

KNOWLEDGE PAPER ON

MILLETS 2021

STATUS & WAY FORWARD

An outcome of Virtual Meeting organised by ASSOCHAM



JULY 9, 2021



KNOWLEDGE PAPER ON

MILLETS 2021

STATUS & WAY FORWARD

An outcome of Virtual Meeting organised by ASSOCHAM

JULY 9, 2021

Event Partner



Knowledge Partners



THE ASSOCIATED CHAMBERS OF COMMERCE AND INDUSTRY OF INDIA

4th Floor, YMCA Cultural and Library Building, 1 Jai Singh Road, New Delhi-110001
Tel: 011-4655 0555 (Hunting Line) | Fax: 011-2301 7008/09 | Web: www.assocham.org

Follow us on



Dr. S.K. Malhotra
Agriculture Commissioner

Phone : +91-11-23383549, 23381012
E-mail : ag.comm@nic.in
agricommissioner@gmail.com



भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
कृषि भवन, नई दिल्ली-110001
Government of India
Ministry of Agriculture & Farmers Welfare
Department of Agriculture, Cooperation
& Farmers Welfare
Krishi Bhawan, New Delhi-110001
Dated: 6th September, 2021

Message

It was my pleasure to be the Chief Guest in the Session on **Millets 2021: Status and Way Forward** organised by ASSOCHAM on July 09, 2021.

According to the Ministry of Agriculture & Farmers Welfare, in 2016 – 2017, the area under the cultivation of millet declined with 60% less coverage area (to 14.72 million hectares) due to change in consumption pattern, conversion of irrigated area for wheat and rice cultivation. But with the concerted efforts of Government, the productivity increased and production level is stagnant from last few years.

In the endeavour to ensure food and nutrition security for our country, it is important to increase the production of these crops as they are rich source of various essential nutrients and it is also important to simultaneously revert the control of production, distribution and consumption back to the people. I am happy to inform you that the **year 2023** will be observed as the **International Year of Millets**, following India's proposal to the Food and Agriculture Organization, which was approved by UN General Council in March, 2021.

I sincerely take this opportunity to appreciate ASSOCHAM's efforts for the timely organisation of the discussion and release of knowledge paper on "**Millets 2021: Status & Way Forward**" with the inputs from the industry, academia and key stakeholders.

I wish ASSOCHAM to keep going with such initiatives!

(S.K.Malhotra)
Agriculture & Horticulture Commissioner



Mr. Vineet Agarwal

President, ASSOCHAM and Managing Director
Transport Corporation of India Limited

MESSAGE

Millets can be the wonder crop providing food, nutrition and livelihood security, beating the adverse effects of climate change with low chemical inputs such as fertilizers and pesticides. India currently has around 14 million hectares of land under millets cultivation. These areas include Haryana, Uttar Pradesh, Chhattisgarh, Gujarat, Rajasthan, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu and Telangana. Production of millets is around 14 million tons a year, with Rajasthan, Maharashtra, and Karnataka leading in millet farming. In spite of the superior quality of millets, only pearl millet has been prioritized as the crop of choice for iron biofortification in India. Therefore, the vast potential exists to utilize the minor millets for biofortification.

Sensing the opportunity, the Government of India had approved 2018 as the National Year of Millets to boost the production of the nutrient-rich millets and the agro-industries involved in its production. Under the National Food Security Mission – NFSM of the preliminary targets for enhancing food grain production by an additional 25 Million Tonnes, the share allocated for millets is 2 Million Tonnes, i.e. 8 per cent of the enhanced food grain production.

The Indian policymakers refocused their attention towards millet farming systems and enacted policies to create an enabling environment for the farmers. This included Integrated Cereals Development Programmes in Coarse Cereals ICDP-CC, Initiative for Nutritional Security through Intensive Millet Promotion – INSIMP (Part of Rashtriya Krishi Vikas Yojna - RKVY) and Rainfed Area Development Programme – RADP, also a component of RKVY.

In view of this backdrop, I have the pleasure to present this Knowledge Paper on “Millets 2021: Status & Way Forward”, an outcome of a Virtual Meeting organized by ASSOCHAM, in association with the Indian Institute of Millet Research (IIMR) and NutriHub.

I take this opportunity to congratulate all the experts associated with the report for their contribution and inputs.

Thank you.



Mr. Deepak Sood

Secretary General
ASSOCHAM

MESSAGE

Millets (sorghum, pearl millet and small millets) are the vital food and fodder crops in semi-arid regions. They are predominantly gaining more importance in nations that are populous, malnourished and facing significant climatic uncertainties. These crops are adapted to a wide range of temperatures, moisture regimes, and input conditions, supplying food and feed to millions of dryland farmers, particularly in developing countries. Also, nutrient to nutrient, every single millet is astonishingly superior. Besides, they also form the essential raw material for potable alcohol and starch production in industrialized countries.

Despite this, millets have received less attention than the major cereals and India has witnessed a decrease in the area under millets production in the past six decades. However, because of national and state-level initiatives, today, millets are returning to farms and fields. The usage of millets in infant food and nutrition products is increasing, and many manufacturers are expanding their business. Growing awareness amongst consumers regarding health benefits associated with millets consumption will boost the industry's growth by 2025. Currently, millets are being promoted through technology dissemination, quality seeds through millet seed hubs, awareness generation, minimum support price and inclusion in PDS. In India, millets are mostly cultivated in Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Odisha, Madhya Pradesh, Rajasthan and Uttarakhand states, allowing a significant potential for growth.

The year 2023 will be observed as the International Year of Millets, following India's proposal to the Food and Agriculture Organization, which was approved at the 160th session of the FAO Council in December 2018.

I am happy to note that ASSOCHAM, in association with the Indian Institute of Millet Research (IIMR) and NutriHub, is releasing this Knowledge Paper on "Millets 2021: Status & Way Forward". I am confident that this paper will provide valuable insights to the reader, and the recommendations will help the policymakers plan the future in the segment.



Mr. Vivek Chandra

Co-Chair, Food Processing Council ASSOCHAM & CEO
Global Branded Business, LT Foods

MESSAGE

Millets are one of the oldest foods known to humans & possibly the first cereal grain to be used for domestic purposes. Millet cultivation can be adopted at a very wide scale. Millets can be grown in diverse agro-ecological zones and are particularly suited for drylands and hilly areas. They can be grown with very low inputs and the cycle from sowing to harvest can be completed in 2 to 4 months.

All millets are nutritionally rich. Encouraging millet production and consumption directly helps in improving malnourishment and correcting the slow growth in correction of nutritional disorders such as anaemia, surging lifestyle disorders such as diabetes, hypertension, metabolic syndrome, etc.

Various innovative interventions have recently been introduced and including, farm level backward integration which converts domestic cultivation to commercial cultivation for meeting health-conscious urban consumer needs. Diversification of processing technologies through developing and retrofitting more than 50 machineries suitable for millets milling to many semi-processed technologies such as baking, cold extrusion, hot extrusion, flaking, popping, puffing, fermentation, malting etc. Nutritional evaluation of millets & their value-added products and clinical trials should be conducted to substantiate the health benefits through empirical data ably supported by NIN.

There is a need to engage all the stakeholders including Schools, Dietitians, Nutritionists, Restaurant chefs, SHGs & NGOs, Private sector, Policy, Individual family's Organic groups, encouraging public-private partnership for the promotion of millets and appropriate communication strategies to create more awareness regarding the nutritional benefits of millets should be implemented.

It gives me immense pleasure to share that ASSOCHAM in association with Indian Institute of Millet Research (IIMR) and NutriHub has developed this Knowledge Paper on "Millets 2021: Status & Way Forward".

I hope that this knowledge paper will provide valuable insights on the current scenario of the millet industry and will help us better understand it.

TABLE OF CONTENT

1. INTRODUCTION	1
1.1 Global Scenario of Millets.....	1
1.2 Status of Millets in India	2
1.3 Export Scenario of Millets	4
1.4 Biofortification of millets	4
2. UTILITIES IN VARIOUS INDUSTRIES.....	6
2.1 Feed Replacement.....	6
2.2 Distilleries	6
3. CHALLENGES IN MILLETS.....	8
3.1 Production related Challenges	8
3.2 Processing related Challenges	9
3.3 Marketing related Challenges.....	9
3.4 Regulatory Challenges	10
4. RECOMMENDATIONS.....	11
4.1 Value chain development for millets.....	11
4.3 Policy Specific Interventions	12
4.4 Popularization and Strategic Awareness Creation	12
4.4 Building the Private Processing Industry	13
4.5 Marketing Aspects.....	13

Executive Summary

Millets are one of the traditional foods known to humankind and possibly the first cereal grain to be cultivated for domestic purposes. Millets are small-seeded grasses that are hardy and grow well in dry zones as rain-fed crops, under marginal conditions of soil fertility and moisture. Millets are rich in minerals like iron, magnesium, calcium, phosphorous and potassium. India is the largest producer of millets in the world. Government of India gazetted Millets as "Nutricereals" for their rich nutrition value. Millets are cultivated majorly in 21 states in an area of 12.68 million hectares, producing 15.30 million tonnes with an average yield of 1236 kg/ha in the year 2019-20. Millets are consumed in many different forms viz. staples, RTE and RTC products. Application of millets also expands to animal feed segment and distilleries. Low productivity of millets, non-availability of good quality seeds, lesser shelf life of millets value added products, lack of technologies/machineries for primary and secondary processing, lack of demand, lack of awareness on the nutritive value of millets, absence of established market linkages, lack of uniform standards and grades for exporting are the major problems. Expansion of area under millets in non-traditional millet cultivating regions, using good quality seeds, cultivating HYV of millets, adopting Good Agricultural Practices and incentivizing millet cultivation is important to increase the production and productivity of millets. Intense research is needed in the areas of millets shelf life, nutritional profiling, development of primary and secondary processing machines to bring consumer specific millet value added products of export quality. Promoting entrepreneurship in millet related products, replicating the successful value chain model developed by ICAR-IIMR, organizing millet promotion programmes to create awareness among consumers is also important. Mainstreaming millets in public funded programmes such as MDM, ICDS to cater millets among common public is inevitable to overcome problems that includes many lifestyle diseases and malnutrition. Millet promotion has to be percolated to various states and districts with knowledge partnering and technology backstopping through various states' millets missions from premier institutions such as IIMR, CFTRI, NIN, etc., Multi-stakeholder led consortium should be engaged in awareness creation through proper branding as cereals of the future. Roping in private sector for inclusive investment will go a long way in taking millets not only a Pan-India but also mainstreaming in export markets as a run up for International Year of Millets – 2023.



Dr. B. Dayakar Rao
(CEO-Nutrihub, Principal Scientist - ICAR-IIMR)

CHAPTER 1: INTRODUCTION

Millets are one of the traditional foods known to humans & possibly the first cereal grain to be used for domestic purposes. Millets are small-seeded grasses that are hardy and grow well in dry zones as rain-fed crops, under marginal conditions of soil fertility and moisture. Millets are also unique due to their short growing season. They can develop from planted seeds to mature, ready to harvest plants in as little as 65 days and are important in highly populated country like India. If properly stored, whole millets can be maintained with good quality for two or more years. Millets are good for diabetic patients as they have a low glycemic index. In terms of production millets are a very versatile, climate resilient crop and can be grown in every nook and corner of our country.

Important millet crops grown in India are Sorghum (Great millet), Bajra (Pearl millet), Ragi (Finger millet) and Small millets viz., Korra (Foxtail millet), Little millet, Kodo millet, Proso millet and Barnyard millet. These are often referred to as coarse cereals, but realizing the nutrient richness of the grains they are now gazetted as "Nutricereals". Millets are rich in minerals like iron, magnesium, phosphorous and potassium. Finger millet is the richest in calcium content, about 10 times that of rice or wheat and proso millet provides richest protein content of about 12 %. Similarly, in terms of nutrient to nutrient comparison, every single millet is extraordinarily superior to rice and wheat and therefore is the solution for the malnutrition that affects a vast majority of the Indian population. Other than the nutritional benefits, millets are also has other advantage such as requires less water, climate resilient, zero carbon footprint, etc.

1.1 Global Scenario of Millets

According to FAO, the world production of millets is 90.35 million metric tonnes from an area of 75.70 million ha (Source: FAO Statistics, 2018). 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%. 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. During the same decade, the area under other millets showed a declining trend from 36 million hectares during 2010 to 33.56 million hectares in 2018, while production decreased from 32.79 million metric tons to 31.02 million metric tonnes during the same time period.

Trends in global millets area, production and yield

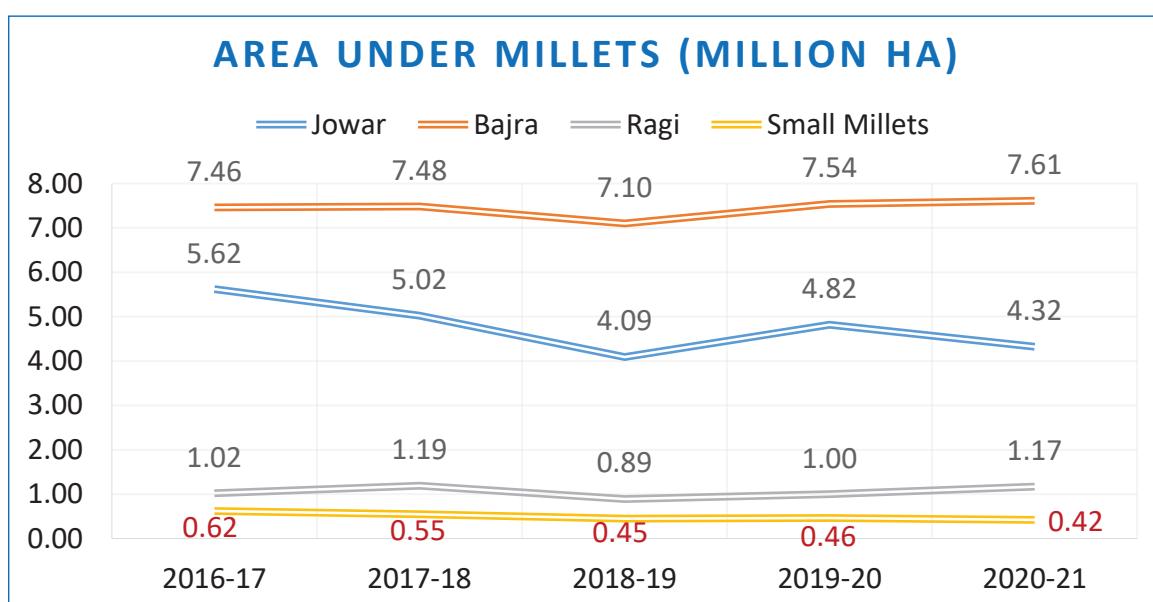
Year	Sorghum			Other Millets		
	Area harvested (M.Ha)	Production (M.tn)	Yield (kg/ha)	Area harvested (M.Ha)	Production (M.tn)	Yield (kg/ha)
2010	42.17	60.18	1427.3	36.01	32.80	910.8
2011	42.20	56.81	1346	33.97	27.05	796.4
2012	39.26	57.32	1460.1	31.26	26.64	852.2
2013	43.90	61.89	1409.9	31.23	26.43	846.2
2014	44.64	68.28	1529.4	32.21	28.42	882.1
2015	42.06	66.00	1569.1	29.58	28.21	953.7
2016	46.13	63.66	1380	31.65	27.71	875.5
2017	41.56	57.73	1388.9	31.51	28.37	900.4
2018	42.14	59.34	1408.1	33.56	31.02	924.3

Source: FAO Data

1.2 Status of Millets in India

India is the largest producer of millets in the world. In India, Millets are grown in about 21 States. There is a major impetus in Karnataka, Andhra Pradesh, Tamil Nadu, Kerala, Telangana, Uttarakhand, Jharkhand, Madhya Pradesh and Haryana.

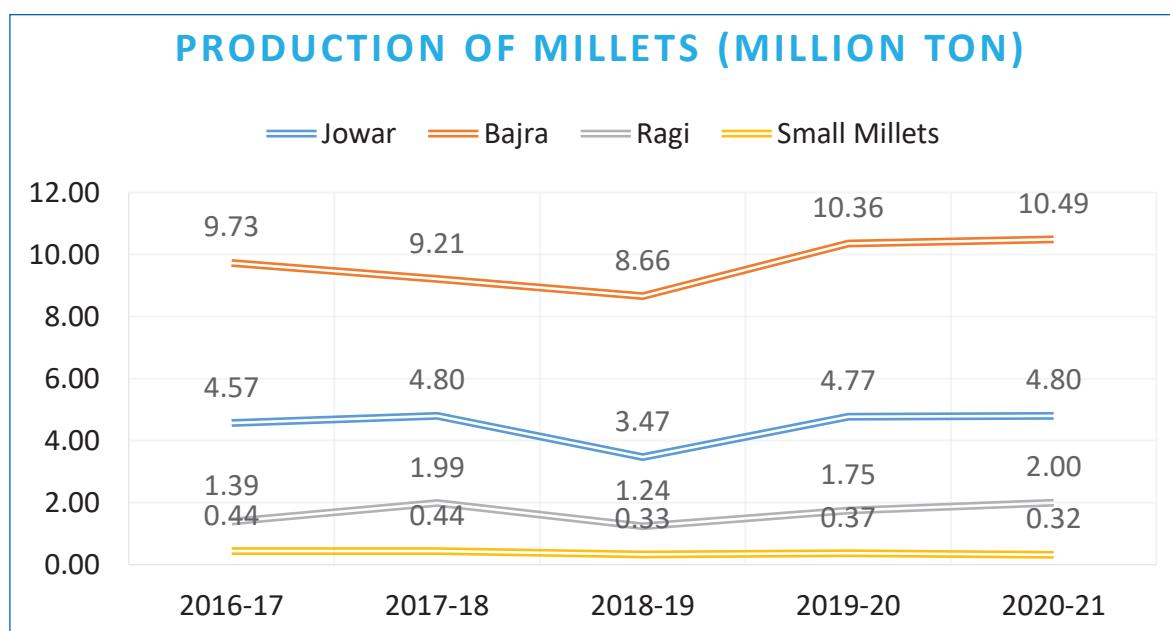
In India, millets are cultivated in an area of 12.68 million hectares, producing 15.30 million tonnes with a yield of 1236 kg/ha in the year 2019-20. Sorghum is the fourth most important food grain in India after rice, wheat and maize in terms of area (4.48 Mn. ha) and production (4.38 Mn. MT). India 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. Though, area under millets has gone down significantly but the production & productivity has increased by 32% and 159% respectively. This increase in the production of millets will contribute in doubling farmers income by the year 2023-24 which also will be recognized as the International Year of Millets.

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).

Production of all the millets recorded a high negative growth rate (-3.6%) backed by a decline in area under cultivation of sorghum at CAGR of -17.8 %, pearl millet (-7.5%), Ragi (-19.8 %) and small millets (-22 %) from 2014-15 to 2019-20. Though there is a decline in area and production, at the overall level, the yield has shown growth with a CAGR of 13.5 % during the same period. Even in small millets, the yield has witnessed growth with a CAGR of 22 % during the same period.



Over the last seven decades lot has changed with regard to millets. Post green revolution, the scenario of Indian agriculture has been changed and people are shifted to cultivate rice and wheat due to several reasons such as changing in food habit, increased income, higher productivity, urbanization, competition with other crops.

The area under all small millets is drastically decreased from 1950 to 2019 whereas area under rice and wheat has increased by 43 per cent and 200 per cent respectively. Below table represents a snapshot of the trends in area, production, and productivity of, Ragi, Jowar, Bajra and other small millets between 1950 and 2019.

Millets Area (000 Hectares) and Production (000 Tonnes)								
Year	Ragi		Jowar		Bajra		Small Millets	
	Area	Production	Area	Production	Area	Production	Area	Production
1950-1951	2203	1429	15571	5495	9300	2595	4605	1750
1960-1961	2515	1838	18412	9814	10695	3283	4955	1909
1970-1971	2472	2155	17374	8105	12493	8029	4783	1988
1980-1981	2525	2420	15809	10431	10579	5343	3976	1574
1990-1991	2171	2340	14357	11681	10900	6649	2447	1190
2000-2001	1759	2732	9856	7529	8897	6759	1424	587
2010-2011	1286	2193	7382	7003	8904	10370	800	442
2018-2019	891	1239	4093	3475	7481	8664	454	333

Source: - Ministry of Agriculture and Farmers Welfare, Govt. of India.

1.3 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 countries 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 %.

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.

1.4 Biofortification in Millets

Biofortification can target and overcome global health crisis more commonly known as the Hidden Hunger. Biofortification is one of the many strategies to overcome the hidden hunger in addition to fortification and supplementation. Biofortification strategy makes sense and can be adaptable as it is based on food crops that are already grown and eaten by resource-poor farm households.

As suggested from scientific evidences, consuming biofortified foods help to overcome micronutrient deficiency and are also cost-effective. Biofortified food systems can be holistically catalysed by ensuring supply, demand, advancing enabling environment and marshalling evidence. Currently more than 340 varieties of biofortified crops have been released in 40 countries with many more in the pipeline.

ICAR- IIMR's 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). 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. High Iron biofortified pearl millet improves cognitive function in Iron deficient Indian adolescents.

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).

CHAPTER 2: UTILITY IN VARIOUS INDUSTRIES

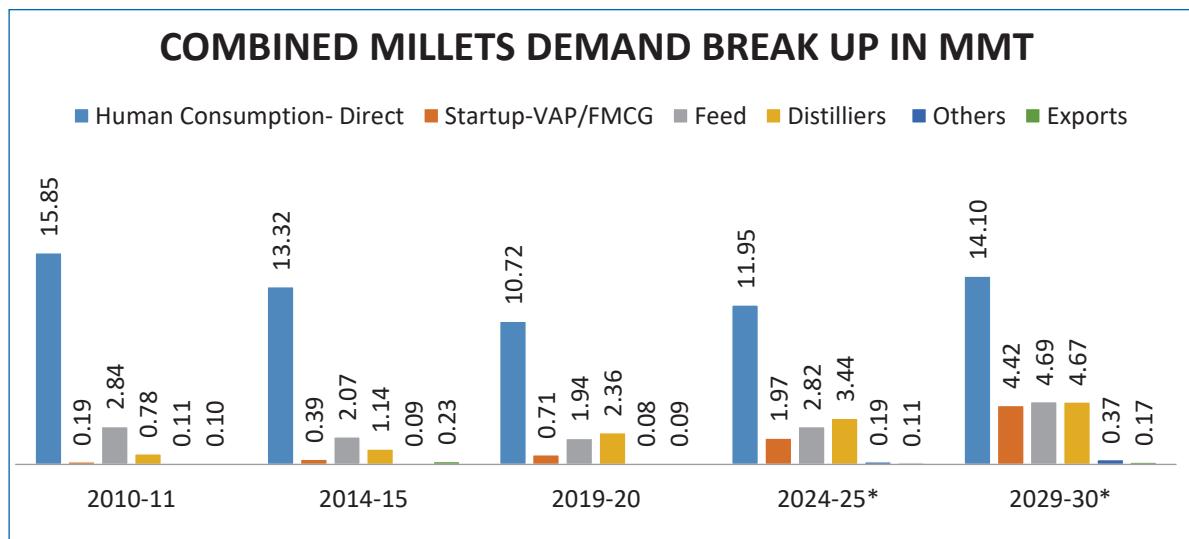
Other than millets being used in food processing industries and for human consumption, it can be used in many other industries also.

2.1 Feed Replacement

Maize is one of the cheapest sources of energy used in production of animal feed or compound feed compared to other grains. It provides the most energy at INR 1 compared to other feed grains as it provides highest metabolizable energy. Despite this, the scenario may not remain the same in coming years as the growth of maize production is slower compared to its consumption in animal feed segment. Moreover, the production of compound feed is likely to grow by CAGR of 5.6% which would put more stress on domestic maize demand. Eventually, this increase in demand and shortness of supply would push its prices and encourage cheaper imports. To arrest this deficit projected in coming future may to some extent filled by using alternative feed grains particularly millets like bajra, sorghum, ragi etc. The availability of conventional cereals or grains like wheat and rice would be limited due to their extensive usage in food segment.

2.2 Distilleries

Jowar is used in distilleries for use for liquor production. During 2010-11, most of the millets were used as food with a small portion going towards animal feed and other segments. The share of millets used as direct food for human consumption over the year has gradually declined to 10.72 MMT by 2019-20. It fell at a CAGR of 2.45% during 2010-11 to 2019-20. This can be attributed to change in food habits amongst the population particularly in rural areas. But over 50 % of Indian Urban millet consumption is in value-based products and the major distribution channel in urban is e-commerce/online stores.



The rising health consciousness amongst upwardly urban youth population is likely to re-discover the millets consumption as direct food in coming years. Moreover, many start-ups/FMCGs are coming up with millets based food products which is likely to attract more people in coming year. This resurgence in demand in urban and semi-urban areas is likely to boost its growth at a CAGR of 20.01% from 2019-20 till 2029-30.

In case of animal feed, projected rise in population of livestock and poultry in the coming 10 years is likely to put strain on the dominant feed grain i.e. maize. Its growth in production is projected slower compared to its Feed and FSI demand for the mentioned period. This would push feed manufacturers to either import maize which could be costly or use other domestic grains. The conventional grains like wheat and rice would mostly be used as food so its availability for feed is doubtful and this could make millets both major and minor the perfect replacement for maize in this segment.

India has pre-poned the target of achieving 20% ethanol-blending with petrol by five years i.e. from 2030 to 2025 as it looks to cut dependence on costly oil imports. The govt wants to use excess food grain supplies including millets to achieve this target. Taking this policy change into account, we are projecting usage of millets in distilleries to grow by a CAGR of 7.05% for the duration 2019-20 till 2029-30.

CHAPTER 3: CHALLENGES IN MILLETS

3.1 Production related Challenges

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. Most of the millet crops are cultivated under rainfed conditions.

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.

Area Stabilization & Area expansion in non-traditional areas: 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. Similarly, 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.

Nutritional profiling of various cultivars across all major millet growing areas: All the released cultivars have to be nutritionally evaluated for virtues and performance with regard to proximate composition, GI, etc.

Availability of Good Quality Seeds: There 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. Lack of mechanizations in pearl millet production and inadequate seed production research is another major problem in producing good quality seeds.

3.2 Processing related Challenges

Problems in Primary Processing

- Primary processing of millets is so challenging. Lack of appropriate processing technologies that yield stable shelf products constitutes a significant limitation in the utilization of millet grain to develop value-added products.
- Different processing facilities is needed for different millets because of the various grain size and physical structure such as outer seed coat which is of 1-7 layers.
- Polishing minor millets as done for major food cereals may lead to nutrition losses, defeating the purpose of consuming it.
- Lack of proper mechanism to separate unhulled grains from de-hulled grains.
- The other major problem is absence of proper grades and standards.

Problems in Secondary Processing

- 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.
- One of the most important challenging issues pertaining to millets value added products is their shelf-life. Low shelf life of flours and semolina due to hydrolytic and oxidative rancidity (Approx. 6 months) is caused by enzyme lipase and lipoxygenase.
- 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.
- Lack of comprehensive data on the effect of various processing technologies on nutritional characteristics and a framework of best processing technologies is also a major concern.

3.3 Marketing Related Challenges

- Absence of Market Intelligence on millets to analyze the export competitiveness of millets, and price volatility of domestic and international markets.
- Market Intelligence with information on standards of international markets, emerging segments, regulations and trade policies in the public domain and consumer preferences.
- Mechanism for building linkages between startups, big processors, government markets/programs, etc. required for bulk deals and contract manufacturing is also absent in current situation.

- Overcoming the social stigma on millets that they are Poor Man's Food, lack of awareness among the consumer about millets, lack of palate-friendly RTE/RTC products were other challenges faced by the industries.
- Other than this, high entry barriers in modern retail, low market awareness for both the ingredients & product formats, low repeatability in purchase, lack of package of strategies for Branding, Positioning, USP and Marketing in various consumer segments, countries, or regions were the other problems.

3.4 Regulatory Challenges

- 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.
- Quality standards and their certification is still a major drawback for export Millet based product claim should be part of the approved claim list of FSSAI so companies who are interested can use it in public relations.
- Lack of knowledge about export policies and understanding about the markets in different countries.

CHAPTER 4: RECOMMENDATIONS

4.1 Value Chain Development for Millets

- Expansion of millets cultivation across the country including in non-traditional areas like UP, Punjab, Haryana to augment higher production for domestic as well as global requirements and enhancing their yield levels is needed.
- Efforts to bring millets cultivation under irrigated condition. This would enhance the productivity level to meet the expected demand of millets around 40-50 Billion tonnes in 2050.
- Public-Private organizations can come together in building up of seed hubs for increasing the quality seed capacity and production. Usage of good quality seed can increase the production at least by 20 %.
- Establishment of Public-Private partnerships can lead to increased investment towards increasing seed & seed grain production, improving last mile activities such as segregation, aggregation, increasing processing capacities both in organized as well as unorganized sectors.
- 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 stakeholders 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.
- Upscaling, strengthening & Replication of scalable State Millet Missions & district level penetration.

4.2 Policy-Specific Interventions

- Incentivizing millet cultivation to increase the area under millets. Models of state like Karnataka can be replicated where under the “The Food of the Future” initiative farmers were given ₹ 10000/ ha incentive to for cultivation of millets)
- To increase the demand of the millet among common public, millets should be incorporated in the public distribution programme such as PDS under a nominal price of Rs. 1/Kg. Currently only 6 states provides millets through their PDS system.
- As of now, MSP covers only major millets (Sorghum, Bajra, Ragi), provision of MSP for minor millets should be considered.
- Biofortified millets can be made available for the consumption of resource-poor farm households, as it reduces “Micronutrient” deficiency and are can be sustainable solution to alleviate malnutrition.
- Introducing nutrition benefits of millets in course curriculum of school education, catering schools and hotel management institutions and public health care communication.
- Establishment of millet clusters, modernization of existing processing units, establishing automated processed units, establishment of export promotion forums constituting industries is needed for the uptake of millets export.
- 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.
- 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, start-ups, etc., would become a possibility.

4.3 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.
- 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., in co-ordination with various ministries such as tourism and external affairs 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.

4.4 Building the Private Processing Industry

- Accelerating the Incubation of Millet Start-ups 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.

4.5 Marketing Aspects

- Building consumer focussed “Millet based Products” is important. Demand generation should be major area of focus for the companies.
- Existing mega trends in food industry such as convenience, snacking space and traditional foods should be targeted to develop and market millet based products.
- Customer's mindfulness and the focus on health & well-being should be correctly captured and in demand for superfoods and functional foods should be fuelled with millet based products.
- Breaking the general philosophy of “Common Product for All”, companies should start developing selling millet based products based on the needs of the consumer.
- Building USP around individual millets highlighting its nutritional benefits, and also by promoting its superiority as sustainable and climate resilience crop and its importance for society.
- Systematically strengthening of millets value chain from seeds and cultivation to palatable nutritious recipes and products to increase India's market share size in international markets.

ACKNOWLEDGEMENT CONTRIBUTORS



Dr. S. K. Malhotra
Agriculture Commissioner
Ministry of Agriculture and
Farmers Welfare, Govt. of
India



Ms. Pradnya Paithankar
SDG Manager
UN-WFP



Mr. Vivek Chandra
Co-Chair, Food Processing
Council ASSOCHAM & CEO
Global Branded Business,
LT Foods



Mr. Amit Singh
Head of Raw Material
Procurement
Warehousing and Inbound
Logistics ITC Limited,
Food Division



Dr. Binu Cherian
Country Director
HarvestPlus



Mr. Akhilesh Singh
Lead Breeder-Pearl Millet
Bayer BioScience



Mr. Unupom Kausik
President
NCML



Mr. B. Dayakar Rao
Principal Scientist
IIMR & CEO, NUTRIHUB



Dr Vilas A Tonapi
Director
ICAR- IIMR



Mr. Prashant Parameswaran
MD & CEO, Tata Consumer
Soulfull Private Limited



Ms. Vinita Sudhanshu
Deputy General Manager
APEDA



Ms. Nirupama Sharma
Joint Director & HOD
(Agri, Food Processing & FMCG),
ASSOCHAM



Dr M Kandeeban
Research Manager
(Agribusiness
Management)



Ms. Aaina Agrawal
Senior Executive
(Agri, Food Processing & FMCG),
ASSOCHAM

About ASSOCHAM

The Knowledge Architect of Corporate India

Evolution of Value Creator

ASSOCHAM initiated its endeavour of value creation for Indian industry in 1920. Having in its fold more than 400 Chambers and Trade Associations, and serving more than 4,50,000 members from all over India. It has witnessed upswings as well as upheavals of Indian Economy, and contributed significantly by playing a catalytic role in shaping up the Trade, Commerce and Industrial environment of the country.

Today, ASSOCHAM has emerged as the fountainhead of Knowledge for Indian industry, which is all set to redefine the dynamics of growth and development in the technology driven cyber age of 'Knowledge Based Economy'.

ASSOCHAM is seen as a forceful, proactive, forward looking institution equipping itself to meet the aspirations of corporate India in the new world of business. ASSOCHAM is working towards creating a conducive environment of India business to compete globally.

ASSOCHAM derives its strength from its Promoter Chambers and other Industry/ Regional Chambers/ Associations spread all over the country.

Vision

Empower Indian enterprise by inculcating knowledge that will be the catalyst of growth in the barrierless technology driven global market and help them upscale, align and emerge as formidable player in respective business segments.

Mission

As a representative organ of Corporate India, ASSOCHAM articulates the genuine, legitimate needs and interests of its members. Its mission is to impact the policy and legislative environment so as to foster balanced economic, industrial and social development. We believe education, IT, BT, Health, Corporate Social responsibility and environment to be the critical success factors.

Members – Our Strength

ASSOCHAM represents the interests of more than 4,50,000 direct and indirect members across the country. Through its heterogeneous membership, ASSOCHAM combines the entrepreneurial spirit and

business acumen of owners with management skills and expertise of professionals to set itself apart as a Chamber with a difference.

Currently, ASSOCHAM has more than 100 National Councils covering the entire gamut of economic activities in India. It has been especially acknowledged as a significant voice of Indian industry in the field of Aerospace and Defence, Auto and Auto Ancillaries, Arbitration & Legal Affairs, Corporate Social Responsibility, Environment & Safety, HR & Labour Affairs, Corporate Governance, Information Technology, Luxury and Lifestyle, Biotechnology, Telecom, Banking & Finance, Company Law, Corporate Finance, Economic and International Affairs, Tourism, MSMEs, Textiles, Civil Aviation, Infrastructure, Energy & Power, Education, Legal Reforms, Real Estate and Rural Development, Startups & Skill Development to Mention a few.

Insight into 'New Business Models'

ASSOCHAM has been a significant contributory factor in the emergence of new-age Indian Corporates, characterized by a new mindset and global ambition for dominating the international business. The Chamber has addressed itself to the key areas like India as Investment Destination, Achieving International Competitiveness, Promoting International Trade, Corporate Strategies for Enhancing Stakeholders Value, Government Policies in sustaining India's Development, Infrastructure Development for enhancing India's Competitiveness, Building Indian MNCs, Role of Financial Sector the Catalyst for India's Transformation.

ASSOCHAM derives its strengths from the following Promoter Chambers: Bombay Chamber of Commerce & Industry, Mumbai; Cochin Chambers of Commerce & Industry, Cochin: Indian Merchant's Chamber, Mumbai; The Madras Chamber of Commerce and Industry, Chennai; PHD Chamber of Commerce and Industry, New Delhi.

Together, we can make a significant difference to the burden that our nation carries and bring in a bright, new tomorrow for our nation.

Deepak Sood
Secretary General, ASSOCHAM
E: sg@assocham.com

The Associated Chambers of Commerce and Industry of India

ASSOCHAM Corporate Office: 4th Floor, YMCA CCL And Library Building, 1 Jai Singh Road, New Delhi-110001
Tel: 011-46550500 (Hunting Line) • Fax: 011- 23017008, 23017009 Email: assocham@nic.in • Web: www.assocham.org



THE ASSOCIATED CHAMBERS OF COMMERCE AND INDUSTRY OF INDIA
4th Floor, YMCA Cultural and Library Building, 1 Jai Singh Road, New Delhi-110001
Tel: 011-4655 0555 (Hunting Line) | Fax: 011-2301 7008/09 | Web: www.assocham.org