet Flakes	RTE	Comparable to rice flakes	3
287	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Sorghum	Jowar cake	RTE	Better sensory quality than regular cake	0.25
288	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Finger Millet	Ragi cake	RTE	Better sensory quality than regular cake	0.25
289	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Kodo Millet	Kodo millet Idli mix	RTC	Minor millet-based convenient foods	3
290	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Proso Millet	Proso millet idli mix	RTC	Minor millet-based convenient foods	3
291	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Little Millet	Little millet idli mix	RTC	Minor millet-based convenient foods	3
292	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	NA	Designer rawa	RTC	Enhanced product cooking quality with high resistant starch	3
293	PROFESSOR JAYASHANKAR TELANGANA STATE	Hyderabad	Multi-grain	Multi millet porridge mix	RTC	Minor millet-based convenient foods	3

	AGRICULTURAL UNIVERSITY						
294	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Multi grain	Millet Paediatric mix	RTC	Suitable for 2 yr & above children, meeting all nutritional requirements	3
295	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Multi grain	Millet soup mix	RTC	Minor millet-based convenient foods	3
296	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	NA	Protein-rich Millet cookies	RTE	Rich in protein	3
297	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	Finger Millet	High protein, high fibre Ragi noodles	RTC	High in protein and fibre	6
298	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	NA	Minor Millet mix	RTC	High in fibre and protein for adult population	6
299	PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY	Hyderabad	NA	Instant Idly mixes	RTC	Sensory quality on par with idly prepared from traditional process	6
300	College of Home Sciences, SKRAU, Bikaner, Rajasthan	Bikaner	Pearl Millet	Bajra Biscuits	RTE	Innovation in underutilized food crops Increased shelf-life of finished products	3
301	College of Home Sciences, SKRAU,	Bikaner	Pearl Millet	Bajra Cake	RTE	Innovation in underutilized food crops Increased shelf-life of finished products	0.25

	Bikaner, Rajasthan						
302	College of Home Sciences, SKRAU, Bikaner, Rajasthan	Bikaner	Pearl Millet	Bajra Sticks	RTE	Innovation in underutilized food crops Increased shelf-life of finished products	6
303	College of Home Sciences, SKRAU, Bikaner, Rajasthan	Bikaner	Pearl Millet	Bajra Kakra	RTE	Innovation in under utilized food crops Increased shelf-life of finished products	1
304	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	Sonipat	NA	Multigrain Muffin	RTE	Enriched with protein, fiber and mineral. Enriched with millets	NA
305	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	Sonipat	NA	Savory Veggie Gluten free Cookies	RTE	Replacement of 100% refine wheat flour, Rich in dietary fibre, high-quality protein. And enriched with millets	NA
306	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	Sonipat	Kodo Millet	Nutri-Muffins	RTE	Kodo millet and kutki millet from tribes of Madhya Pradesh with high nutraceutical values	0.5
307	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	Sonipat	Little Millet	Kutki cookies	RTE	Kodo millet and kutki millet from tribes of Madhya Pradesh with high nutraceutical values	3
308	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	Sonipat	Kodo Millet	Extruded Products (kurkure)	RTE	Kodo millet and kutki millet from tribes of Madhya Pradesh with high nutraceutical values	3
309	National Institute of Food Technology Entrepreneurship and Management	Sonipat	Multi-grain	Multi-grain Pasta	RTC	Millets and other grains added rich in Rich in minerals like calcium and iron content and low glycaemic index	8

	(NIFTEM)						
310	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	Sonipat	Multi grain	Multigrain noodles	RTC	High antioxidants and low glycaemic index	6
311	ICRISAT	Hyderabad	Sorghum	Jowar Meal (upma mix)	RTC	Delivers health-benefitting properties of sorghum in combination with pulses and oilseeds as a source of quality protein and fat. The key ingredients are taken through a controlled processing to enhance digestibility, reduce anti-nutrients and enhance the bioavailability of micronutrients	6
312	ICRISAT	Hyderabad	Sorghum	Multigrain meal (Kichidi mix)	RTC	Delivers health-benefitting properties of sorghum and foxtail millet along with green gram as a source of quality protein. The key ingredients are taken through a controlled processing to enhance digestibility, reduce anti-nutrients and enhance the bioavailability of micronutrients	6
313	ICRISAT	Hyderabad	Sorghum	Multigrain Sweet meal (Sweet mix)	RTC	Delivers health-benefitting properties of sorghum in combination with wheat. Jaggery is added for sweetness	6
314	ICRISAT	Hyderabad	Sorghum	Nutri-Cookies	RTE	The product promotes the consumption of millets in a convenient and acceptable format and ultimately improve the dietary diversity using the health-benefitting properties of sorghum and finger millet along with barley and soya	4
315	ICRISAT	Hyderabad	Pearl Millet	Pearl millet chikki	RTE	The product promotes the consumption of millets in a convenient and acceptable format and ultimately improve the contents pearl millet along with ground nut, sesame and jaggery	4
316	ICRISAT	Hyderabad	NA	Peanut sesame chikki	RTE	Promotes healthy combination of peanut, sesame and jaggery. The product is energy dense and protein rich, can be consumed in a convenient and acceptable format. The product is targeted towards the population that are vulnerable to malnutrition	4

317	ICRISAT	Hyderabad	Sorghum	Smart Breakfast	RTC	"Smart Brkfast" is a single serve ready-to-eat breakfast cereal concept. The main ingredient in the product is roasted flakes made from sorghum and pearl millet. The product is all natural, gluten-free, sugar-free, and source of prebiotics	4
318	ICRISAT	Hyderabad	Sorghum	Sorghum Crispies	RTE	Sorghum crispies is a health snack product prepared from sorghum grains using extrusion technology. The crispies can be coated with different flavors like tomato, pudina etc, and can be consumed directly as a snack product. The product is gluten-free, diabetic-friendly and low in fat	6
319	Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PDKV)	Akola	Sorghum	Abil Powder	RTC	Traditional products prepared from Sorghum Dried Ambil powder is used for stable-life without any preservatives	2
320	Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PDKV)	Akola	Sorghum	Sorghum Papad	RTC	Traditional products prepared from Sorghum	7
321	Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PDKV)	Akola	Multi grain	Extruded Products enriched with Medicinal plants	RTE	Value-added product prepared from Sorghum, Pearl Millet and Maize Ashwagandha, Gudwel, Drumsticks and Ginger powder are added	2
322	Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PDKV)	Akola	Finger Millet	Finger Millet based Pasta	RTC	Value-added product prepared from Finger Millet Microwave-based puffed cereal based Pasta	2
323	Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PDKV)	Akola	Barnyard Millet	Baryyard Fasting food	RTE	Value-added product prepared from Barnyard Millet	2

ANNEXURE 13 – Effect of various processing methods on the physiologically bioactive components of the millets

Process	Bioactive Compound	Effect
Dehulling	Total Polyphenols	Reduces 80% phenolic content
	Ferulic acid	Greatly reduced
	P-coumaric acid	7 times reduced
Hydrothermal treatment	Total polyphenol	Reduces
Blanching	Total polyphenol	28% reduction in the polyphenol content
Wet cooking alone, boiling – 15 min	Total phenolic content	Reduced (sorghum – 79%; Finger millet – 40%)
Steaming	Free vanillic acid Free p-coumaric acid	Reduced
	Ferulic acid and bound p-coumaric acid	Increased
Soaking and steaming	Total phenolics, Total flavonoids and procyanidin levels	Decreased
Steam and microwave	Total phenol content	Decreased in barnyard millet
	Total phenol content	Increased in foxtail and proso millets
Microwave treatment	Caffeic acid, ferulic acid and subtotal cinnamic acids, gallic acid, sinapic acids	Significant increase
Microwave treatment	In most other individual phenolic acids	Significant decrease
Germination	Total polyphenols	44% reduction (first 24-h) 80% reduction – 120 h
Germination	Apigenin and myrecetin levels,	Increased
	Naringenin, kaempferol and rutin	Decreased
	Gallic, vanillic, chlorogenic, ferulic, sinapic acids, subtotal benzoic acids, subtotal cinnamic acids and total phenolic acids	Significant ($p \leq 0.05$) increase
	P-hydroxybenzoic, caffeic and p-coumaric acid contents	Significant decrease
	Decreased phenolic acids except free vanillic and bound p-coumaric acid	Decreased
	Total phenolics, total flavonoids and	Increased

	procyanidin levels	
Fermentation	Total Polyphenols	Reduction (first 14 hour) (from 304 to 122 mg/100 g upon)
		Polyphenol contents decreased only by specific cultures
Malting	Protocatechuic acid	3fold decrease Decreased (from 45 to 16 mg/100 g)
	Free Phenolics such as gallic, vanillic, coumaric and ferulic acids	Increased
	Bound phenolic acid	Decreased

Annexure 14 – List of Millet Startups incubated/trained from Nutrihub TBI of ICAR-IIMR, Hyderabad

Sl. No	Startup	Promoter	Business Idea	City	Revenue (Lakhs)
1	Ahobilam Foods Pvt Ltd	Mrs. P. Hemamalini	Restaurant	Hyderabad	80
2	Fountainhead Foods Pvt. Ltd.	Mr. Sai Krishna Bharadwaj Popuri	RTE/RTC	Hyderabad	401
3	GoBhaarati Agro Industries & Services Pvt. Ltd.	Mr. Sridhar Murthy Iriventi	RTE/RTC	Ranga Reddy	105
4	Perfura Technologies Pvt Ltd	Mr. Nanda Gopal	Machinery	Coimbatore	300
5	Ridgeland Industries Pvt Ltd	Ms. Dabbugunta Madhavi	RTE	Hyderabad	12
6	Rowan Agro Nature Private Limited	Dr. Umesh Devurkar	RTE & RTC	Vijayapura	90
7	Nutrisnax	Mr. Rohit Didige	RTE	Hyderabad	25
8	Adithi Millets & Organics	Mr. Soma Shekar (CEO)	RTE/RTC	Kurnool	166
9	H2M Foods and Beverages	Mr. Santosh Khemundu	RTE	Mayurbhanj	10
10	Millenova foods	Ms. Sowmya Mandarapu	RTE	Hyderabad	354

11	Doctor Millets Agro industries Pvt. Ltd.	Dr. Manikyam Gupta	Machinery manufactures	Hyderabad	216
12	Boutique Foods	S. Shilpi Bhandari (Founder)	RTE/RTC	Thane	70
13	Coastal Foods	Mr. T.Siva Kumar	RTE/RTC	Guntur	103
14	Frescogreen (Millet Basket)	Ms. Manvitha Reddy (Founders)	RTE/RTC	Hyderabad	33.5
15	Sivamshu Associates	Mr. B Ujwal Mallikarjun	RTE	Hyderabad	19.1
16	Swad Nandini Pickles	Mr. Bal bhim Basole	RTC/RTE	Bidar	80
17	Indian Sisters Kitchen HVK Sona Harvest LLP	Mr. Harsha Vardhan Kandhuri	RTE	Noida	7
18	Nutrimagic	Mr. Sreehari	RTE	Hyderabad	3.6
19	NFP Tech	Mr. Surya Prakash Reddy	Primary processig & RTC	Hyderabad	105
20	Millet Mantra	Ms. Poojitha Reddy Bujala	RTE & RTC Products.	Hyderabad	
21	Healthy U	Ms. Sandhya Rani Muskula	RTE & RTC Products.	Hyderabad	
22	Vedas Natural Products	Ms. Vemulapati Mrudula	RTE & RTC Products.	Hyderabad	19.7
23	Arogya Bakery	Mr. Naveen Kumar T	RTE & RTC Products.	Nizamabad	48
24	Nutriage nutritional Pvt Ltd	Mr. Samala Sai Krishna	RTE & RTC Products.	Hyderabad	16
25	Swedha Foods	Mr. Dhanunjay varkala	RTC	Nagarkurnool	3.7
26	VSP Nutribite	Ms. G. Sunitha	RTE & RTC Products.	Hyderabad	16
27	Panchamanyam	Ms. S.Sunitha	RTE & RTC Products.	Hyderabad	0.31
28	Amarjit Nutriments	Mr. Ajit Kumar Sabat	RTE/Beverages	Erhampur	10
29	Milleys	Mr. Amit Yadav	RTE/Beverages	Alwar	
30	Supr kjoke	Ms. Balijepalli Nagaratnam	RTE & RTC Products.	Hyderabad	2
31	Sri Avani Agro Foods	Mr. Chandra Shekar Reddy	RTC	Mahabubnagar	15

32	Ancinet Foods	Ms. D.Lakshmi Haritha Bhavani	RTE & RTC Products.	Hyderabad	-
33	Healthy Millet Products	Mr. DATTATREYA KANDUKURI	RTE	Prakasam	
34	Wonder Eats	Ms. HEMLATA GANESH BHATKHANDE	RTE & RTC Products.	Ponda	
35	Thammu Foods	Mr. K.UDAYA BHASKAR	RTE & RTC Products.	West Godavari	
36	Reconnect	Mr. M. KRANTHI KUMAR REDDY	RTC	Hyderabad	1.5
37	Manna Millets	Mr. MALLARAPU CHINA NAGARAJU	RTC	Hyderabad	10
38	S M Millets	Ms. NELLURI SAMANTHAKAMANI	RTE & RTC Products.	Hyderabad	
39	Tasty Tribe	Ms. NUPUR JHA	RTE Snacks		
sridh	Grain Factory	Ms. PATURI RAJANI	RTE		0.1
41	Ragi Kart	Mr. PHANIDHAR	RTC	Hyderabad	
42	Pardha Millets	Mr. POTHURAJU RAVICHANDRA KUMAR	Primary Processing RTC	Guntur	
43	Sri Sai Balaji Foods	Mr. RAGHUNATHA REDDY CHINTA	RTE & RTC Products.	Anantapur	15
44	Millet Break Pvt LTD	Mr. RAHUL KUMAR SINGH	RTE & RTC Products.	Varanasi	0.6
45	Elite Nutri	Mr. RAHUL VADLAKONDA	RTE & RTC Products.	Hyderabad	60
46	Rainbow Enterprises	Ms. RAZIA BEGUM	RTE & RTC Products.		
47	Nutrify U	Dr. SHILPA TEJAVATH	RTE		
48	Good Life Foods	Ms. SHRAVANI KANDIKANTI	RTE & RTC Products.	Hyderabad	
49	Nutri Seed Food	Mr. SRIKANTH THATI	RTE	Hyderabad	
50	Millets cart Private Limited	Mr. THOTA JAGAN MOHAN	RTE & RTC Products.	Hyderabad	
51	Rashmi Home Foods	Ms. V.ARUNA	Resturant	Hyderabad	2.8

52	Chhapanbhog Foods Pvt Ltd	Mr. MOHANTY	RTE & RTC Products.	Bhubaneswar	70
53	Centre for Tech. & Develop. Society	Dr. KALPNA ARORA	RTE & RTC Products.	Dehradun	5
54	G -TREE AGRO TECH PVT.LTD	Ms. BINDU GOURI KOTTARAM	RTE & RTC Products.	Coimbatore	45
55	Hapup	Ms. SHRUTI AJMERA REDDY	RTE & RTC Products.	Hyderabad	
56	Impeccable Innovations Pvt Ltd	Mr. ARNAB GUHA	RTC	Banglore	45
57	Lippia Pvt.Ltd.	Mr. CHAKRAVARTHY	RTC	Hyderabad	84.5
59	Nutrimagic	Mr. D. SREEHARI	RTE & RTC Products.	Hyderabad	3.6
60	Sai Sustainable Agro	Jitendra Sinha	Technology acess to farmers on cultivation	Koraput	250
61	Ajji's	Lakshmeesha.M	Food truck -millet cuisine	Banglore	15
62	Millets and More	Arigay Ramya	Contemporary Millets cafe.	Hyderabad	2.5
63	DMR Foods	D Mahipal Reddy	RTE & RTC Products.	Banglore	10
64	Avinashh	Pragjnanand	0	Visakhapatnam	3
65	Avanni Organics	Ashok Kumar Kommuri	Farmer and millets processing business	Cuddapah	
66	Choudeswari Traders	Sharmila Varanasi	Millets processing & its value added products.	Vizianagaram	25
67	Pardha Millets	P.Ravichandra Kumar	Millet Primary processing unit	Guntur	43
68	Millet Mantra Pvt Ltd	Poojitha.T	Breakfast segment - Millet Muesli	Hyderabad	
69	Millet Break Private Limited	Rahul Kumar Singh	RTE products like jowar pops and millet biscuits	Varanasi	
70	Sri Sai Balaji Foods	Chinta Raghunatha Reddy	Millet RTE & RTC Products	Anantapur	

71	Dos and Company	Aman Sharma	RTE Product with Fortified Minerals and Vitamins	Jaipur	9
72	Tasty Tribe Pvt Ltd	Nupur Jha	RTE Snacks		
73	Smart Foods	Krishnaa Kantthawala	RTC / RTE Millet Food-Noodles, Cookies, Trail Mix	Pune	9
74	Millet Marvels	Mrs. O G Ushasri	Millet cloud kitchen, RTE/RTC Millet Food	Hyderabad	10
75	Famnutra Millet Foods Pvt Ltd.	Ganduri sailesh	RTC Millet Food	Hyderabad	0.7
76	Malts & Millets Enterprise	Yedukondalu Badeti	RTC products	Khamam	0.5
77	NFP Tech Services Private Limited	Suryaprakashreddy	Primary Processing.Millet Grains and Millet Value-added Products	Kondangai	45
78	Magasool Agro Pvt Ltd	Ajay Tannirkulam	In-chip and On-site testing.	Banglore	20
79	Swaadika Health Staples Pvt Ltd.	Srinivasan VK	Adding Health To Every Meal	Banglore	2
80	TastyLeaf Millets	Gunasekhar K	Millet Instant food includes Snacks and millets food court	Tirupati	53
81	Millet Chef	Syambabu Vajjavarapu	Millets RTE, RTC & RTM products	Hyderabad	20
82	Eco Smart Global	Chandra Vasasali	Processing of Millets & RTE &RTC Products	Hyderabad	
83	JoBaRa Foods Pvt Ltd.	Shreepad Kulkarni	Primary Processing. RTE and RTC market	Nagpur	
84	Strongarm Ventures Pvt Ltd	K Sanjay	Millet Biscuits, Millet POPs, Diabetic friendly snacks	Hyderabad	

85	The Pipal-Oak Company	Vignesh Raam Ankuraj	Millet Secondary Processing machinery	coimbatore	
86	Megabite	Asit Mohanty	Energy bar & Chocolate filled ragi muesli	Rourkela	
87	Millet Munch	Madhavi	RTC Milet Products	Hyderabad	
88	S&S Millets	Bhimanathini Surendar	Farming & online & traditional outlets	Karimnagar	
89	SRL Millet Processing Unit	Lakkam Subbareddy	Process raw millets into RTE	Cuddapah	
90	Sri Modern Agro Farm	Suresh Tirupattur Nagarajan	RTE & RTC Millet products	Kancheepuram	
91	GoMillet Foods	Pavan Annambhotla	Millet Puffs	Hyderabad	
92	Millet Snack	Jasper Samuel Boothapaty	Millet flakes RTE snacks	Secunderabad	1.3
93	Ayusmat Foods	Karthick Vinoth.G	RTC Millet Biriyani products	Jambai	
94	Greenblaze Energy Pvt Ltda	Kiran Ventrapragada	Millet beverages, Craft Beer	Hyderabad	
95	Food Xprs	J P Rao	RTE & RTC Millet Products	Hyderabad	5
96	Sirivruddi	Shivanagouda Patil	Millet Value added products	Haveri	
97	Millets Family	Madugula Srikanth Reddy	online website & Mobile app Sales	Karimnagar	
98	NutriMill	Vemula Mohan Krishna	RTE & RTC Millet products	Karimnagar	
99	Yummilet / Amanhealth	Dr. Ponakala Koteswara Rao/Malathi	Millet based nutritional snacks	Hyderabad	
100	My Millets	Sharon Pradeep	Ragi cupcakes and ready to bake cake mix	Hyderabad	
101	Ishaan Enterprises	Reshma Thakur	RTE & RTC Products	Hyderabad	

102	Earthylife	Pramod Renugunta	Sanitised dish bars, sanitised scrubbers and prepare coir to grew micro greens. From millet waste.	Hyderabad	
103	Agro Path	Shubhadha Deshpande	Millet cookies & Health Products	Hyderabad	
104	Organic by Default	Rajesh Pudota	RTC & RTE Milet Products	Guntur	
105	kamakshi Fresh	Vijay Kumar	RTC Multi grain atta,Multimillet energy powder	West Godavari	1.3
106	Sri Rathna Nature Oil Mills	S.Saranya	Millet Cold pressed oils.	Chennai	
107	Millet Recipes	Sriramakrishna kalasani	RTE & RTC millet products	Hyderabad	11
108	Uggu	Ranjeetha	Millet bar and flakes	Hyderabad	
109	N&P Agro The social contract	N Naveen Kumar	Millet Pops	Guntur	
110	The Cornerstone Company	Nageswara Rao K	RTE & RTC Millet Products	Hyderabad	
111	Prakeerthi Greens	V. Santhi Suneetha	Millet based kid's products.	Guntur	
112	Pinaki Enterprises	Megha Namdeo Dubey	RTE & RTC Millet Products	Indore	
113	Samagna Hospitality	Chareesh shankar kenche	Restaurant	Hyderabad	
114	Millets Mantra	Vamsi Krishna Kothamasu	RTE/RTC	Ranga Reddy	
115	InnovEAT Foods	Sandeep Bhalerao	High-protein millets products and soups	Nagpur	
116	Taproot Farms	Gopi Krishna Anumasa.	RTE & RTC Products	Hyderabad	
117	Raps Kitchen	Rukmini	RTC	Hyderabad	
118	Vina Venkatesha	Ganesh Gupta	Restaurant	Vijayawada	115
119	Boinpally Agro Foods	Shashidhar	RTC/RTE	Hyderabad	100

120	Efresh Health Foods Happy life Pvt Ltd	Srihari	RTC/RTE	Hyderabad	
121	Hope Blessing Enterprises	Philip Ratnam	RTC	Dwaraka,	28
122	Inner being wellness private limited	Mr. Jadhav	RTC/RTE	Hyderabad	102
123	Kamakshi Foods	Raghu	RTC/RTE	Hyderabad	1500
124	M for Millets Pvt Ltd	RajBupati	RTC/RTE	Hyderabad	250
125	Orgolite Agro Pvt Ltd	Manu	RTC	Bangalore	
126	Greentatwa Agri Tech	Dr. Peddi Ramarao	RTE & RTC Millet Products	Hyderabad	400
127	Rasvirrya Foods Private Liimited	Preetam Dutt Koka	RTE/RTC	Bangalore	
128	Lazarson Food Industries	Zephaniah Chittumuri		AP, Karnataka and Telangana	
129	Spatika Agro and Herbals	Mohan D R		Karnataka	
130	Vagamon Foods	Sameer Dwivedi		Telangana	
131	N & N flours and snacks	Narni Ramalakshmi		AP, Telangana	
132	Isha Foods	Ramesh Naik Kethavath		Telangana	
133	Samath	Sameera Nayani			
134	Amma Foods	D.Narasimman		Tamil Nadu	
135	Vego Milt Foods	Govardhan Singh		Karnataka	
136	Urban Monk Private Limited	Ruchika Bhuwalka		Karnataka	
137	Sorgum Roti Suppliers	Kukkadapu Pradeep Kumar		Telangana	
138	Sai Sales Syndicate	G Ravi Shankar		AP	
139	Earth N Crops	Saloni Mittal			

140	Samartha Foods	kuppam sai kiran		Telangana	
141	Adi Mantra Foods Private Limited	Pratiksha Birole		Maharashtra	
142	Millet Gen	Rajeshwari Devi			
143	Promeat	Debabrata Das		Delhi	
144	Bobby's Spice Tree	Bobby Antony		Pan India	
145	Altein Ingredients	Tarak Badkas			
146	Sattva Millets and Food Products	K V Rama Subba Reddy			
147	Doof	YAMINIPRIYA YELLUGARI/ Kiran		Karnataka,	
148	H n T Bites	Neelima		Telangana	
149	Samruddhi-Sri Datta Foods	Sridevi Tokala		Telangana	
150	GMRK Foods	Akash Santosh Reddy		Telangana	
151	Native Roots	Amit Gupta		Haryana and Delhi	
152	Aarogya Bakery	Naveen Kumar		Telangana	
153	MEALETS	Preetam Dutt Koka			
154	Nutriage Nutritional Foods Private Limited	SAMALA SAI KRISHNA		Telangana, Bangalore	
155	Taproot Farms	Gopi Krishna Anumasa		Telangana	
156	SRI MITHRU INDUSTRIES	M.Brahmam			
157	Promillets – Total Lite Foodz	Anita Jacob			
158	Mighty Millets	Sahil Jain		Maharashtra.	
159	Greentatwa Agri-Tech LLP	Greentatwa Agri-Tech LLP, represented by its Designated Partner Dr. Peddi Rama Rao		Tamil Nadu	

160	Phytorich Fine Foods Pvt. Ltd.	Dr. Neelambika T. Meti		Maharashtra	
161	Vinessence	Dr. Archana K M		Karnataka	
162	Croitre SAS France	Swetha Ashwath Narayana		Nil	
163	NAMASTEKISAN	Durgaprasad		Telangana, AP, Karnataka,Tamil Nadu	
164	Arch Foods	Arpit Agarwal		Uttarakhand	
165	Pravista Natural	Katakam Santhosh		Telangana	
166	Sampige	R Prasant		Karanataka	
167	Ishta Cafe	Vinayak Gajendragad		Karnataka	
168	Green Earth Processors	Anoop Aggarwal			
169	360 Super Food	Ranga Rao Thadakamalla		Telangana	
170	Warehub	N.Prasad		Chennai	
171	Bliss Tree/ Velagan Agro	Shivaramakrishnan			
172	Sakala Millet Breads	Pallavi Upadhyaya			
173	Slurrp Farm	Meghana Narayana			
174	Food XPRS Lunch Services	J. P. Rao			
175	Millet Craft	Sri Ram			

ANNEXURE 15 – Success Stories of Millet Entrepreneurship

1. H2M Food and Beverages: Founder – Mr. Santosh K

THE NEW INDIAN EXPRESS
MONDAY, JULY 22, 2019

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Drink to your health!

Seema Rajpal says cheers to H2M Food & Beverages' healthy, millet-based drinks and finds out their story

Always thankful

Take note

SCAN CODE TO READ THE STORY

CATCHY WORDS

THOSE WHO BELIEVED

2017

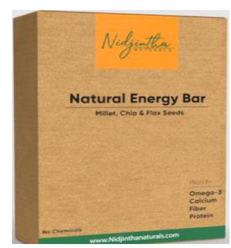
2018

Product: Millets Beverages

Started with an investment of 25 Lakhs, H2M foods is able to provide employment to 34 farmers and eight team members.

Their future plans are into Millets Beer and Diary products made our of millets and supplying them to export markets

2. NFPTech Services Pvt. Ltd.: Founder – Mr. Surya Prakash Reddy



Product: Primary Processing of Millets and selling husk for alternative uses

Belonging to a farmers family, Mr. Surya Started his journey with Nutrihub, ICAR-IIMR, as a Pre-Seed Stage participant. He started his entrepreneurial journey with an idea one-and-half years back and now his firm has registered a growth of 4 Lakh INR.

His future plans are to extend into secondary processing and coming up with value-added products, on which he has already started his work.

3. Millenova Foods: Founder – Ms. Soumya

Product: Horti-Millet Snacks

Ms. Soumya, a mother of two, has seen her kids eating unhealthy snacks. She started her entrepreneurial journey to replace this junk food with healthy alternatives. A food technology graduate, Ms. Soumya chose millets, our ancient grains, as her main ingredient and integrated them with horticulture.

4. M For Millets Pvt. Ltd.: Founder – Mr. Bhupathi Raju


Product: RTE/ RTC Products in B2G Model

They have started with an investment of Rs. 1,00,000 and now they are clocking a turnover of Rs. 1.3. crores. Their portfolio is nothing short of a healthy “millet-o-meal” with various options to choose from – cookies, halwah bar, dibs, crisps, sweet pepper millet crisps, spirulina millet crisps, namkeen and crunches

5. Sattva Life Foods Pvt. Ltd.: Founder – Ms. Shruti Ajmera Reddy


Product: Nutri Health Mixes for babies/Kids

Hapup is a brand built with and focused solely on nutrition. Naturally made multi-millet Nutri mixes is their effort in that direction.

- Hapup today is available on 12 online platforms like amazon.in, FirstCry.com, flipkart.com
- Hapup is also available at select Modern Trade Stores in Hyderabad

Hapup is also honoured to have partnered with children’s hospitals like Nice Hospital, Krishna Children’s Hospital, etc.

ANNEXURE 16 – Average Modal Price of Jowar (Rs./Quintal)

Year	Rajasthan			Maharashtra				Tamil Nadu	Karnataka	Gujarat
	Ajmer	Jaipur	Jodhpur	Akola	Sholapur	Beed	Ahmadnagar	Tiruppur	Athani	Bhavnagar
2010	1266.00	1193.00	1172.73	871.11	1265.09	1325.66	1257.77	1189.13	1095.58	1603.40
2011	1302.75	1451.01	1191.76	1058.17	2491.84	2409.82	2366.69	1851.58	2658.63	1572.18
2012	1326.18	1505.04	1344.60	1172.72	2045.22	1887.61	2001.72	1960.96	2043.57	1510.59
2013	1427.24	1594.74	1473.56	1231.51	1698.49	1634.36	1756.39	1830.11	1533.33	1725.98
2014	1695.63	1525.00	1651.76	1700.00	2039.89	2177.67	2011.80	2065.14	1907.81	2166.45
2015	1766.02	1607.13	2076.23		1943.11	1844.60	1958.90	2393.03	1918.54	1904.16
2016	1516.38	1677.88	1964.04	1642.04	2140.12	1856.96	2047.74	2532.79	2236.90	1929.60
2017	1475.00	1746.49	1803.33	1369.72	2025.01	1808.65	1952.38	2427.02	2319.09	2065.00
2018	1520.00	1613.96	1691.67	1253.89	2267.05	1883.63	1920.83	2280.24	1867.86	2311.52
2019	1917.00	2343.75	1838.13	1885.42	2962.64	2665.09	2981.25	2756.76	2550.00	2671.21
2020	2250.00		2373.08	1252.67	3128.78	2747.27	2881.46	3487.50		2408.68
Avg Price	1587.473	1625.8	1689.172	1343.725	2182.476	2021.938	2103.357	2252.205	2013.131	1988.07

Source:Agmarknet

ANNEXURE 17 – Average Modal Price of Bajra (Rs./Quintal)

Year	Gujarat			Maharashtra						Karnataka
	Banasanth	Bhavnagar	Anand	Nashik	Dhule	Ahmednagar	Beed	Sholapur	Akola	Gulbarga
2010	1028.64			935.62	953.90	983.09	933.44	982.11	1232.50	857.14
2011	990.00			1114.01	1039.63	1459.90	1090.17	1135.53	1382.27	982.43
2012	1145.70	1527.34		1297.93	1192.02	1388.79	1320.56	1186.77	1514.29	1198.94
2013	1373.77	1650.36		1474.24	1460.71	1493.56	1372.11	1413.13	1498.33	1407.39
2014	1223.19	1746.40		1500.62	1392.91	1602.29	1507.75	1363.74		1285.08
2015	1254.07	1402.76	1320.00	1433.22	1431.84	1583.26	1455.09	1473.47	1646.15	1375.66
2016	1573.53	1608.93	1518.57	1648.21	1668.24	1704.31	1606.34	1549.69	1854.23	1633.64
2017	1318.90	1377.18	1100.00	1408.15	1316.61	1487.35	1416.50	1495.00	1658.46	1386.45
2018	1376.81	1496.93	3125.00	1519.81	1389.25	1405.51	1524.43	1999.67	1647.13	1343.60
2019	1956.30	2107.53	1650.00	2129.93	1885.32	2002.68	2165.26	2008.85	2119.59	1999.36
2020	1721.65	1848.85	1510.00	1752.81	1481.81	1866.42	1607.49	2207.67	1850.00	1532.61
Average Price	1360.233	1640.698	1703.928	1474.05	1382.931	1543.378	1454.467	1528.694	1640.295	1363.845

Source:Agmarknet

ANNEXURE 18 – Average Modal Price of Ragi (Rs./Quintal)

Year	Karnataka						Tamil Nadu		
	Davangere	Tumkur	Kolar	Chikkamagalore	Chintamani	Haveri	Vellore	Denkanikottai	Hosur
2010	821.93	908.72		910.40	928.68		1026.74	855.13	780.33
2011	951.91	1032.22	1100.00	907.42	926.56		1187.14	1066.15	1090.79
2012	1050.91	1100.63	1062.00	1091.00	1143.55	861.45	1464.35	1170.34	1110.61
2013	1800.00	1850.00	1775.00	1822.22	1718.11	1496.67	1782.91	2198.39	2209.96
2014	1883.33	1648.91	1566.36	1547.58	1551.45	1212.38	1789.81	2359.27	2356.59
2015	1564.00	1578.58	1633.08	1364.10	1468.60	1214.29	1876.03	1657.73	1629.64
2016	1933.33	1982.36	1896.13	1534.43	1792.96	1516.43	2060.81	2076.48	2120.69
2017	2209.72	2714.15	2369.43	2303.37	2569.86	2463.10	2627.37	2551.55	2558.05
2018	1918.94	2329.08	2356.80	1843.78	2082.14	1479.57	2268.61	2125.65	2129.74
2019	2227.23	2260.00	2366.67	1973.63	2327.49	1789.29	2586.39	2900.00	2900.00
2020	2149.62	2167.97	3269.00	2007.69	2070.83	1821.15	2866.39		
Average Price	1682.811	1779.329	1939.447	1573.238	1689.112	1539.37	1957.868	1896.069	1888.64

Source:Agmarknet

ANNEXURE 19 – Trend in MSP of Millets

Year	Jowar-Hybrid	Jowar-Maldandi	Bajra	Ragi
2010-11	880	900	880	965
2011-12	980	1000	980	1050
2012-13	1500	1520	1175	1500
2013-14	1500	1520	1250	1500
2014-15	1530	1550	1250	1550
2015-16	1570	1590	1275	1650
2016-17	1625	1650	1330	1725
2017-18	1700	1725	1425	1900
2018-19	2430	2450	1950	2897
2019-2020	2550	2570	2000	3150
CAGR (%)	***11.2***	***11.1***	***8.6***	***12.6***

ANNEXURE 20 – Trends of Exports of Millets (in thousand kg)

Year	Bajra	Ragi	Sorghum
2010-11	54662.78	5647.538	43291.95
2011-12	84238.49	4265.219	30884.53
2012-13	66449.33	8030.237	243788.5
2013-14	29135.07	10592.52	53994.73
2014-15	55857.14	9399.61	121021.9
2015-16	60519.67	5590.04	52382.06
2016-17	48832.8	6439.87	53372.86
2017-18	45497.16	8272.92	33053.81
2018-19	38863.6	10534.4	86741.44
2019-20	40652.5	9645.08	13548.49
CAGR	**-4.93**	**5.78**	**-8.18**

Source: DGCIS

ANNEXURE 21 – Emerging Food Trends

1.	Traditional/Ancient foods	8.	Healthy snacking
2.	Functional foods	9.	Naturally fortified foods
3.	Immunity-Boosting foods	10.	Plant protein foods/Vegan foods
4.	Gluten-free foods	11.	Infant foods
5.	Pre-biotic and Pro-biotic foods	12.	Sports nutrition
6.	High antioxidant foods	13.	Healthy beverages
7.	Convenience/Instant foods	14.	Nutraceuticals

ANNEXURE 22 – Exports of Sorghum (Quantity in thousand kg)

Year	PHILI-PPINES	SAUDI ARAB	KUWAIT	U ARAB EMTS	JAPAN	TAIWAN	BAHARAIN IS	OMAN	YEMEN REPUBLC	QATAR	NEW ZEALAND	SRI LANKA DSR	ISRAEL	KENYA	Others	Total
2003-2004	0.00	100.00	0.00	271.00	0.00	131.00	23.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	137.47	664.47
2004-2005	172.00	42.00	145.00	7400.00	22.00	955.00	26.00	11890.00	0.00	0.00	0.00	0.65	0.00	0.00	11164.20	31816.85
2005-2006	0.00	0.00	0.00	323.00	224.00	371.00	22.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23209.60	24149.60
2006-2007	148.00	0.00	315.51	1483.26	62.00	245.00	97.00	0.00	0.00	0.00	1109.00	0.00	22.00	0.00	213.90	3695.67
2007-2008	1340.00	3146.00	642.00	1381.33	6.00	7381.01	23.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24439.59	38358.93
2008-2009	368.00	1284.00	757.00	1004.20	82.00	12978.00	349.81	294.00	3199.46	118.00	2.40	26099.00	24.00	11000.00	20547.82	78107.69
2009-2010	2071.00	3283.01	1089.00	1629.09	233.10	1581.00	128.36	620.00	4062.00	0.00	0.00	3136.00	47.00	676.88	45158.15	63714.59
2010-2011	4580.50	2979.36	963.12	2707.67	287.00	4063.44	150.04	0.00	795.00	192.00	23.60	2370.04	24.00	0.00	24156.18	43291.95
2011-2012	809.00	1765.52	981.31	2097.11	46.00	1789.00	417.12	84.40	361.00	373.52	16.00	0.00	0.00	15000.00	7144.55	30884.53
2012-2013	4122.00	5956.52	1298.00	3339.54	698.00	22743.00	416.92	413.30	4143.85	732.70	52.98	0.00	52534.00	30000.00	117337.70	243788.51
2013-2014	1049.00	2177.00	1424.00	4178.92	1238.60	26313.05	259.00	337.28	4250.00	212.00	498.00	27.00	114.00	0.00	11916.88	53994.73
2014-2015	4708.00	3940.00	996.00	3522.94	1274.00	4466.00	375.00	402.00	1853.00	72.00	35.00	106.00	6.00	47500.00	51765.98	121021.92
2015-2016	1222.00	5574.00	1550.00	2426.50	1363.00	2073.00	559.00	481.00	1128.00	24.00	35.72	229.00	39.00	21600.04	14077.80	52382.06
2016-2017	469.00	3219.00	1487.01	2524.59	856.00	1243.00	497.55	419.11	672.00	139.00	90.15	328.00	104.00	20000.00	21324.45	53372.86
2017-2018	1765.00	2783.00	1725.00	932.61	1017.00	1228.00	643.00	661.00	0.00	255.00	104.40	112.00	67.00	20000.00	1760.80	33053.81
2018-2019	8402.00	10401.88	1842.00	2456.40	1573.00	1627.00	782.00	480.20	616.00	1026.00	64.65	49.00	20.00	20000.00	37401.31	86741.44
2019-2020	2671.03	2644.00	1527.11	1276.00	1054.98	678.00	591.30	187.45	163.00	130.87	110.79	54.00	20.00	1.95	2438.01	13548.49

Source: DGCIS

ANNEXURE 23 – Exports of Bajra (Quantity in thousand kg)

Country	Saudi Arabia	U.A.E.	Namibia	Tunisia	Yemen Arab Republic	Libya	Morocco	U.K.	Kuwait	South Africa	Pakistan Ir	Egypt	Canada	Others	Total
2003-04	2826.00	1107.70	0.00	0.00	975.00	0.00	0.00	209.52	75.00	44.00	0.00	216.00	114.97	**624.24**	**6192.43**
2004-05	2538.00	11339.37	0.00	0.00	231.60	0.00	0.00	101.00	83.10	0.00	0.00	0.00	5.70	**815.85**	**15114.62**
2005-06	2063.00	2081.06	0.00	0.00	1804.00	0.00	110.00	216.00	77.00	5.45	0.00	1714.00	51.20	**860.03**	**8981.75**
2006-07	954.00	2314.22	0.00	125.00	744.00	0.00	614.00	166.00	43.00	1.45	0.00	519.00	27.55	**1297.81**	**6806.03**
2007-08	2774.12	2581.93	1146.00	48.00	27842.76	506.00	500.00	754.83	142.98	119.65	0.00	1741.59	142.22	**15729.04**	**54029.12**
2008-09	6412.00	7948.50	2645.00	48.00	29684.00	719.00	500.00	571.21	330.00	3075.25	3790.62	1820.00	123.62	**18033.23**	**75700.44**
2009-10	5015.83	17465.41	2851.00	333.00	7179.00	100.00	819.00	586.33	546.00	400.00	388.50	1784.00	131.27	**3085.84**	**40685.19**
2010-11	4283.30	10393.39	966.00	369.00	10568.16	497.00	959.10	1376.61	551.99	241.70	10583.36	2318.20	314.03	**11240.94**	**54662.78**
2011-12	7399.04	9998.95	1514.06	2138.00	12835.67	1034.50	1231.21	1001.02	433.46	356.10	20698.63	2247.07	210.91	**23139.86**	**84238.49**
2012-13	7838.00	7943.99	2205.00	791.00	20325.21	899.00	1181.00	1210.12	408.18	161.50	4591.45	1585.48	122.89	**17186.53**	**66449.33**
2013-14	1267.00	5871.41	322.00	669.00	1270.00	1580.00	1180.00	820.33	385.00	172.00	999.48	934.00	101.95	**13562.90**	**29135.07**
2014-15	7286.00	9764.81	1863.00	2050.27	13229.35	1841.00	1528.00	737.82	763.36	575.64	2404.00	1019.00	164.30	**12630.59**	**55857.14**
2015-16	8847.00	8085.64	5083.00	1248.00	7004.00	479.00	1206.00	587.92	481.00	310.00	21494.40	714.00	131.27	**4848.44**	**60519.67**
2016-17	11341.00	10242.23	4952.00	2382.00	3847.00	861.00	2328.00	743.71	533.40	322.01	3486.03	1654.00	178.43	**5961.99**	**48832.80**
2017-18	7460.00	8532.46	3850.00	2122.00	8205.00	2206.00	3089.00	879.42	480.52	417.76	1914.00	1080.00	96.26	**5164.74**	**45497.16**
2018-19	6727.00	10502.43	1156.00	1995.00	7053.00	963.00	1143.00	844.92	165.00	1039.68	680.00	250.00	91.80	**6252.77**	**38863.60**
2019-20	10398.00	7105.54	3952.61	3344.00	2987.00	2655.00	1837.00	1008.66	543.05	498.13	467.00	384.00	84.68	**5387.83**	**40652.50**

Source: DGCIS

ANNEXURE 24 – Exports of Ragi (Quantity in thousand kg)

	NEPAL	SRI LANKA DSR	MALAY SIA	U ARAB EMTS	U S A	KUWAIT	OMAN	MALDIVES	BAHARAIN IS	SAUDI ARAB	AUSTRALIA	CANADA	SINGA-PORE	Others	Total
2003-04	218.44	244.00	235.60	182.93	27.20	18.00	7.30	2.50	23.00	17.77	22.06	78.80	0.20	**88.46**	**1166.26**
2004-05	59.57	389.61	47.25	75.50	13.20	62.70	0.80	7.10	17.00	5.00	0.00	0.44	16.68	**562.80**	**1257.65**
2005-06	529.57	405.50	48.04	95.00	27.80	29.62	21.90	1.15	31.60	18.45	1.00	1.97	0.00	**83.80**	**1295.40**
2006-07	9.00	323.70	68.98	76.40	33.63	14.93	8.40	1.40	2.00	81.73	22.76	27.93	0.37	**46.20**	**717.43**
2007-08	553.34	768.58	247.02	174.03	51.79	81.56	3.30	3.51	4.92	37.63	6.75	41.78	23.85	**747.63**	**2745.68**
2008-09	2044.05	592.70	221.47	352.41	87.68	40.11	3.13	0.00	18.98	186.67	27.12	21.24	22.79	**265.99**	**3884.33**
2009-10	2402.10	678.70	321.16	683.15	92.00	33.26	155.31	1.85	21.29	127.23	12.46	69.03	4.80	**1289.99**	**5892.30**
2010-11	2379.12	521.50	361.48	797.21	122.07	70.90	77.24	0.00	13.72	75.82	74.50	71.70	21.80	**1060.50**	**5647.54**
2011-12	3172.04	47.20	292.76	175.62	106.92	53.62	24.70	1.75	31.36	41.03	10.60	16.03	10.62	**280.98**	**4265.22**
2012-13	5367.64	218.00	366.58	388.42	35.47	68.52	9.26	17.73	33.53	17.27	17.30	5.90	4.15	**1480.48**	**8030.24**
2013-14	2257.35	819.10	275.10	132.33	26.90	29.80	0.00	5.14	37.13	6.33	1.62	21.92	5.85	**6973.95**	**10592.52**
2014-15	2410.01	728.00	284.20	173.76	64.61	24.50	29.00	0.00	9.55	0.00	27.70	22.35	6.01	**5619.92**	**9399.61**
2015-16	1289.80	810.45	295.37	143.89	13.88	39.48	32.13	1.45	11.00	7.74	16.49	11.25	16.27	**2900.84**	**5590.04**
2016-17	3217.01	2558.62	209.52	244.84	15.31	25.41	28.25	11.50	14.96	6.58	22.66	3.65	2.50	**79.06**	**6439.87**
2017-18	3948.56	3369.33	331.91	201.93	8.33	24.66	59.25	10.86	14.70	5.88	0.10	7.01	8.12	**282.28**	**8272.92**
2018-19	6485.88	3373.39	187.18	165.44	21.76	31.86	46.93	10.52	10.16	3.84	5.20	5.20	5.21	**181.83**	**10534.40**
2019-20	7330.28	1523.32	251.02	215.13	43.35	33.30	32.22	17.57	14.45	8.50	3.67	2.92	2.75	**166.60**	**9645.08**

Source: DGCIS

ANNEXURE 25 – Write-up on Various Policy Interventions Towards Mainstreaming Millets

1. Policy Efforts in India

1.1. Government of India Efforts

- 2012 – Initiative for Nutritional Security through Intensive Millet Promotion (INSIMP)
- 2013 – National Food Security (NFS) Act covers 'coarse grains'
- 2017 – NITI Aayog of Government of India releases the National Nutrition Strategy (NNS) for 'Nourishing India' and recommends that the MoA & FW strengthen cereal productivity and production diversity – including the production of 'coarse' cereals such as millets.
- 2018 – Millets officially declared as "Nutricereals" (Annexure 1)
- Millets made part of National Food Security Mission (NFSM)
- 2018 – GoI has declared as the 'National Year of Millets' (NITI Aayog, 2018)
- 2018 – The Indian government launched the Sub-mission on Nutri-cereals under NFSM with an outlay of INR 300.00 crore for 2018–19
- 2018 – GoI has sent a proposal to United Nations for declaring 2023 as the 'International Year of Millets', in order to promote greater production and consumption of millets
- 2021 – UNGA has approved and declared the 2023 to be observed as the 'International Year of Millets'

National Food Security Mission – was launched in 2007–08 to increase the production of rice, wheat, pulses and coarse cereals. The mission is being continued during 12th Five Year Plan with new target of additional production of 25 million tonnes of food grains comprising of 10 million tonnes rice, 8 million tonnes of wheat, 4 million tonnes of pulses and 3 million tonnes of coarse cereals by the end of XII Plan.

The interventions covered under NFSM-Coarse Cereals include Cluster Demonstrations on improved package of practices, seed distribution of hybrid and HYVs, local initiatives and other initiatives like demonstration by NGOs in remote areas, assistance for custom hiring. During 2015–16, the interventions covered under additional area coverage for increasing coarse cereals production during Rabi/Summer for NE States (includes Cluster Demonstrations on improved package of practices, seed distribution of hybrid and HYVs, local initiatives and other initiatives like demonstration by NGOs in remote areas, assistance for custom hiring). NFSM-Coarse cereals is being implemented in 265 districts of 28 states.

1.2. Odisha Millet Mission

The Odisha Millet Mission is working since 2018 with the tag line "Reviving millets in farm and on plates". This mission focused on the tribal areas of Odisha where millets are the priority crops, and to address the major supply chain and consumption challenges.

The Impact of Mission

1. The reach of OMM is about 15,292 villages of 81 blocks from 15 districts of the state.
2. All millets are being cultivated in 47190 ha, with ragi occupying over 86% of area.
3. In year 2019–20, ODMM has procured the 94745 quintals of millets at Rs. 3148 per quintal from 20,328 farmers.
4. Established 38 Custom Hiring Centers at cluster level for helping 30,285 farmers.
5. Supplied the 99 quintals of seed in 2020–21.
6. Conducted 45 Participatory Varietal Trails and identified 103 unique traditional and 14 unique improved varieties.
7. Distribution of ragi under PDS to 16 lakhs beneficiaries in 7 districts in 2018–19.
8. Ragi Laddu introduced as a morning snack for pre-school children under ICDS in Keonjhar and Sundargarh.

9. Established the Cafes across locations to be called “Millet Shakti Cafe” to serve the millets-based hot cooked items and bakery products.
10. More than 45 events organized and served millet-based food items to 4.4 lakh people in the last two years.

1.3. Karnataka Organic Farming Policy 2017

The State government launched the 'Karnataka Organic Farming Policy 2017', in order to enable the next level of development in Organic Farming and Millets Promotion.

Activities of Millet Mission

- Minor millet growing farmers are incentivized with Rs 10,000 per hectare through DBT for maximum of 2 hectare each
- Procurement of Ragi & Jowar by giving a bonus of **20–25 percent above the MSP** from farmers through cooperative department.
- Millets focused Production Clusters in Haveri, Chitradurga, Davanagere and Koppala districts for piloting the integrated farming support in terms of training on soil, water, rain water and energy conservation, farming practices, agro biodiversity, etc.
- Assistance for Processing Machineries of Nutri-Cereals **–** up to Rs 10 lakhs (50% subsidy) for setting up of millet processing machinery.
- Market of processed Nutri-Cereals through Government Outlets (ex.: Nandini Milk Union Outlets, HOPCOMS)
- Creating public awareness through international, national and district level organic and millet melas/fairs.
- E-platform and mobile Apps (ReMS-COMM) for direct marketing.
- “Organics and Millets-National Trade Fairs in 2017, 2018 and 2019.
- Millet Walks for discussing and promoting the health benefits of millets in districts.
- Workshops for dieticians, nutritionists, fitness and food bloggers, chefs and hotelier associations/ caterers, retailers/ wholesalers/processers, etc.
- Road shows **–** Officials, farmers federations, local companies who are into millets and other Stake holders.

1.4. Mission on Millets – Andhra Pradesh

The state has launched a program on “Comprehensive Revival of Millets cultivation’ by tribals in north Coastal Andhra and parts of Rayalaseema. The program intends to develop tribal and rainfed areas into MILLET-HUBS that can potentially supply millets to meet increasing demand and find its place in the grain economy.

The Objective is to promote millet food tradition across all levels and help people drive home the message of long-term benefits of including power-packed millets in the diet.

Activities

- Established a Millets Promotion board in the state
- Formed a committee for declaring the MSP for Sorghum grown in the state.
- Procurement of millets through MARKFED and FPOs
- Published a book on Millet Recipes in Telugu language
- Published a book on Sri Ragi Cultivation in Telugu language
- A pilot inclusion of Millet recipe for 500 Pregnant and Lactating Women

- A pilot inclusion of millet recipe for 100 TB patients
- A pilot inclusion of Ragi Malt and millet biscuits in welfare hostels

1.5. Tamil Nadu – NADP – Millet Mission – 2014–15

The following components are implemented under Tamil Nadu NADP Millet Mission during 2014–15:

- Incentives for cultivation of millets
- Incentives for distribution of millets
- Organizing Frontline Demonstration in an area of 11,500 ha of millet-growing districts.
- Supply of 11,500 kits comprising liquid biofertilizer, micronutrients, fungicides, pesticides, etc., to the beneficiary farmers at the subsidy of Rs 3000/ha for major millets and Rs.2000/ha for minor millets subject to maximum area of 2 ha in millets
- Training to farmers on farming and value addition of millets

Tamil Nadu – Mission on Sustainable Dry land Agriculture (MSDA) 2016

The Agriculture Department of Tamil Nadu has launched the MSDA mission in 2016 for Dry Land farming, focusing on improving the production and productivity of millets, pulses and oilseeds. The overall budget of the mission is Rs.802 crore for covering various aspects such formation of dry land clusters, village clubs, comprehensive land development, value addition, strengthening FPOs, custom hiring centers, animal husbandry, etc.

1.6. Telangana Millets Mission

The Telangana Millet Mission project was launched on 2nd July, 2018, by the Department of Agriculture, Telangana. In view of above, the Department of Agriculture has taken an initiative to implement Telangana Mini Mission on Millets in special drive to reach 6 districts in 5 years.

The project aims to increase the area, production and consumption of millets through better agronomic practices, establish processing facilities, rural entrepreneurship and market linkages that will fuel a millet-based agro-economy. The project proposed to achieve its objectives in a period of five years from 2018–2022.

1.7. Madhya Pradesh Millets Promotion through WCD

The department Women and Child Development (WCD) of MP has been piloting the local processing and inclusion of millets in public funded programs like Hot Cook Meal and Take Home Ration.

Activities

1. WCD has set up millet processing units by SHGs with the funding support of UNDP.
2. WCD has piloted millets processing and feeding through Anganwadi's in 100 project sectors.

1.8. Other Efforts in Public-funded Programs

- **NITI Aayog:** ICAR-IIMR has technically supported NITI Aayog for formulating policy for procurement of millets, inclusion of millets in PDS and announcing MSP for small millets.
- **MoFPI: One District-One Product program of PMFME scheme, MoFPI**

  The unorganized food processing industries in India face challenges that limit their development and weaken performance due to their limited resources and skill. To address this, MoFPI has launched a scheme called PM Formalization of Micro Food Enterprises (PM FME) with an outlay Rs.10,000 crore to enhance the competitiveness of the micro food enterprises in the unorganized sector by supporting through formalizing and handholding.

This scheme is aiming to support 2,00,000 MFEs with formalization, common infrastructure, training, branding and marketing, access to credit and other technical supports during the five years period from 2020–21 to 2024–25.

The Scheme adopts One District One Product (ODOP) approach to reap the benefit of scale in terms of procurement of inputs, availing common services and marketing of products. ODOP for the scheme will provide the framework for value chain development and alignment of support infrastructure. There may be more than one cluster of ODOP product in one district. There may be cluster of ODOP product consisting of more than one adjacent district in a State.

Total districts 17 districts from 11 states were selected for millet-based products. Maharashtra is most proactive with three millet districts followed by Madhya Pradesh, Odisha, Tamil Nadu and Telangana with two districts each.

State	District	Products
Arunachal Pradesh	Tirap	Millet-based foods
Chhattisgarh	Sukma	Jowar, Kodo, Little
Gujarat	Dang	Finger Millet
Jammu and Kashmir	Poonch	Millet-based foods
Karnataka	Devanagere	Millets
Madhya Pradesh	Dindori	Kodo-Kutki
	Mandla	Kodo-Kutki
Maharashtra	Nandarbar	Millet based products (Hill Millet, Finger Millet)
	Solapur	Millet based products (Jowar, Wheat)
	Thane	Millet based products (Hill Millet, Finger Millet)
Odisha	Malkangiri	Millet based products
	Naupada	Millet based products
Rajasthan	Duasa	Wheat (Cereal Based Products – Barley, Bajra, Dalia, Tomato, etc.)
Tamil Nadu	Dharmapuri	Millet Products
	Viridhunagar	Millet Products
Telangana	Komar Bheem	Millet based products
	Mahabubnagar	Millets – Jowar, Ragi and minor millets and MFEs like millet flours, Bakery items , snacks

With respect to support to existing individual micro units for capital investment, preference would be given to those producing ODOP products. However, existing units producing other products would also be supported. In case of capital investment by groups, predominantly those involved in ODOP products would be supported. Under the ODOP program, MoFPI has formulated a committee constituting IIFPT, NIFTEM, ICAR-IIMR, IIT-Kharagpur and other CSRI and ICAR institutes to formulate the detailed cost norms and model DPRs, and appraise the proposals for setting up the Common Incubation Facilities (CIFs). MoFPI has called for applying to CIFs, and received proposals from 23 states and 2 UTs.

Out of 25 proposals, MoFPI has approved 5 millet-based incubation centers. For implementing these projects, ICAR-IIMR was chosen to be the Mentor Institute for two states – Telangana and Kerala.

ANNEXURE 26 – Programs of Poshan Abhiyan/Others for Targeting the Inclusion of Millets

i. **Hot Cook Meal Programs** – Feeding pregnant women, lactating mothers and children for better nutritional outcomes. Millets in combination with pulses could be a transformative supplementation. Millets in the form of Pongal, Porridge, Malt and local recipes need to be included.

ii. **Take-Home Ration** – The traditional rice or wheat supplements can be replaced with a diverse range of millet flours, semolina, instant mixes, snacks, etc., and their needs for protein, fibre and other micronutrients can be addressed efficiently.

iii. **Nutrition Literacy to Women and Children** – Awareness creation on the importance of millets in terms of their rich nutrients, health benefits, various recipes, etc., through the existing system such as Anganwadi, NRHM, Sarva Siksha Abhiyan, RGSEAG, etc.

iv. **Rajiv Gandhi Scheme for the Empowerment of Adolescent Girls (RGSEAG) –** Millet based supplements will help in minimizing the anaemia in adolescent girls and thus breaking the inter-generational malnutrition of newborn babies.

v. **National Rural Health Mission (NRHM) –** For various supplementations such as Iron, Calcium, Folic acid, etc.

vi. **Mid-day Meal Programs –** Introducing millets to school-going children will create long-lasting anthropological growth, nutritional awareness and healthy food habits of the next generation. Supplementing the various recipes like Roti, *Pulav, Pulihora, Pongal*, Malt, Sweets, Snacks, etc., on a daily or weekly basis is much necessary for minimizing the stunting and wasting in children.

vii. **Biofortification** – Released biofortified varieties of sorghum, pearl millet, finger millet and other small millets having high levels of zinc, calcium and iron, may be introduced in supplementary nutrition programs of the WCD department.

viii. **Residential Schools, Colleges and Hostels** – Supplementing the feeding on daily basis is much necessary. The above list will suit.

ix. **Public colleges and Universities** – Guidelines to introduce the millet recipes in the hostels will make an impact on health benefits and shift to healthy food habits in the current generation of people.

x. **Ongoing Public Feeding Programs** – Guidelines for state governments to include the millet-based foods in ongoing feeding programs like Annapurna Canteens in Telangana, Anna Canteens in AP, Amma Canteens in Tamil Nadu, etc.

xi. **Occasional Feeding Programs** – Guidelines for inclusion of millet foods in occasional public-funded programs such as Maha Kumbhmela, Pushkaraalu, etc.

xii. **Other Programs** – TPDS, NFSM, etc.