

Enhancing Production and Exports of Millets from India



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Executive Summary

Millets are small-grained, annual, warm-weather cereals belonging to the grass family. The millet crops originated in Asia and Africa, and are now grown in other regions of the world as well. In several parts of Africa and Asia, millets are a staple food, much like rice or wheat. Millets are also used to feed livestock, making them a valuable source of animal nutrition. Apart from their uses in consumption as food and feed, millets have also been used in traditional medicine system as herbal remedies to treat several diseases, owing to their various medicinal properties.

Jowar (Sorghum), Bajra (Pearl Millet), and Ragi (Finger millet) are the major categories of millets cultivated in India. Besides these, small millets such as proso (cheena), kodo (kodra, arikelu), foxtail (kangni/korra), barnyard (varai, sawa), little millet (kutki), fonio, and pseudo millets including buckwheat and amaranth, are the other varieties of millets cultivated globally.

Millets are considered climate-resilient crops because of their adaptability to changing weather patterns. Cultivation of these crops requires substantially less water. According to a recent research¹, while rice cultivation requires an annual rainfall of around 1200-1250 mm, millets can be cultivated even in areas with 350 mm of rainfall. Millets are also highly tolerant to low soil fertility and high temperatures. Thus, in the wake of growing global concerns pertaining to climate change, millet cultivation can help maintain stable food production and address food security concerns. Further, nutritionally, the energy value, protein and macro nutrient contents of millets are comparable to conventional cereals such as rice.

For centuries, millets were the staples in India. However, after the green revolution, the importance and usage of millets in India reduced significantly, as the emphasis shifted to increased food grain production and productivity using high yielding varieties of wheat and rice. Over the recent years, recognising the important role played by millets in ensuring food and nutritional security, the Government of India (GoI) has been actively promoting the consumption and cultivation of millets in India.

Against this backdrop, the Study analyses the global and Indian scenario of millet production and exports, and identifies the export potential of millets from India. The Study also discusses the challenges in expanding exports of millets and recommends strategies to overcome these challenges, in order to position India as a leading exporter of millets globally.

¹ ASSOCHAM (2022), "Millets: The Future Super Food for India"

Global Millet Scenario

The global production of millets² was estimated at 94.1 million metric tonnes (MMT) during marketing year (MY) 2023³, witnessing a y-o-y increase of 7.4%, on account of the increase in area under cultivation of millets. India was the largest millets producing country during MY 2023, with an estimated production of 17.6 MMT, accounting for 18.7% of the global millets production. The USA was the second largest producer of millets with an estimated production of 9.7 MMT during MY 2023, more than doubling from 4.8 MMT of production recorded during MY 2022. Other major producers of millets in MY 2023 included Nigeria (a share of 9.2% in global millets production), Sudan (7.0%), China (6.1%), and Ethiopia (5.8%).

Among millets, sorghum is an important category. Global production of sorghum was estimated at 62.3 MMT during MY 2023, contributing to 66.3% of the global production of millets during the year. The significant production of grain sorghum on a global scale can be linked to its numerous applications across different industries such as, beverages, value-added foods, livestock feeds, and biofuels.

Over the past decades, there has been a decline in the area under production of millets, due to the availability of more remunerative alternatives for farmers. The area under harvest for millets registered a Compound Annual Growth Rate (CAGR) of (-) 0.6% during MY 2014 to MY 2022. While area under production has dipped, the yield has improved over the past several years. The yield of millets was estimated at 1.29 MT/hectare during MY 2023. The yield of millets registered a CAGR of 0.3% during MY 2014 to MY 2023. The advancement in agricultural methods, agricultural mechanisation, and fertiliser application has resulted in the increase in yield of millets overtime.

The global consumption of millets was estimated at 93.5 MMT during MY 2023, witnessing a y-o-y increase of 6.1%. The growth was mainly due to an increase in millets consumption for animal feed purpose in China. China's consumption of millets had increased by 32.7% during MY 2023. Globally, the consumption of millets for Food, Seed and Industrial (FSI) purposes contributed to 71.6% of the millets consumption in MY 2023, followed by its use for animal feed consumption. India is the largest consumer of millets, with an estimated share of 18.7% in the global millets consumption during MY 2023. Other major consumers of millets during MY 2023 included China (a share of 15.2% in global millet consumption), Nigeria (9.3%), Sudan (7.2%), Ethiopia (5.8%), and Niger (5.6%).

Trade

Global millets exports have been robust over the recent years, registering a CAGR of 26.6% during 2018 to 2022. The outbreak of African Swine Fever among China's pig population led to a fall in global demand for millets in 2019, and resultant dip in global exports of these products. However, global exports of millets witnessed three consecutive years of increase thereafter, due to strong demand by countries in the wake of food security concerns during and after COVID-19. Global millets exports were estimated at US\$ 3.9 billion during 2021, witnessing a y-o-y increase of 67.5%. The exports further increased by 9.7% during 2022, to reach a record high of US\$ 4.3 billion.

² Includes Sorghum and Millet (henceforth referred as other millets) as per USDA Database

³ Refers to Marketing Year as considered by the USDA Foreign Agricultural Services. The reference period is September to August, with some exceptions.

Analysis of global exports of millets at HS-6-digit level indicates that grain sorghum (excluding for sowing) accounted for a majority share of 81.2% in the global millets exports during 2022, followed by other cereals including small millets at 4.4%. Besides these, other categories of millets exported globally include millet (excluding grain sorghum and seed for sowing), which accounted for 3.8% share in the global millet exports during 2022, canary seeds (share of 3.8%), buckwheat (3.7%), and grain sorghum for sowing (2.2%), among others.

The USA, which is among the largest producers of sorghum, is the largest exporter of millets as well, accounting for more than half of global millets exports during 2022. Australia was the second largest exporter of millets with estimated exports of US\$ 811.7 million during 2022, a share of 19.0% in the global millets exports during the year. Other major millets exporters in 2022 included Argentina (a share of 8.6% in global millets exports), Canada (3.3%), France (2.4%), Russia (2.4%), and India (1.6%). The top 3 millet exporting countries accounted for more than three-fourth of the global millets exports during 2022.

China is the largest importer of millets with estimated imports of US\$ 3.8 billion during 2022. China's share in global millets imports has increased overtime, from 41.3% in 2018 to 73.0% in 2022. Other major importers of millets during 2022 included Japan (a share of 2.7% in global millets imports), Spain (2.1%), Mexico (1.8%), Italy (1.3%), and Belgium (1.2%).

India's Millet Scenario

In India, millets such as foxtail millet, barnyard millet and black finger millet have been integral part of diet since a long time. In fact, before Green Revolution, millets accounted for 40% of all cultivated grains, greater than the share of wheat and rice⁴. In India, millets are produced in most of the regions characterised by low to moderate precipitation (200–800 mm rainfall).

During 2022-23, as per the third advance estimates of the Ministry of Agriculture and Farmers' Welfare, Government of India, the production of millets was estimated at 17.2 million tonnes, recording a y-o-y increase of 7.2%. Growth in India's production of millets has been rather muted, with production witnessing a CAGR of (-) 0.04% during 2013-14 to 2022-23.

Bajra also known as pearl millet is the largest category of millets produced in India, accounting for 65.1% share in India's millets production during 2022-23. Jowar, also known as sorghum, is the other major category of millet produced in India, with a share of 23.3% in India's millets production. Ragi and small millets accounted for 9.3% and 2.3% of the total millet production in India during 2022-23, respectively.

The area under millets production fluctuates depending on the price competition among seasonal crops. In 2021-22, area under millets production in India was estimated at 122.9 lakh hectare, witnessing a y-o-y decline of 9.9%. This was the second consecutive year of decline in area under millets production in India.

Among states, Rajasthan was the largest producer of millets, with a production of 4.3 million tonnes in 2021-22, contributing to 26.7% of the overall millets production in India during the year. Maharashtra was the second largest contributor, accounting for 14.4% of overall millets production in India during 2021-22. Other major millet producing states included Uttar Pradesh (a share of 13.9% in millets production), Karnataka (12.8%), Madhya Pradesh (7.4%), Gujarat (7.4%), and Haryana (7.1%). These top 7 states accounted for nearly 90% of India's millets production during 2021-22.

⁴ ICRISAT

India is the largest producer of millets; however, majority of the production is directed towards domestic consumption resulting in low export orientation, estimated at 0.9% of the production of millets in India. As against this, export orientation in millets for the USA stood at 57.1%, Australia was 95.7%, and Argentina was 63.3% during 2021.

India's exports of millets were estimated at US\$ 75.5 million during 2022-23, witnessing a y-o-y increase of 19.9%. Middle East and South Asia regions are the top destinations for India's exports of millets. The UAE was the largest destination for India's exports of millets during 2022-23, with exports amounting to US\$ 13.3 million, a share of 17.7% in India's millet exports. Other major destinations for India's millet export during 2022-23 were Saudi Arabia (a share of 13.8% in India's millet exports), Nepal (7.4%), Bangladesh (4.9%) and the USA (4.1%).

Millet (excluding grain sorghum, and seed for sowing) (HS 100829) was the major category of millets exported from India during 2022-23, with estimated exports of US\$ 30.0 million. The export under this category registered a strong CAGR of 25.3% during 2018-19 to 2022-23. Other cereals including small millets and pseudo millets (HS 100890) was the other major category of millets exported from India during 2022-23, with estimated exports of US\$ 14.4 million.

Government Initiatives

The United Nation's General Assembly declared 2023 as the International Year of Millets based on a proposal from India. As part of the effort to promote millets, the Government of India has been organising International Year of Millets 2023 events to raise awareness about Indian millets and their value-added products. To boost exports, the government is facilitating the participation of exporters, farmers, and traders in various international trade expos and Buyer Seller Meets.

The Government of India has also been focusing on millets in the recent Union Budgets. The Government announced support for post-harvest value addition and branding of millet products in the Union Budget 2022-23. In the Budget 2023-24, there was significant emphasis on agricultural innovation, with plans to transform the Indian Institute of Millet Research in Hyderabad into a Center of Excellence.

The Government is supporting branding and publicity abroad through Indian missions, engaging international chefs, and connecting with potential buyers such as departmental stores, supermarkets, and hypermarkets for organising B2B meetings and direct tie-ups. Additionally, 30 e-Catalogues have been developed for targeted countries, containing information on Indian millets, value-added products, exporters, start-ups, and other stakeholders.

Various stakeholders are adopting a collaborative approach to millets promotion. For instance, Agricultural and Processed Food Products Export Development Authority (APEDA) and the Department of Agriculture and Farmers' Welfare are collaborating to increase the cultivation area, production, and productivity of millets, including bajra, jowar, and ragi. In another example, the NITI Aayog has signed a Statement of Intent with the United Nations World Food Programme to promote millets globally. Further, APEDA has signed a Memorandum of Understanding with the Indian Institute of Millets Research to enhance value addition and farmers' income.

Further, various state governments are also implementing schemes to promote cultivation and consumption of millets in their respective states, such as Odisha Millet Mission, Andhra Pradesh Millet Mission, Tamil Nadu Millet Mission, etc.

Strategies for Enhancing Production and Exports of Millets

Target Markets for Enhancing Millet Exports

India's export orientation in millets is significantly lower than several other top millet producing countries. Currently, there are 4 millet categories at HS 6-digit level where India was among the top 5 global exporters in 2022. This includes millet seed for sowing (HS 100821), millet (excluding grain sorghum, and seed for sowing) (HS 100829), other cereals including small millets (HS 100890), and grain sorghum for sowing (HS 100710). In other categories of millets, India's exports performance has been lacklustre.

According to data from ITC Export Potential Map, India has an untapped potential of US\$ 47.1 million in export of millets (not including value added products), given India's current supply capabilities, target market demand, market access conditions, and current bilateral linkages. Tapping the latent potential in exports of millets could help increase the millets exports from India to over US\$ 122 million. To leverage this potential, the Study identifies potential target markets for different categories of millets to expand exports in the short term. Markets such as Indonesia, Nepal, the UAE, the USA, Germany, South Africa, South Korea, Turkey, Oman, and Sri Lanka could be targeted for millets (excluding grain sorghum). Meanwhile, for grain sorghum, India could target markets such as China, Sudan, Djibouti, Zimbabwe, Spain, Ethiopia, Eritrea, Italy, South Africa, and Japan, among others.

The Study also highlights significant market concentration in India's millet exports, with the top 10 export destinations accounting for approximately 67.6% of India's millet exports in 2022. A comparative assessment of the extent of market concentration in each category of millets is undertaken using a Market Concentration Index. Analysis suggests that market concentration is highest for India in the categories of millet seed for sowing (HS 100821) and grain sorghum for sowing (HS 100710). Products with high market concentration would require appropriate market diversification strategy. The Study also notes that many of the top 5 global importers across all categories of millets exports do not feature among the top 5 export destinations for India. Thus, there is also need for market penetration strategies for the top importing markets of millets.

Encouraging Export of Value-added Products

There is need for India to focus on enhancing exports of millet flour and other millet-based value-added food products. As per APEDA, currently, India's exports of millet-based value-added products are miniscule⁵. Enhancing exports of high value-added millets preparations like snacks, ready to cook (RTC)/ ready to eat (RTE) products including pasta and noodles made from millets, fermented millet flour, puffed or flaked millets items, can help fetch premium price for exporters and in turn garner greater export revenues.

Processed millets hold significant potential for exports from India, owing to the highly nutritious and gluten-free characteristics of millets, and the rising global demand for gluten-free food products in the recent years. Leveraging the market opportunities, several major players in the processed foods industry in India are entering the processed millet products segment. In addition to catering to the domestic demand, these processed food businesses should be encouraged to leverage the growing demand for healthier and more sustainable food options in the international markets.

⁵ APEDA & YES BANK (2022), Indian Superfood Millets: A USD 2 Billion Export Opportunity

A focus area for value-added exports could be malts made of millets. Malt is an extensively traded commodity, with the global exports in malt (HS-1107) amounting to US\$ 4.7 billion in 2022, although currently it predominantly consists of glutenous malts such as barley malt and wheat malt. Millet malt could become a substitute to glutenous malts considering the growing demand for gluten-free products, particularly beverages such as beers. In India, leading malted beverage manufacturers are embracing millets for brewing unique and innovative gluten-free variants of alcoholic beverages using millets such as locally grown Bajra and Ragi. These Indian manufacturers should also focus on catering to the growing global demand for gluten-free beverages.

Apart from human consumption, value added millet products in the bird feed segments could also be explored for enhancing exports. Currently, proso millet is being widely used as a mix in bird feed. India is both an exporter and importer of bird feed⁶. Focus on high quality millets, with due consideration to the seed size and traceability to ensure that they fall within Minimum Permissible Limits, could help enhance exports of these products⁷.

Enhancing Exports of Organic Millets

Over the recent years, the demand for organic products has been on a rise, with the global market for organic food and beverages reaching nearly US\$ 208.2 billion⁸ in 2022. Indian firms, including small enterprises, have already begun tapping the export market for organic millets products like noodles, cookies, namkeen, and pasta in countries such as the UAE, the USA, the Netherlands, and Australia. Institutional support from government bodies such as APEDA is also helping Indian firms to tap into the export market for organic millets from India. In 2021, the first batch of millets cultivated in the Himalayas in Uttarakhand was exported to Denmark, which was driven by the collaborative effort between APEDA, the Uttarakhand Agriculture Produce Marketing Board, and the exporter firm. Going forward, more such entrepreneurial efforts, institutional support and joint efforts, including awareness programmes and marketing campaigns, would be required to boost exports of organic millet products from India.

Addressing Non-Tariff Barriers

Analysis in the Study indicates that while the effectively applied tariff faced by India on exports of millets are relatively low, non-tariff measures (NTM) and related regulations present significant obstacles for Indian exporters. In some of top global importers, such as China, India's sorghum exporters face as many as 97 NTMs, which is substantially higher when compared to 24 NTMs faced by Indian rice exporters in China. Likewise, in the UAE, India's exports of millets (for sowing) face as many as 122 NTMs, as opposed to 10 NTMs on India's exports of rice to the UAE.

Stringent NTMs lead to higher cost of compliance and longer processing times, thereby affecting the market access. To counter the issue, there is a need to strengthen the quality testing and inspection infrastructure in the country for millets exports. The current domestic laboratory testing infrastructure is highly skewed across India. The topmost exporter of millets viz. Gujarat has 17 such labs. Meanwhile, Rajasthan, which is the largest producer and fourth largest exporters of millets, has only 15 labs, while Telangana, which is the third largest exporter of millets has only 7 such labs, as of end-August 2023. Development of testing infrastructure in the top millet producing states will be imperative for furthering exports of millets from

⁶ APEDA & YES BANK (2022), Indian Superfood Millets: A USD 2 Billion Export Opportunity

⁷ Ibid.

⁸ ISI Emerging Market: Grand View Research

the country. In this context, a comprehensive and dedicated programme for millets could be introduced by the GOI, for building technical infrastructure by investing in setting up and equipping labs. Besides this, in order to help exporters to better navigate the complex regulatory and standards requirement for exports of millets, a comprehensive manual for millet exporters could be developed comprising export protocols, quality guidelines for millets exports, details of various processing machinery and certification requirements for end-products, among others.

Addressing Data Issues for Informed Policy Decisions

The existing data on trade in millets is available for millet grains only. Data for products such as millet flour and value-added millet products is not being captured under separate HS-codes and is currently being classified under the broader category of preparations of other cereals. As against this, processed products of other cereals such as wheat flour, wheat starch, wheat gluten, wheat bran etc., have their separate HS code classifications. The absence of specific HS-Codes for processed millet products makes it challenging to assess the performance and trajectory of trade in processed millet products at both India and global level, and in turn impacts informed policy making for the sector. Thus, given the importance being accorded to millets at the international level, India should consider making representations at the World Customs Organisation (WCO) for the creation of separate HS-Codes for processed millet products such as millet flour, millet starch, millet gluten, millet bran, millet malt, etc. Additionally, the ITC-HS in India could have eight-digit classification for processed millet products as well as small millets that currently do not have separate HS codes at 8-digit level.

Strengthening the Millets Value Chain in India to Enhance Exportable Surplus

The millets value chain includes seed supply, cultivation, harvest, storage, processing, marketing (incl packaging and branding), distribution, and consumption. Addressing specific issues across the value chain and increasing the efficiency of processes would be important for positioning India as a stable and dependable source of price competitive and good quality millets and millet products in international markets. The Study focuses on some of the value-chain related challenges for enhancing millets exports and strategies to alleviate these challenges.

Augmenting Seed-hubs Capacities for Minor Millets

In India, hybrid seed development in sorghum and pearl millet has advanced rapidly. The 'seed village' concept involving multiplication of specific cultivars in particular villages has been effectively used to undertake seed production programme in non-traditional areas. During the last decade alone, more than 220 cultivars⁹ of millets have been introduced for different agro ecologies¹⁰. However, these new cultivars should be brought in seed production chain to augment millet productivity. Moreover, the adoption of hybrid seeds in other minor millets that have significant export potential has been limited. Cultivars of these other varieties need to be developed depending on the location specific requirements of soil, rainfall, temperature, humidity, day length, and cropping patterns. Nutrient-use efficiency, particularly nitrogen, both native and applied, also needs to be enhanced as small millets are generally sown in poor soils¹¹.

⁹ A cultivar is a kind of cultivated plant that people have selected for desired traits and when propagated retain those traits. Methods used to propagate cultivars include division, root and stem cuttings, offsets, grafting, tissue culture, or carefully controlled seed production.

¹⁰ National Academy of Agricultural Sciences (2022), Promoting Millet Production, Value Addition and Consumption

¹¹ ICAR (2023), Small millets in India: Current scenario and way forward, K Hariprasanna

The establishment of seed-hubs could reinforce the seed supply chain, facilitating the commercialisation of new cultivars and improving the rate of seed replacement for minor millets. These seed-hubs would help supply high-quality breeder seeds needed to further enhance the production of high-quality seeds.¹² This would improve the exportable surplus from the country.

Promoting Adoption of Bio-fortified Millet Seeds

Bio-fortification of millet refers to development of nutritionally enriched millet varieties through genetic manipulations. This seed-based approach is farmer-empowering and can also go a long way in reducing deficiency of micronutrients, particularly iron, zinc and vitamin A. According to a recent report by the National Academy of Agricultural Science, pearl millet already has a biofortified variety named “Dhanashakti”¹³. Currently, India is growing more than 70,000 ha of biofortified pearl millet¹⁴. Research efforts are also ongoing for the development of biofortified sorghum varieties combining high yield and micronutrients as well as biofortified small millet varieties with high iron and zinc content¹⁵.

Given the potential of biofortification in millets as a feasible strategy to alleviate the micronutrient malnutrition, there could be greater focus on cultivation of biofortified millets as well as production of biofortified millet seeds for exports to partner countries. These biofortified millets would have export appeal in the African region where nutritional security is a major concern and millets are also widely consumed.

Biofortified millet variants can also be promoted for use by the food processing industries. Companies can be encouraged to engage in contract farming of specific biofortified millet varieties for secondary and tertiary processing, with a focus on catering to both domestic and international markets.

Promoting Cluster Farming of Millets

Millets can help India’s agricultural exports become more sustainable. A shift away from water-intensive crops such as rice towards millets could significantly alleviate the water scarcity issue. However, the cultivation would require more land because of the lower yield of millets compared to crops such as rice. Thus, improving the productivity of millets would be crucial to ensure that the trade-off is beneficial for farmers.

Select farmers’ collectives or millet-producing clusters in the country, such as in the Gajapathi district of Odisha, have been successful in ensuring cost reduction and increased productivity. By aggregating resources and procuring inputs in bulk, the groups reduce production costs, enhance farm productivity, and increase profitability. Such model could be further scaled up for enhancing the productivity and in turn, the exportable surplus. In addition to enhancing productivity, this cluster-based approach could also be helpful in enhancing farmers’ access to modern processing technologies that are vital for millet cultivation. Besides, the cluster approach can also help in cost-effective quality control, meeting packaging standards and obtaining certifications for targeting export markets.

Increasing Farmer’s Income through Carbon Markets

As climate change concerns gain prominence, carbon markets offer opportunities to generate revenues while promoting environmental sustainability. Carbon markets can reward farmers for practices that reduce their emissions. Against this backdrop, production and exports of millets gains further salience.

¹² National Academy of Agricultural Sciences (2022), Promoting Millet Production, Value Addition and Consumption

¹³ Ibid

¹⁴ ICAR (2023), Enhancing Productivity And Nutrition With Biofortified Pearl Millet Cultivars

¹⁵ Ibid.

Recent research suggests that methane and nitrous oxide emissions from rice cultivation, which contribute to around 20% of the agriculture sector Green House Gas (GHG) emissions in India, can be reduced by replacing 50% of the rice with coarse cereals including millets. In fact, close to 50 Mt of CO₂e can be saved per year through this intervention¹⁶. Given the low carbon intensity of millet cultivation, participating in carbon trading and offsetting initiatives would help tap into potential revenue streams for millets farmers and exporters, while also enhancing India's environmental sustainability.

Policy level intervention would be of paramount importance for India to ensure verifiable management of GHG emissions in agriculture sector. In this context, while the GOI has recently come out with the Carbon Credit Trading Scheme to develop a carbon market in India and decarbonise the Indian economy by pricing the emission, the scheme does not specify whether carbon trading in the agricultural sector could be regulated under this scheme. The GOI could consider including a section under the scheme for regulations pertaining to carbon trading in agriculture. Once a carbon market for agriculture is adequately developed, there could be greater incentives for the private sector to provide support services for lower carbon intensive agricultural segments such as millets. This would also help encourage exports of carbon credit from the agriculture sector, going forward.

Addressing Cost Issues

A recent analysis by NABARD indicates that the returns on cultivation of millets such as jowar, bajra, and ragi remain substantially lower than wheat and rice, despite higher minimum support price (MSP) for millets as compared to rice and wheat, over the recent years. This holds true even as the cost of cultivating rice remains higher than that of millets¹⁷. Better post-production linkages, promotion of cluster farming, strengthening of farmer producer organisations (FPOs), improved processing value chains and development of carbon markets could improve returns on millets cultivation. In addition, there is a need to introduce MSP for small millets such as foxtail millet and little millet. Alternatively, state governments could introduce benchmark prices for procurement of small millets to encourage production of these millet varieties. Currently, this is being done by the Government of Odisha under its Odisha Millets Mission, wherein the state government is set to launch a benchmark price for non-ragi millets, calculated using the same formula as that of MSP. Similar measures can be taken up by other millet producing states as well.

Addressing cost issues would be crucial from the point of view of improving price competitiveness of millets exports. Given the significant cost disadvantages, the GOI could consider increasing the Remission of Duties and Taxes on Exported Products (RoDTEP) rates for millets exports, up from the current rate of 1% to a suitable higher rate. This would help make Indian millet exports more competitive in the global market and increase export volumes.

Marketing Strategy for Enhancing Millets Consumption

Popularising Consumption of Millet-based Dishes

While efforts are being made by various state governments as also by the Government of India for mainstreaming millets in the recent years, the GOI could undertake specific food promotion campaigns for popularising consumption of millet-based dishes including millet khichdi/pulao, millet dosa/idli, millet chips/

¹⁶ CSTEP (2021), Energy and Emissions Implications for a Desired Quality of Life in India via SAFARI

¹⁷ NABARD (2023), Millet for Health and Wealth

crackers etc., both domestically and in the international markets. The Government of India has undertaken several food promotion campaigns in the past, including the 'Incredible Tiffin' initiative. Other countries have also popularised their food items through similar campaigns. In South Korea, for example, a group of young Koreans undertook a promotional campaign for a well-known Korean dish, Bibimbap. Known as the Bibimbap Backpackers, this group travelled to over 20 cities in 15 countries on a 255-day trip to cook bibimbap. Similar project was undertaken by a group of Turkish volunteers, who started the Turkish Coffee Truck initiative to promote Turkish coffee culture across the USA. The GOI could also sponsor a similar programme for popularising Indian millet-based dishes. This programme could also be used as a platform for popularising the nutritional and health benefits of millets. Focus on quality and hygiene aspects in such initiatives could also help in dissipating the negative perception about Indian food being greasy and unhealthy.

Geographical Indications Tags

Geographical Indications (GIs) are considered important tools for marketing strategies, and function as product differentiators. To reap the benefits of GI status, it is important for the GI brand to be recognised as a reliable and preferred brand in the market with a distinguished positioning. Products such as Darjeeling Tea have been able to gain substantial market share on account of this brand building. In order to attain similar levels of success, key value proposition needs to be defined for the millet products having GI status.

Initiatives are also needed for identifying more local rare millet variants as well as millet products which can be accorded with GI status. Currently, several states such as Uttarakhand and Madhya Pradesh have applied and obtained GI-tags for their unique varieties of locally grown millets. Other states could adopt a similar approach for identifying local rare millets to apply for GI-tags.

In addition to identifying new products, the logo and name of the GI brand needs to be developed and marketed, and mechanism needs to be devised for ensuring that all the millet products marketed under the GI brand meet the minimum specified standards. The GOI could also introduce regulation pertaining to the minimum proportion of millets in various processed millet product to be eligible to claim the millet branding. Besides, the central and state governments could also focus on linking FPOs, food producer companies, and exporters with international business communities to facilitate marketing of GI-tagged millets from the states. Export related brochures, interactive CDs, etc. can be created for popularising the GI-tagged millet products in international markets.

Conclusion

With an untapped export potential of US\$ 47.1 million, there is significant scope for enhancing India's exports of millets. The Study recommends tapping this latent potential through focusing on market diversification, enhancing exports of organic and value-added millet products, and addressing tariff barriers. Besides, the Study also recommends strategies for strengthening the millet value chain to increase the country's exportable surplus in millets. This includes addressing cost related issues in millet cultivation, augmenting seed-hubs capacity for minor millets, adopting bio-fortified millet seeds, promoting cluster farming of millets and promoting carbon credit trading in agriculture for enhancing farmers' income. The Study also lays emphasis on marketing strategies such as popularising millet consumption through food campaigns, identification of rare millets for obtaining GI-tags, and branding and promotion of GI-tagged millet products.



Millets are small-grained, annual, warm-weather cereals belonging to the grass family. The millet crops originated in Asia and Africa, and are now grown in other regions of the world as well. In several parts of Africa and Asia, millets are served as a staple food, much like rice or wheat. These are commonly used to make porridges, flatbreads and several other staple dishes. These are also used to make traditional fermented beverages like beer or gruel. Millets such as sorghum and pearl millet are commonly used for brewing alcoholic/ malted beverages.

In addition to its use for human consumption, millets are also used to feed livestock, making them a valuable source of animal nutrition. Their nutritional value makes them an important component of livestock diets, which, in turn, contributes to food security by ensuring a stable supply of animal-based protein.

Apart from their uses in consumption as food and feed, millets have also been used in traditional medicine system as herbal remedies to treat several diseases, owing to their various medicinal properties. For instance, Foxtail yellow seeded millets have been medicinally used as astringent, digestive, emollient and stomachic. These are also used in the treatment of dyspepsia, poor digestion and food stagnancy in the abdomen. White seeds of foxtail millets are refrigerant and have been used in the treatment of cholera and fever, while the green seeds are diuretic and strengthen virility¹⁸. Similarly, proso millet are known to improve glycemic responses and plasma levels. In addition, several research studies have established that proso millet protein could be a potential therapeutic intervention for treating type-2 diabetes¹⁹.

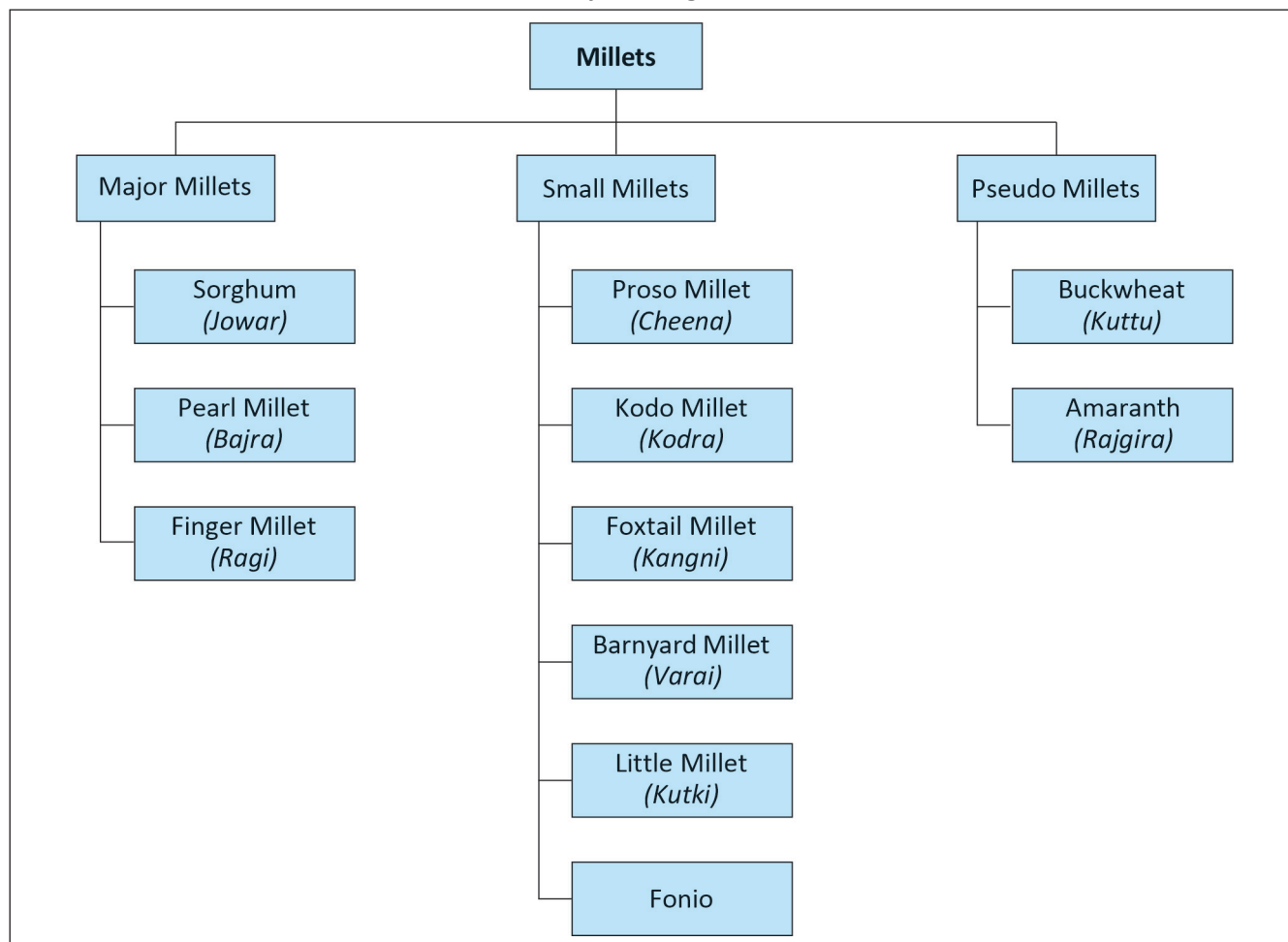
Major Types of Millets

Jowar (Sorghum), Bajra (Pearl Millet) and Ragi (Finger Millet) are the major categories of millets cultivated (Exhibit 1). Besides these, small millets such as proso (cheena), kodo (kodra, arikelu), foxtail (kangni/korra), barnyard (varai, sawa), little millet (kutki), fonio and pseudo millets including buckwheat and amaranth, are the other varieties of millets cultivated globally.

¹⁸ IIMR (2017), Nutritional and Health Benefits of Millets

¹⁹ Ibid.

Exhibit 1: Major Categories of Millets



Source: Exim Bank Representation based on APEDA and FAO's Classification of Millets

Significance of Millets for Food and Nutritional Security

India is among the countries that are more vulnerable to climate change. The projections of the Coupled Model Inter-comparison Project for India shows that the average climate is likely to be warmer by 1.7°C to 2.0°C in the 2030s and by 3.3°C to 4.8°C in the 2080s compared to the preindustrial times. The precipitation is likely to increase by 5% to 6% in the 2030s and 6% to 14% in the 2080s²⁰. There is emerging evidence that the productivity of crops, livestock and fishery is likely to be affected, with consequent implications for food security, livelihood and sustainability in agriculture. As per a study on impact of climate change on India by the National Innovations in Climate Resilient Agriculture (NICRA), rainfed rice yields in India are projected to reduce marginally (<2.5%) in 2050 and 2080, and irrigated rice yields by 7% in 2050 and 10% in 2080 scenarios. Further, wheat yield is projected to reduce by 6-25% in 2100 and maize yields by 18-23% in the same period²¹. In this context, millets can emerge as important crops for ensuring food security.

Millets are considered climate-resilient crops because of their adaptability to changing weather patterns. These are hardy crops grown in arid and semi-arid environments and are resilient to higher temperatures. Cultivation

²⁰ ICAR (2019), Risk and Vulnerability Assessment of Indian Agriculture to Climate Change

²¹ PIB (2023), Impact of Climate Change on Agriculture

of these crops require substantially less water and can even be cultivated in drought prone environments. According to a recent research²², while rice cultivation requires an annual rainfall of around 1200-1250 mm, millets can be cultivated even in areas with 350 mm of rainfall. Millets are tolerant to drought and other extreme weather conditions and hence are endemic to such geographies. Millets are also highly tolerant to low soil fertility. Accordingly, millets can be grown in areas where other cereal crops, such as rice or wheat are not likely to survive. Thus, in the wake of growing global concerns pertaining to climate change, millets cultivation can help maintain stable food production and address food security concerns. Moreover, since millets require less water and fewer chemical inputs compared to many other cereal crops, their cultivation can also help reduce the environmental impact of agriculture and promote sustainable farming practices.

Further, nutritionally, the energy value, protein and macro nutrient contents of millets are comparable to conventional cereals such as rice. Millets significantly contribute to human and animal diets owing to their high levels of energy, calcium, iron, zinc, lipids, and high-quality proteins. In addition, they are also rich sources of dietary fibre and micronutrients²³. The protein and dietary fibre content of nearly all categories of millets are known to be significantly higher than that of rice, while the starch and carbohydrate content (per 100 gm) are found to be lower than rice (Table 1). Further, millets are naturally gluten-free, making them an excellent choice for individuals with dietary restrictions such as gluten resistance/ intolerance and celiac disease. Besides, millets have a low Glycaemic Index, and are, therefore, considered beneficial for the prevention of diabetes. Millets are also known to be beneficial for the management and prevention of hyperlipidemia and risk of cardiovascular diseases²⁴.

Table 1: Comparison of Nutritional Profile of Millets with Major Cereals (per 100 g)

Grains	Energy (kcal)	Protein (g)	Carbohydrate (g)	Starch (g)	Fat (g)	Dietary Fiber (g)	Minerals (g) ²⁵	Calcium (mg)	Phosphorus (mg)
Sorghum	334	10.4	67.6	59	1.9	10.2	1.6	27	222
Pearl millet	363	11.6	61.7	55	5	11.4	2.3	27	296
Finger millet	320	7.3	66.8	62	1.3	11.1	2.7	364	283
Proso millet	341	12.5	70.0	-	1.1	-	1.9	14	206
Foxtail millet	331	12.3	60.0	-	4.3	-	3.3	31	290
Kodo millet	353	8.3	66.1	64	1.4	6.3	2.6	15	188
Little millet	329	8.7	65.5	56	5.3	6.3	1.7	17	220
Barnyard millet	307	11.6	65.5	-	5.8	-	4.7	14	121
Maize	334	11.5	64.7	59	3.6	12.2	1.5	8.9	348
Wheat	321	11.8	64.7	56	1.5	11.2	1.5	39	306
Rice	353	6.8	74.8	71	0.5	4.4	0.6	10	160

Note: Rows highlighted in green represent millets and their nutritional contents, whereas those highlighted in yellow represent major cereals.

Source: Modern Processing of Indian Millets: A Perspective on Changes in Nutritional Properties, 2022, National Library of Medicines

²² ASSOCHAM (2022), "Millets: The Future Super Food for India"

²³ Z. M. Hassan, N. A. Sebola, and M. Mabelebele (2021) "The Nutritional Use of Millet Grain For Food And Feed: A Review", National Library of Medicine

²⁴ APEDA Millet Portal: Health Benefits of Millets

²⁵ Minerals include iron (Fe), potassium (K), zinc (Zn), magnesium (Mg), vitamin B-complex, niacin, and folic acid.

Scope of the Study

For centuries, millets were the staples in India. However, after the green revolution, the importance and usage of millets in India reduced significantly, as the emphasis shifted to increased food grain production and productivity using high yielding varieties of wheat and rice in the identified green revolution geographies. Over the recent years, recognising the important role played by millets in ensuring food and nutritional security, the Government of India has been actively promoting the consumption and cultivation of millets in India.

In order to encourage production and consumption of millets, the Government of India had observed 2018 as the 'National Year of Millets'. The Government of India had also notified millets as 'Nutri-Cereals' in April 2018, and thereafter integrated nutri-cereals with the National Food Security Act. With a view to promote the ecological and nutritional benefits of millets at an international level, the Government of India also spearheaded the resolution of the United Nations General Assembly (UNGA), for declaring 2023 as the 'International Year of Millets', with the objective of raising awareness and directing policy attention for promoting and mainstreaming millets in the global food basket.

Against this backdrop, the study analyses the global and Indian scenario of millet production and exports, and identifies the export potential of millets from India. The study also discusses the challenges faced by Indian exporters in expanding exports of millets and recommends strategies to overcome these challenges in order to position India as a leading exporter of millets globally.

Methodological Note

The Harmonised Systems codes used in the Study for millets are as per the classification of millets given by the Agricultural and Processed Food Products Export Development Authority (APEDA) and the Food and Agriculture Organisation of the United Nations (FAO). The HS codes (at 6-digit level) used for the study are listed in Table 2. While the scope of the study includes processed millets, analysis of trade and production data for this segment has not been undertaken, in the absence of specific and separate HS codes for the same.

Table 2: HS Codes Considered for Millets

HS Code	Product Description
100710	Grain sorghum, for sowing
100790	Grain sorghum (excluding for sowing)
100810	Buckwheat
100821	Millet seed for sowing (excluding grain sorghum)
100829	Millet (excluding grain sorghum, and seed for sowing)
100830	Canary seed
100840	Fonio
100890	Other cereals including small millets and pseudo millets

Source: APEDA, FAO



Global Scenario of Millets

Millets have gained significant attention over the recent years, driven by various factors that are reshaping our food systems and agricultural practices. As the world grapples with the consequences of climate change, millets have garnered recognition for their remarkable resilience to adverse environmental conditions. Further, demand for these nutritious grains is rising, driven by growing awareness of its health benefits and its potential to be a wholesome diet. The versatility of millets in culinary applications, from whole grains to flours, lends itself to a wide range of food products, catering to the evolving dietary preferences of a diverse global population. The increasing global interest in millets is leading to value-added applications in modern food and beverages, as well as pet food and animal feed sectors, making them versatile and essential commodities across many regions. Moreover, governments around the world are taking initiatives to promote millet production and its consumption, recognising its ecological sustainability and positive impact on local economies.

Global Production

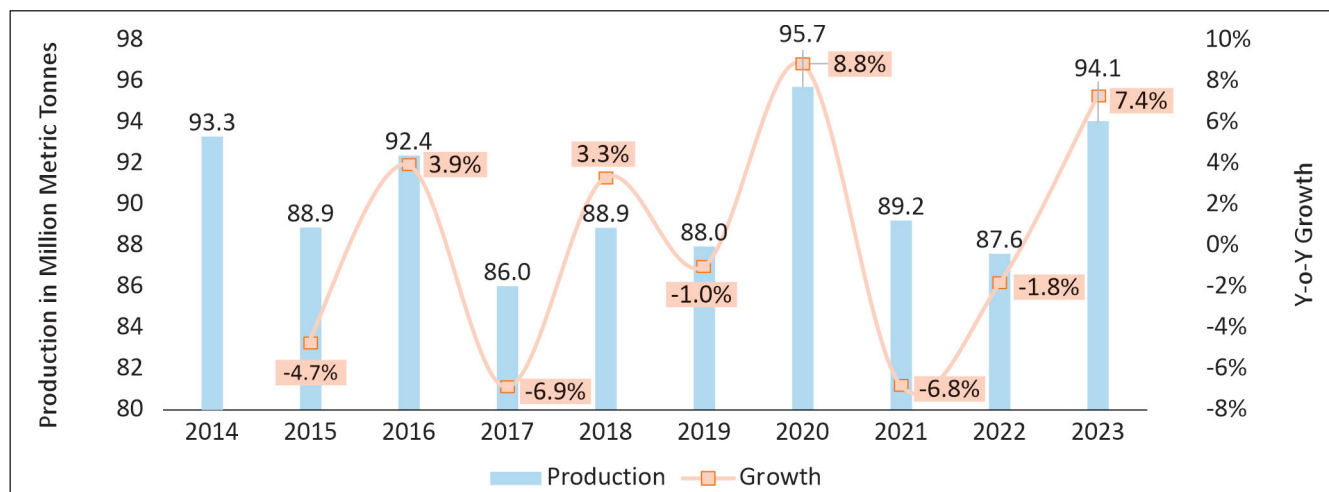
The global production of millets²⁶ was estimated at 94.1 million metric tonnes (MMT) during marketing year (MY) 2023²⁷, witnessing a y-o-y increase of 7.4% during the year. The production witnessed an increase after two consecutive years of decline, as the area under cultivation witnessed an increase. During the period from MY 2014 to MY 2023, millet production recorded a nominal CAGR of 0.1%, witnessing intermittent periods of growth and decline but no major volatility.

India was the largest millets producing country during MY 2023, with an estimated production of 17.6 MMT, witnessing a y-o-y increase of 2.6% during the year. India accounted for 18.7% of the global millet production during MY 2023. Production of millets in India has witnessed slight increase over the period MY 2019 to MY 2023, registering a CAGR of 0.5% during this period.

²⁶ Includes Sorghum and Millet (henceforth referred as other millets) as per USDA Database

²⁷ Refers to Marketing Year as considered by the USDA Foreign Agricultural Services. The reference period is September to August, with some exceptions.

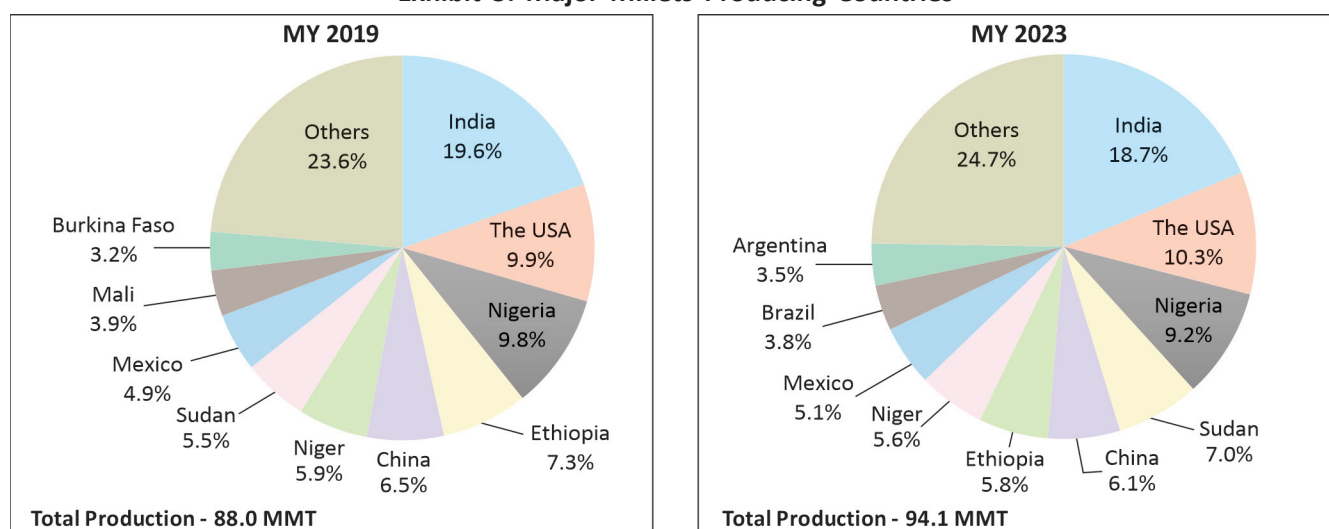
Exhibit 2: Global Millets Production



Note: Time period is the respective marketing year

Source: USDA, Exim Bank Research

Exhibit 3: Major Millets Producing Countries



Source: USDA, Exim Bank Research

The USA was the second largest producer of millets, with an estimated production of 9.7 MMT during MY 2023, more than doubling from 4.8 MMT of production recorded during MY 2022. The large increase was on account of normalisation of drought condition in the USA during MY 2023. The USA accounted for 10.3% of the global millet production during MY 2023. There has been an increase in the USA's millet production during the period MY 2019 to MY 2023, with a recorded CAGR of 2.8% during this period.

Sorghum constitutes the majority of the millets produced in the USA, and the country accounted for 15.5% of the global sorghum production during MY 2023. As per Sorghum Checkoff, only 2% of the sorghum produced in the USA is used for human food production, 30% goes towards ethanol production and the remaining is used for animal feed²⁸. The USDA is encouraging usage of sorghum in more food applications, and has

²⁸ Mary Ellen Shoup (2022), Sorghum in focus: 'The goal is to increase the use of sorghum in the US food supply,' says Sorghum Checkoff, FoodNavigator USA

included whole grain sorghum, pearled sorghum and sorghum flour in the Food Buying Guide for Child Nutrition Programs.

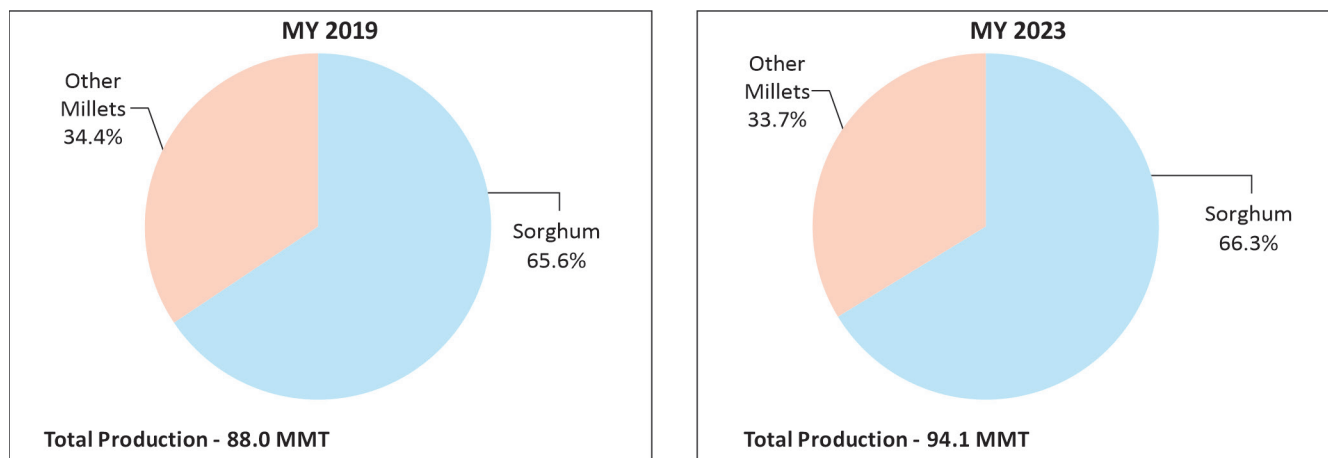
Other major producers of millets in MY 2023 included Nigeria (a share of 9.2% in the global millets production), Sudan (7.0%), China (6.1%), and Ethiopia (5.8%) (Exhibit 3). The top six countries together accounted for more than half of the global millets production during MY 2023.

Compared to MY 2019, there has not been major changes in the share of countries contributing to the global millets production in MY 2023 (Exhibit 3). India maintained its position as the world's largest millets producer during MY 2023, with a decline of (-) 0.9 percentage point in share. Ethiopia's share declined from 7.3% in MY 2019 to 5.8% in MY 2023 as the production of millets witnessed a decline due to a fall in area under production of millets in the country.

Among millets, sorghum is an important category. Global production of sorghum was estimated at 62.3 MMT during MY 2023, contributing to 66.3% of the global production of millets during the year (Exhibit 4). The production of sorghum registered a CAGR of 1.9% during MY 2019 to MY 2023.

The significant production of grain sorghum on a global scale can be linked to its numerous applications across different industries. Grain sorghum's nutritional content and hardiness make it a key dietary and economic asset, serving as a staple food in areas with limited resources. It is also used in traditional beverages and value-added foods. In several countries, it is also an essential component of livestock feed. Further, its industrial uses, mainly in the production of biofuels, support the advancement of sustainable energy solutions. These numerous applications of grain sorghum have spurred its global growth, especially in response to changing climatic conditions and shifting customer demand.

Exhibit 4: Global Category-wise Millets Production

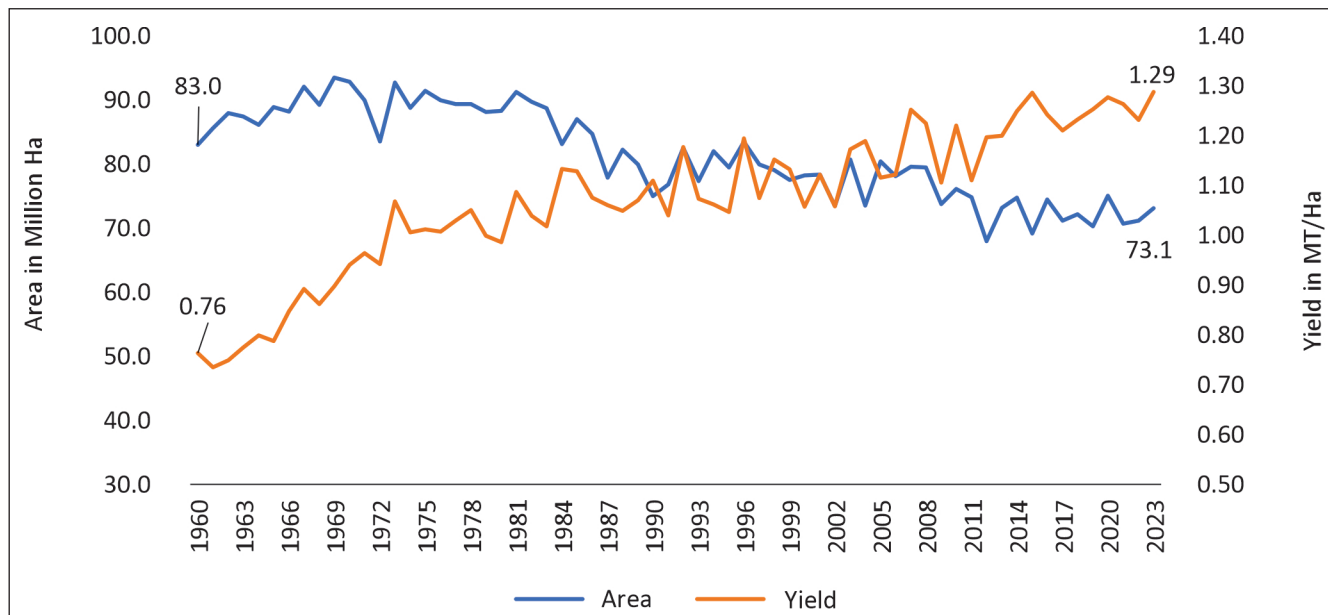


Source: USDA, Exim Bank Research

The advancement in agricultural methods, agricultural mechanisation, and fertiliser application has resulted in the increase in yield of millets overtime. Over the past decades, there has been a decline in the area under production of millets, due to the availability of more remunerative alternatives for farmers. The area under harvest registered a CAGR of (-) 0.6% during MY 2014 to MY 2022. However, in MY 2023, area harvested for millets stood at 73.1 million hectares globally, which was a 2.7% increase from the previous year.

While area under production has dipped, the yield has improved over the past several years. The yield of millets was estimated at 1.29 MT/hectare during MY 2023, witnessing a y-o-y increase of 4.5%. The yield of millets registered a CAGR of 0.3% during MY 2014 to MY 2023 (Exhibit 5).

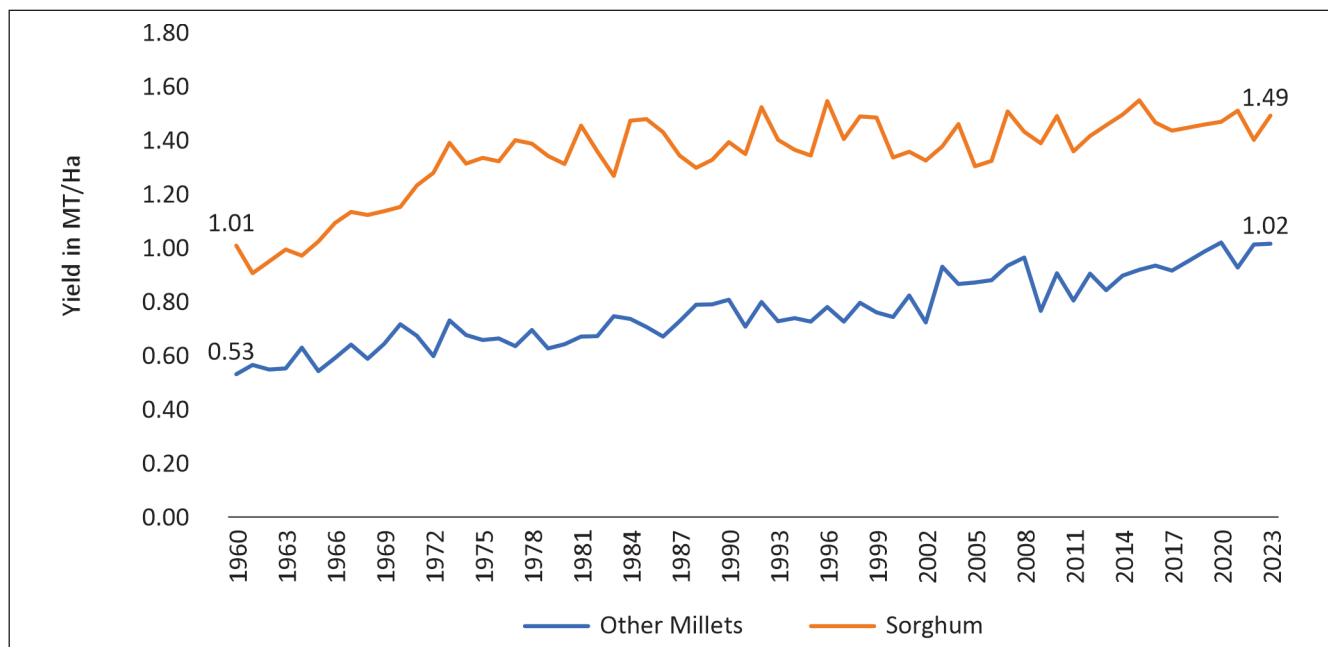
Exhibit 5: Global Area under Harvest and Yield of Millets



Source: USDA, Exim Bank Research

Although witnessing an increase overtime, there is marked difference in the yield of sorghum and other millets. The yield of sorghum was estimated at 1.49 MT/hectare during MY 2023, whereas the yield of other millets was estimated at 1.02 MT/hectare (Exhibit 6).

Exhibit 6: Yield Comparison of Other Millets and Sorghum



Source: USDA, Exim Bank Research

Consumption

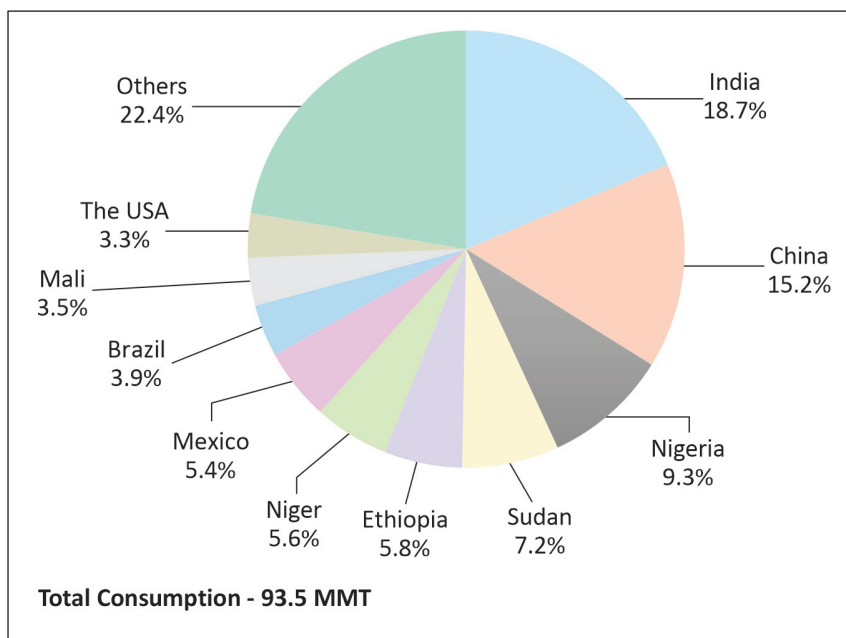
Millets are one of the oldest farmed cereal grains in the world and are believed to be the first domesticated cereal grain. There is evidence of the cultivation of millet in the Korean Peninsula dating to the Middle Jeulmun Pottery Period (around 3,500–2,000 BC). In India, millets, including foxtail millet (*priyangava*), barnyard millet (*aanava*), and black finger millet (*shyaamaka*), have been mentioned in some of the oldest Yajurveda texts, indicating that millets consumption was very common, pre-dating the Indian Bronze Age (4,500 BC)²⁹. However, in recent period, the consumption of millets has dipped. As per a large-scale survey, between 1962 and 2010, India's per capita consumption of millets fell drastically from 32.9 to 4.2 kg³⁰. The per-capita consumption remains at low levels.

The global consumption of millets was estimated at 93.5 MMT during MY 2023, witnessing a y-o-y increase of 6.1%. The growth was mainly due to an increase in millets consumption for animal feed purpose in China. China's consumption of millets increased by 32.7% during MY 2023.

Globally, the consumption of millets for Food, Seed and Industrial (FSI) purposes contributed to 71.6% of the millets consumption in MY 2023, followed by its use for animal feed consumption.

India is the largest consumer of millets, with an estimated share of 18.7% in global millets consumption during MY 2023. Majority of millets production in India is primarily for domestic consumption. China is the other major consumer of millets with estimated consumption of 14.2 MMT, a share of 15.2% in the global millets consumption. Other major consumers of millets during MY 2023 included Nigeria (a share of 9.3% in the global millets consumption), Sudan (7.2%), Ethiopia (5.8%), and Niger (5.6%) (Exhibit 7).

Exhibit 7: Major Consumers of Millets (MY 2023)



Source: USDA, Exim Bank Research

²⁹ International Crops Research Institute for the Semi-arid Tropics

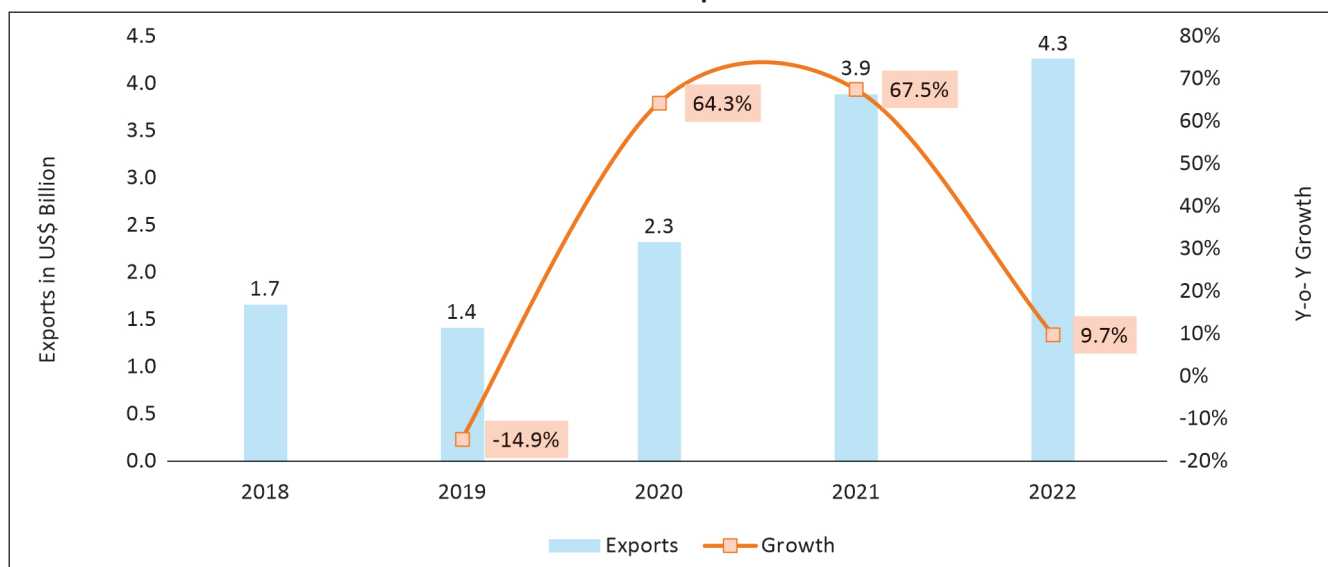
³⁰ Potaka J et al (2021) Assessing millets and sorghum consumption behavior in urban India: a large-scale survey. *Front Sustain Food Syst* 5:680777. <https://doi.org/10.3389/fsufs.2021.680777>

International Trade

Global millets exports have been robust over the recent years, registering a CAGR of 26.6% during 2018 to 2022. Global exports of millets witnessed a decline in 2019 due to the outbreak of African Swine Fever (ASF) in China, which significantly decreased domestic pig meat production, and consequently the demand for livestock feed sources like grain sorghum. After a decline in 2019, the exports of millets witnessed three consecutive years of increase, due to strong demand by countries in the wake of food security concerns during and after COVID 19 pandemic. Global millets³¹ exports were estimated at US\$ 3.9 billion during 2021, witnessing a y-o-y increase of 67.5% (Exhibit 8). The exports further increased by 9.7% during 2022 to reach a record high of US\$ 4.3 billion.

Following the dip in demand in 2019, there was a substantial increase in Chinese imports owing to the recovery in swine herd after ASF and growing demand for meat production in the country. Alongside, there was remarkable increase in exports of sorghum from the USA, with the exports increasing from US\$ 652.7 million in 2019 to US\$ 1483.3 million in 2020, a y-o-y increase of 127.3%. Thereafter, the exports from the USA further increased to US\$ 2035.1 million during 2021 and US\$ 2276.8 million during 2022.

Exhibit 8: Global Exports of Millets



Source: ITC Trade Map, Exim Bank Research

Global grain sorghum trade continues to expand, bolstered by recovery in sales by the USA and larger purchases by China³². In 2020, the USA and China reached a historic Phase One Trade Agreement that entails comprehensive reforms and changes in China’s economic and trade practices. The agreement covers areas such as agriculture, intellectual property, technology transfer, financial services, and currency. China committed to significant additional purchases of the USA’s goods and services and import a minimum of US\$ 40 billion worth of the USA’s food, agricultural, and seafood products annually, totalling at least US\$ 80 billion over two years, with an aspiration to import an extra US\$ 5 billion annually for another two years. Notably, the Phase One agreement opened China’s food and agriculture market to American products, addressing a multitude

³¹ HS codes as mentioned in the Introduction Chapter

³² FAO World Food Situation, 2023

of trade and non-trade barriers, and facilitating the expansion of the USA's food, agriculture, and seafood exports. As a result, the USA's exports of sorghum to China witnessed an increase.

Other millets are also gaining momentum in both feedstock and food applications due to their better productivity in dry and high-temperature conditions. Products such as millet flour, flakes, and cookies are gaining popularity in the consumer market. Their high protein content makes them appealing to vegetarian and vegan population in the USA, Europe, and Asia Pacific. In Africa and Asia, breakfast cereals like flakes and local recipes are also witnessing growing adoption, leading to substantial trade growth and revenue generation in other millet categories as well.

Analysis of global exports of millets at HS-6-digit level indicates that grain sorghum (excluding for sowing) accounted for a majority share of 81.2% in the global millets exports during 2022, followed by other cereals including small millets at 4.4%. Besides these, other categories of millets exported globally include millet (excluding grain sorghum and seed for sowing), which accounted for 3.8% share in the global millet exports during 2022, canary seeds (share of 3.8%), buckwheat (3.7%), and grain sorghum for sowing (2.2%), among others (Table 3).

Table 3: Product-wise Exports of Millets

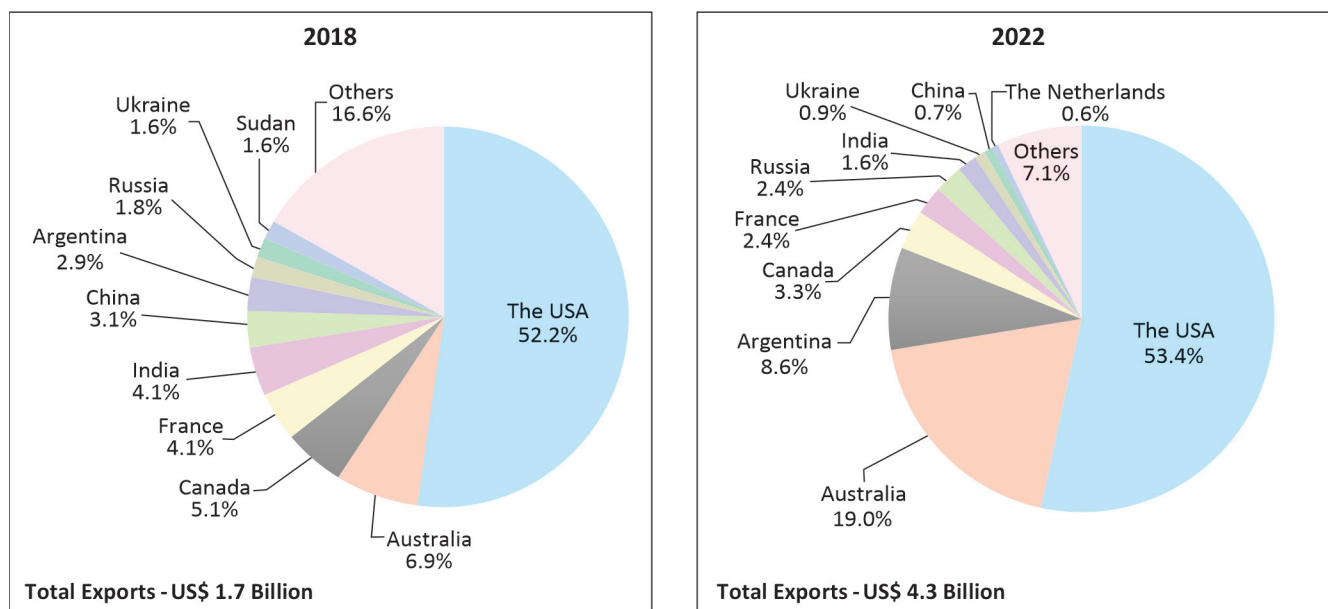
HS Code	Product	Exports in 2018 (US\$ Million)	Exports in 2022 (US\$ Million)	Share in Millets Exports in 2022	Y-o-Y Growth in 2022	CAGR during 2018 to 2022
100790	Grain sorghum (excl. for sowing)	1067.2	3464.6	81.2%	10.7%	34.2%
100890	Other cereals including small millets and pseudo millets	182.3	188.9	4.4%	-5.4%	0.9%
100829	Millet (excl. grain sorghum, and seed for sowing)	90.1	162.3	3.8%	-4.5%	15.8%
100830	Canary seed	96.9	160.1	3.8%	11.4%	13.4%
100810	Buckwheat	82.0	156.5	3.7%	18.0%	17.5%
100710	Grain sorghum, for sowing	106.4	95.9	2.2%	16.3%	-2.6%
100821	Millet seed for sowing (excl. grain sorghum)	33.3	36.0	0.8%	33.4%	2.0%
100840	Fonio	0.3	0.5	0.0%	-12.8%	18.9%

Source: ITC Trade Map, Exim Bank Research

During the period 2018-2022, the share of grain sorghum (excluding for sowing) in the global exports of millet has increased significantly, from 64.3% in 2018 to 81.2% in 2022, mainly due to the increase in demand from China for use in animal feed. Due to the stronger growth in exports of grain sorghum, the share of other millets witnessed a decline during the period, despite the steady rise in export value in all categories except grain sorghum used for sowing.

The USA, which is among the largest producers of sorghum, is the largest exporter of millets as well, accounting for more than half of global millets exports during 2022. Australia was the second largest exporter of millets with estimated exports of US\$ 811.7 million during 2022, a share of 19.0% in the global millets exports during the year. Australia is not among the top 10 millets producing countries and majority of its production is used for exports. Other major millets exporters in 2022 included Argentina (a share of 8.6% in global millets exports), Canada (3.3%), France (2.4%), Russia (2.4%), and India (1.6%) (Exhibit 9). The top three millet exporting countries accounted for more than three-fourth of the global millets exports during 2022.

Exhibit 9: Major Millets Exporters (2018 vs 2022)



Source: ITC Trade Map, Exim Bank Research

During 2018 to 2022, the USA’s share in global millets exports increased from 52.2% in 2018 to 53.4% in 2022. The reason for this increase is the increase in domestic production and increased demand from China, which is the largest export destination for the USA, accounting for 80.1% of the USA’s millets exports during 2022.

Australia also witnessed an increase in its share in global exports of millets from 6.9% in 2018 to 19.0% in 2022. The increase in the global prices prompted Australian farmers to increase production of millets. Australia’s sorghum production increased from 397 thousand MT in MY 2019 to 1.8 MMT in MY 2023. A significant recovery in production during 2021, following several years of drought, resulted in larger exportable supplies in the country. Australia’s sorghum exports to China has also substantially increased. In 2022, China imported US\$ 661.9 million worth of grain sorghum (excluding for sowing) from Australia, thereby increasing Australia’s market share in China’s import of millets to 17.7% in 2022, up from 10.9% in 2021. The exports of millets from Australia to Japan also witnessed a significant increase, from US\$ 0.6 million in 2018 to US\$ 81.9 million during 2022. Over the past two years, sorghum prices (in terms of export unit value³³) in Australia have generally been lower than in the USA, enhancing Australia’s competitiveness.

The global export orientation of millets, which is the ratio of the quantity of export to the quantity of production, is estimated to be 11.9% in 2021. Among the major exporting countries, Canada had the highest

³³ ITC Trade Map

export orientation for millets at 151.4%. Canada mainly produces canary seeds and imports large quantity of grain sorghum and other millets from countries such as the USA, China and India. Canary seeds from Canada are largely exported to countries like Mexico, Spain, Algeria, and the USA, among others.

Several other countries had high export orientation in millets. Among the top 5 exporting countries, the export orientation for the USA stood at 57.1%, Australia was 95.7% and Argentina was 63.3% (Table 4). As against this, India's export orientation was estimated to be 0.9% in 2021, indicating a lack of exportable surplus despite the sizable millets production.

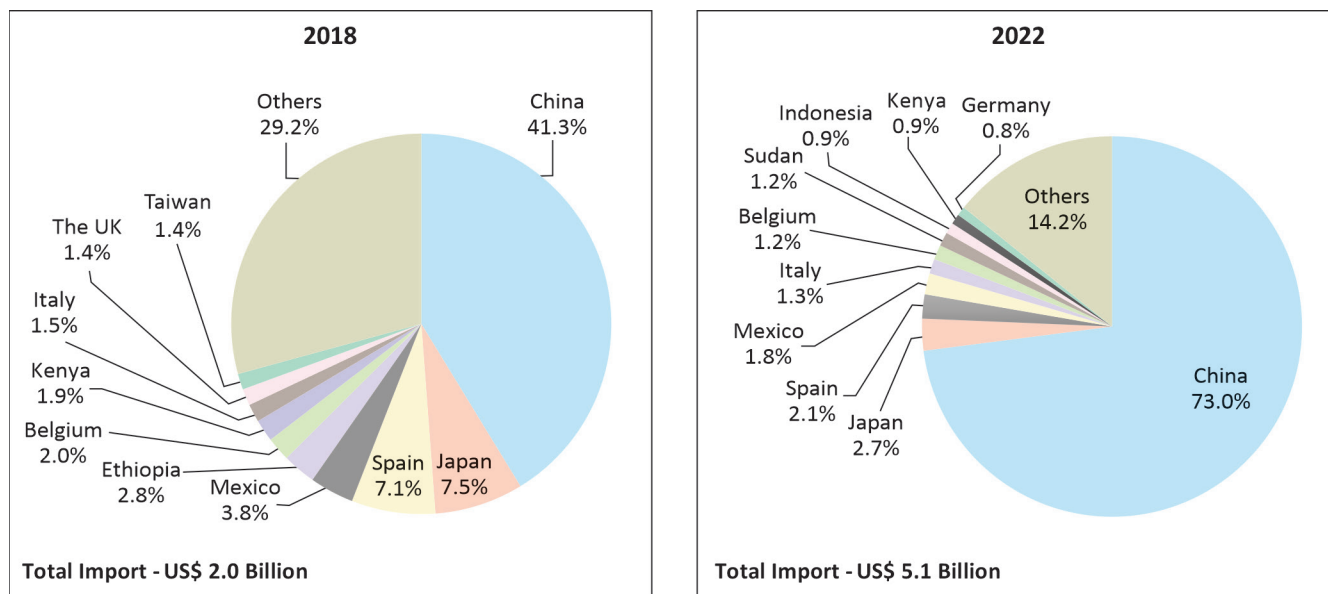
Table 4: Export Orientation of Top Exporting Countries in 2021

Country	Export Quantity in Million Tonnes	Production Quantity in Million Tonnes	Export Orientation
World	11.9	100.7	11.9%
The USA	6.7	11.7	57.1%
Argentina	2.1	3.4	63.3%
Australia	1.6	1.7	95.7%
France	0.3	0.6	41.9%
Ukraine	0.2	0.4	59.0%
Canada	0.2	0.1	151.4%
<i>India</i>	<i>0.2</i>	<i>18.0</i>	<i>0.9%</i>
Russia	0.1	0.5	17.5%
Kenya	0.1	0.2	30.7%
Sweden	0.1	0.0	-
Hungary	0.05	0.1	46.4%
Tanzania	0.05	1.5	3.1%
Bolivia	0.03	1.5	1.8%
The Netherlands	0.02	0.0	-
China	0.02	5.7	0.3%

Source: FAO, EXIM Bank Research

China is the largest importer of millets with estimated imports of US\$ 3.8 billion during 2022. China's share in global millets imports has increased overtime, from 41.3% in 2018 to 73.0% in 2022. Rising living standards and urbanisation are catalysing China's meat production and consumption, leading to increase in the animal feed requirement in the country. Increasing domestic consumption and unmet demand from domestic sources has led to the increase in millets imports by China. The USA is the largest supplier of millets to China, accounting for almost 63.6% of the millets imports by China during 2022.

Exhibit 10: Major Millets Importers (2018 vs 2022)



Source: ITC Trade Map, Exim Bank Research

Japan was the second largest importer of millets with estimated imports of US\$ 139.2 million during 2022, constituting a share of 2.7% in the global millets imports. Japan’s share in millets has declined from 7.5% in 2018 to 2.7% in 2022. Other major importers of millets during 2022 included Spain (a share of 2.1% in global millets imports), Mexico (1.8%), Italy (1.3%), and Belgium (1.2%) (Exhibit 10).



Indian Scenario of Millets

In India, millets such as foxtail millet, Barnyard millet and black finger millet have been integral part of diet since a long time. In fact, before Green Revolution, millets accounted for 40% of all cultivated grains, greater than the share of wheat and rice³⁴.

Green Revolution marked a notable shift in the production scenario of millets in India. Millets, which were a major crop and staple food in the 1960s, were replaced with high-yielding varieties of wheat and rice for food security. Several staple grains also benefited from cost incentives provided through Minimum Support Prices (MSPs). Further, consumer demand surged for ultra-processed and ready-to-eat products. Processed foods, which contain refined grains that are high in sodium, sugar, and unhealthy fats, gained popularity. These shifts led to decreased consumption of traditional millet-based foods.

In India, millets are produced in most of the regions characterised by low to moderate precipitation (200–800 mm rainfall). Major millet crops cultivated in India include jowar or sorghum, bajra or pearl millet, mandua/ragi or finger millet; and small millets comprising kangni or foxtail millet, kutki or sama or little millet, kodo millet, jhangora or sawan or barnyard millet, cheena or proso millet, and korale or brown top millet.

As the world's leading producer of these resilient grains, India's agricultural landscape is deeply interwoven with the growth of millets. Amid the growing concerns related to food, fuel, malnutrition, health, and climate change, millets are once again reclaiming their position as an integral part of India's agricultural structure, flourishing primarily in economically challenging agro-climatic zones.

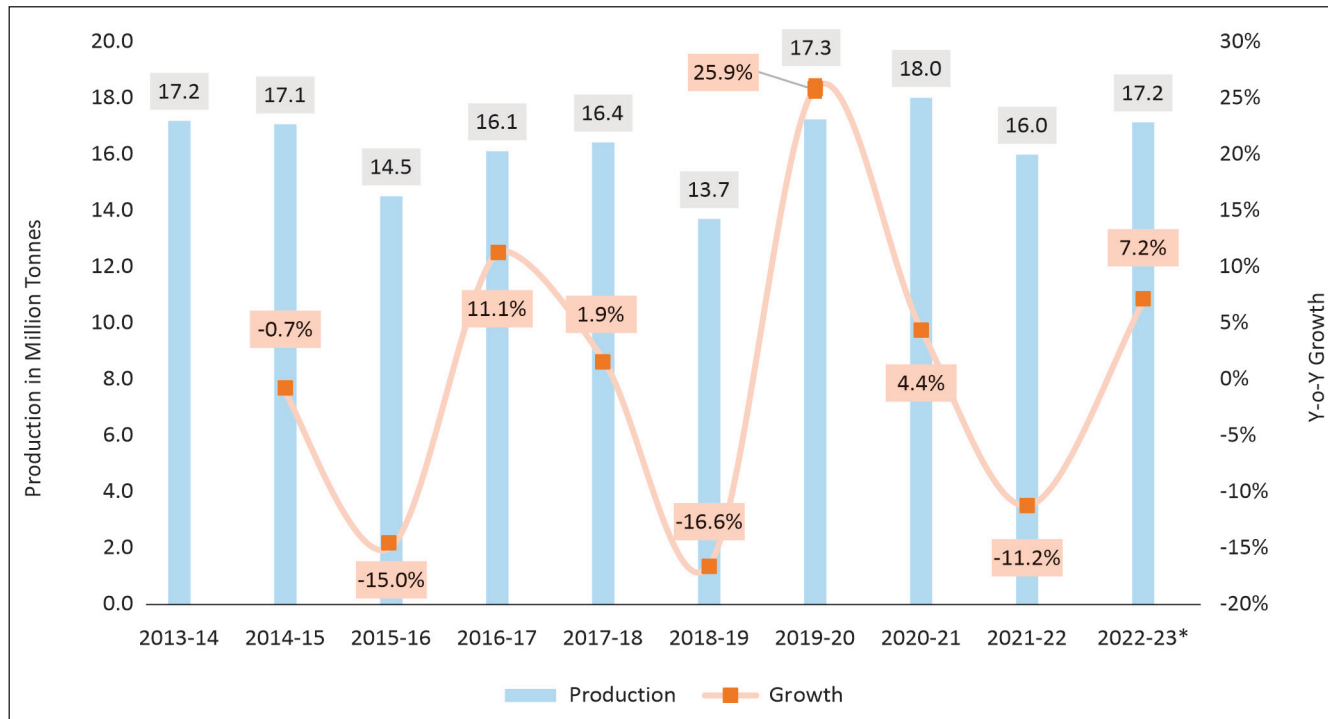
Production

During 2020-21, the millets production in India reached 18.0 million tonnes—the highest level in the decade from FY 2014 to FY 2023. Thereafter, production of millets in India reached a level of 16.0 million tonnes during 2021-22, registering a decrease of (-) 11.2% as compared to the previous year. This decline can be attributed to sharp reduction in the area under cultivation of millets by 9.9% during the year. The largest decline in area under cultivation for millets was witnessed in Rajasthan, as the area under cultivation in the state decreased by 5.5 lakh hectare, representing a decline of (-) 11.2%. Maharashtra also witnessed a decline of 4.5 lakh hectare in area under cultivation of millets during 2021-22.

³⁴ ICRISAT

During 2022-23, as per the third advance estimates of the Ministry of Agriculture and Farmers' Welfare, Government of India, the production of millets was estimated at 17.2 million tonnes, recording a y-o-y increase of 7.2%. Growth in India's production of millets has been rather muted, with production witnessing a CAGR of (-) 0.04% during 2013-14 to 2022-23.

Exhibit 11: Production of Millets in India



*Third Advance Estimates

Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

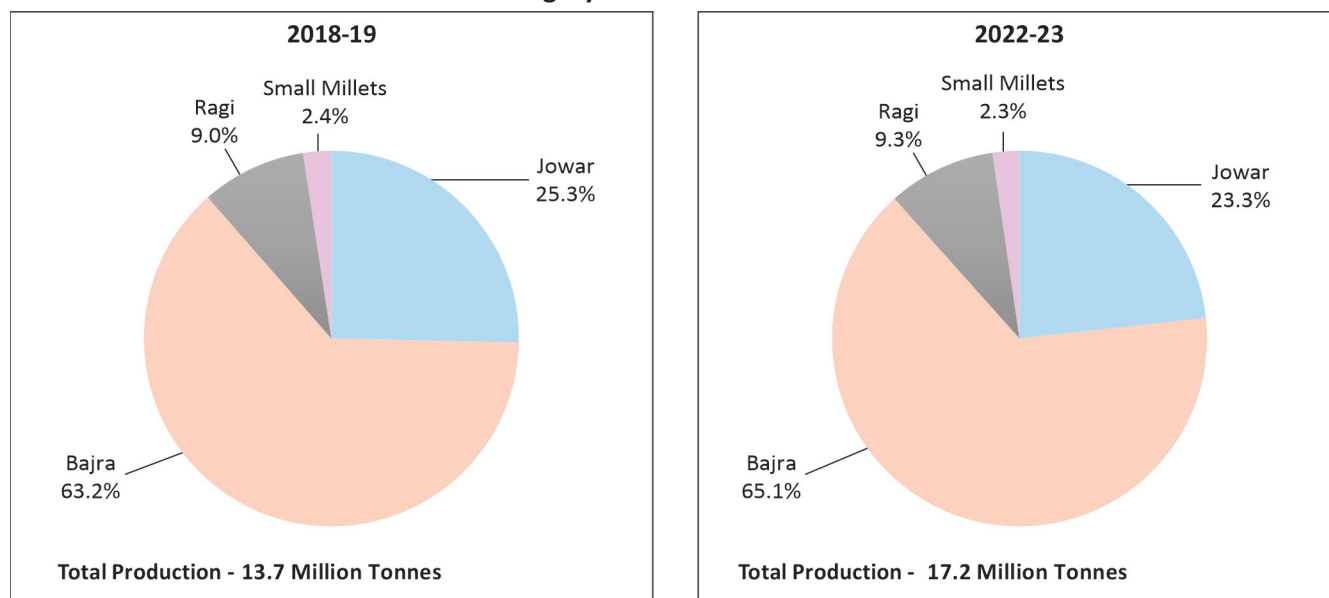
Bajra, also known as pearl millet, is the largest category of millets produced in India. India's bajra production registered a CAGR of 6.5% during 2018-19 to 2022-23—increasing from 8.7 million tonnes during 2018-19, to 11.2 million tonnes during 2022-23. Alongside, Bajra's share in India's total millets production increased from 63.2% during 2018-19 to 65.1% during 2022-23 (Exhibit 12).

Jowar, also known as sorghum, is the other major category of millet produced in India. Sorghum production in India was estimated at 3.5 million tonnes during 2018-19, and increased to 4.0 million tonnes during 2022-23, registering a CAGR of 3.5% during this period. Due to the relatively muted growth in Jowar production, its share in total millets production declined from 25.3% in 2018-19 to 23.3% in 2022-23 (Exhibit 12).

Ragi and small millets accounted for 9.3% and 2.3% of the total millets production in India during 2022-23, respectively. Ragi production has witnessed the largest growth among the millet categories during 2018-19 to 2022-23, registered a CAGR of 6.6% during the period.

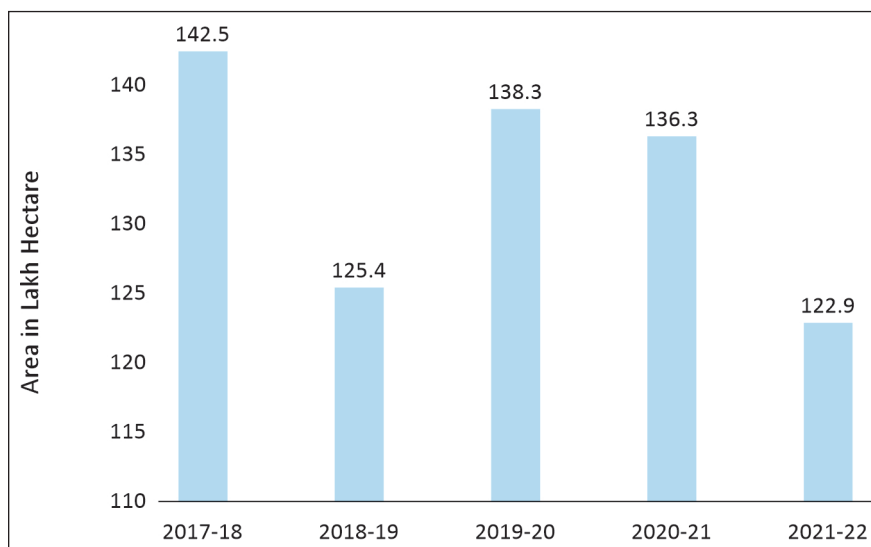
The area under millets production fluctuates depending on the price competition among seasonal crops. In 2021-22, area under millets production in India was estimated at 122.9 lakh hectare (Exhibit 13), witnessing a y-o-y decline of 9.9%. This was the second consecutive year of decline in area under millets production in India.

Exhibit 12: Category-wise Millets Production in India



Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Exhibit 13: Area under Millets Production in India

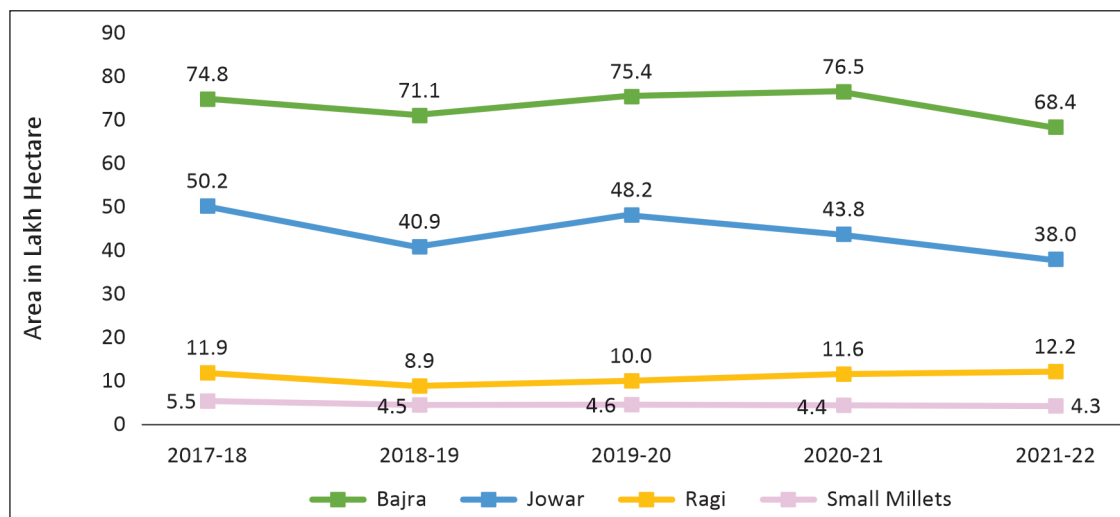


Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Among the millets categories, bajra accounted for 55.7% of area under production for millets during 2021-22. The area under production of bajra was estimated at 68.4 lakh hectare during 2021-22, witnessing a y-o-y decline of 10.6%. Jowar constituted an estimated 30.9% of the area under production of millets during 2021-22. The area under production of jowar also witnessed a decline during 2021-22 (Exhibit 14).

As against the decline in area under production of bajra and jowar, the area under ragi production continued to increase during 2021-22. The area under production of ragi was estimated at 12.2 lakh hectare during 2021-22 (Exhibit 14), witnessing a y-o-y increase of 5.1%. Increasing demand for ragi-based processed items like chips, flour, etc., is propelling the increase in area under production of these millets.

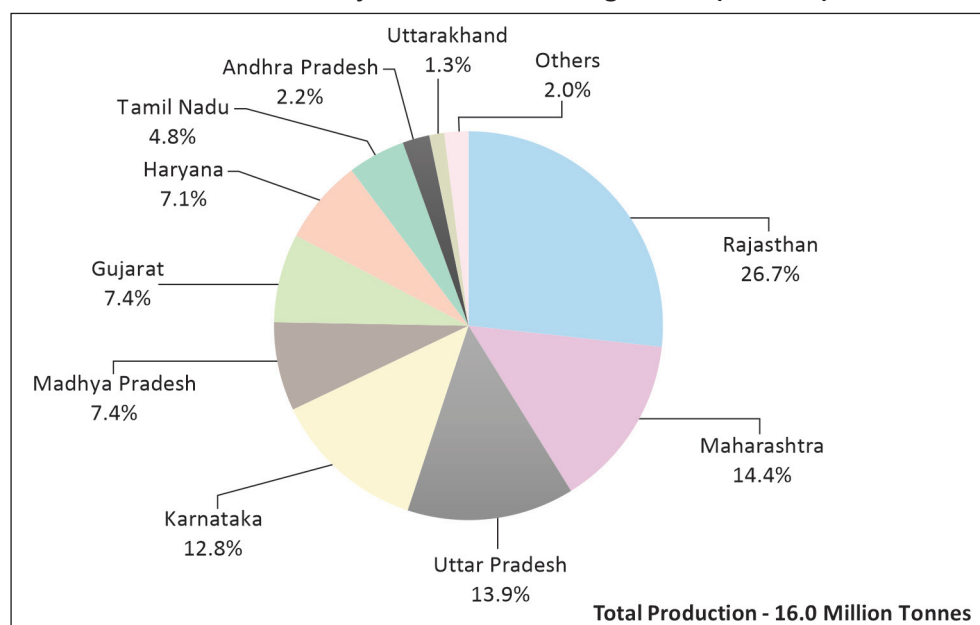
Exhibit 14: Category-wise Area under Production of Millets



Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Among states, Rajasthan was the largest producer of millets, with a production of 4.3 million tonnes in 2021-22, contributing to 26.7% of the overall millets production in India during the year. Maharashtra was the second largest contributor, accounting for 14.4% of overall millets production in India during 2021-22. Other major millets producing states included Uttar Pradesh (a share of 13.9% in millets production), Karnataka (12.8%), Madhya Pradesh (7.4%), Gujarat (7.4%), and Haryana (7.1%) (Exhibit 15). These top 7 states accounted for nearly 90% of India's millets production during 2021-22.

Exhibit 15: Major Millets Producing States (2021-22)

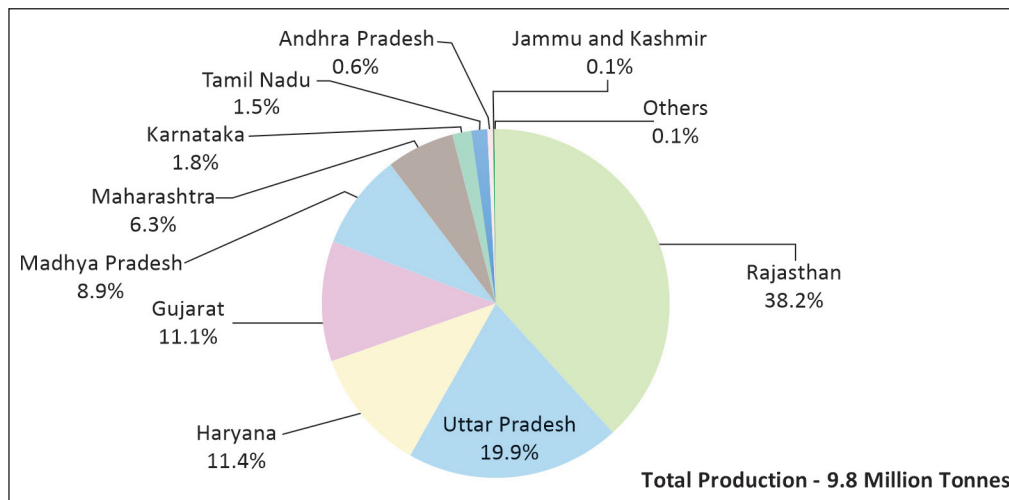


Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Rajasthan is the major bajra producing state in India. With estimated production of 3.7 million tonnes during 2021-22, Rajasthan accounted for 38.2% of the total bajra production in India. Bajra is also the most important millet category grown in the state, accounting for 87.4% of the millets production in Rajasthan during 2021-22.

Uttar Pradesh is the other major bajra producing state, with estimated production of 2.0 million tonnes during 2021-22, a share of 19.9% in India's bajra production during the year. Other major bajra producing states during 2021-22, included Haryana (a share of 11.4% in India's bajra production), Gujarat (11.1%), Madhya Pradesh (8.9%), Maharashtra (6.3%), and Karnataka (1.8%) (Exhibit 16).

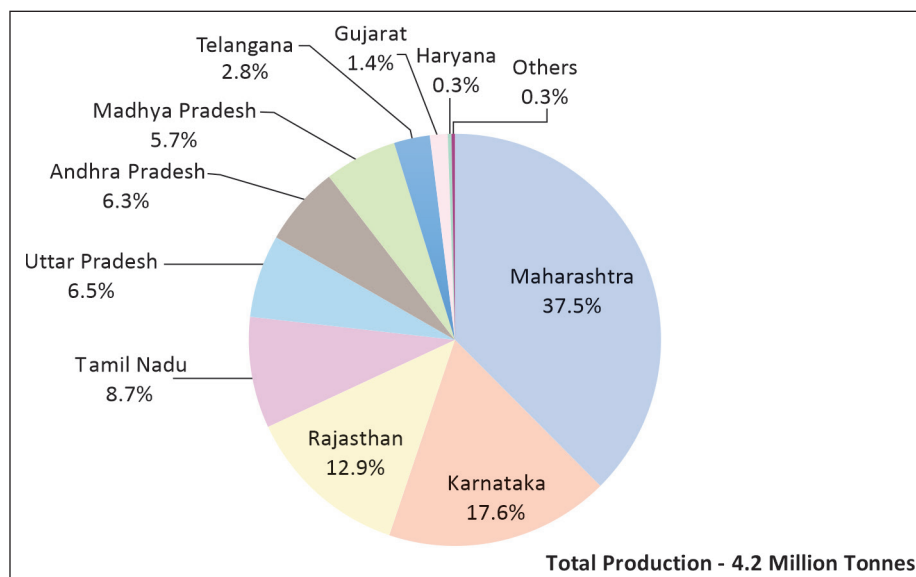
Exhibit 16: Major Bajra Producing States (2021-22)



Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Maharashtra is the major jowar producing state in India. With estimated production of 1.6 million tonnes during 2021-22, Maharashtra accounted for 37.5% of the total jowar production in India. Jowar accounted for 67.6% of the total millets production in Maharashtra during 2021-22. Karnataka is the other major jowar producing state, with estimated production of 0.7 million tonnes during 2021-22, a share of 17.6% in India's jowar production during the year. Other major jowar producing states during 2021-22, included Rajasthan (a share of 12.9% in India's jowar production), Tamil Nadu (8.7%), Uttar Pradesh (6.5%), Andhra Pradesh (6.3%), and Madhya Pradesh (5.7%) (Exhibit 17).

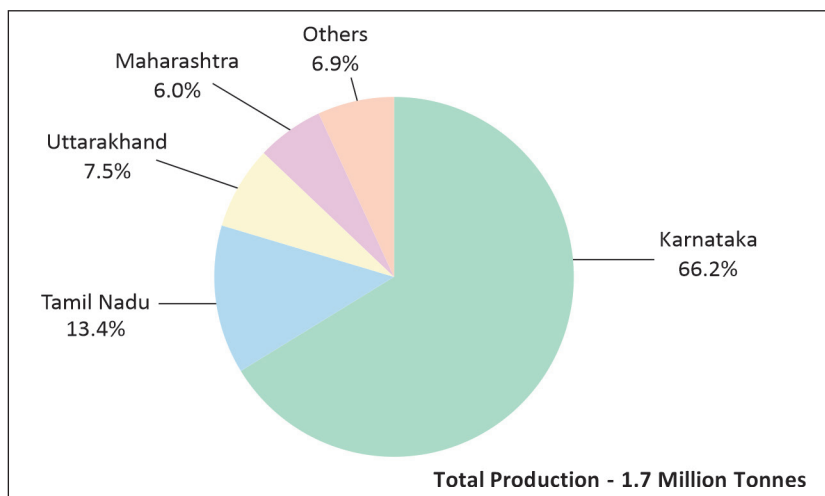
Exhibit 17: Major Jowar Producing States (2021-22)



Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Karnataka accounted for 66.2% of the total ragi production in India during 2021-22, with estimated production of 1.1 million tonnes. Tamil Nadu accounted for 13.4% of India's ragi production during 2021-22, while Uttarakhand and Maharashtra were the other two major producers with share of 7.5% and 6.0%, respectively (Exhibit 18). The ragi production is concentrated in these four states, with these states together accounting for 93.1% of India's ragi production during 2021-22.

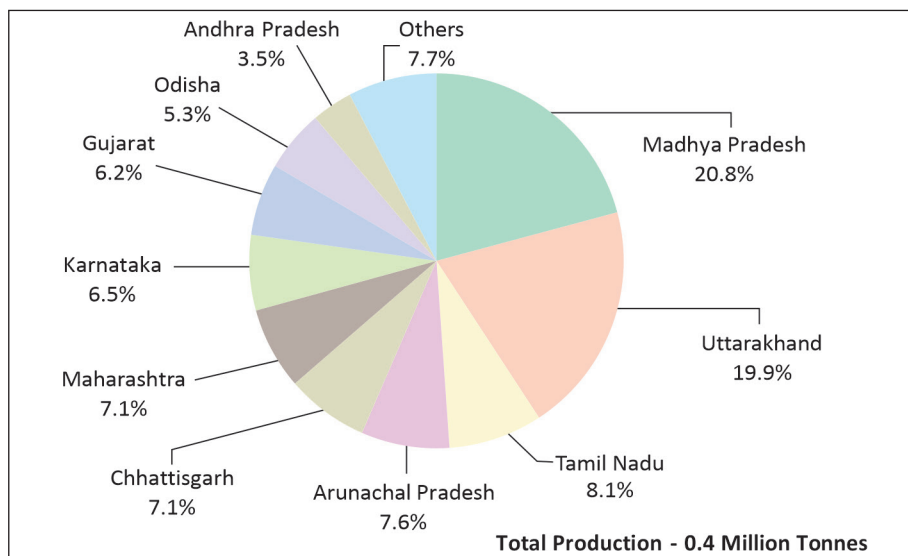
Exhibit 18: Major Ragi Producing States (2021-22)



Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

Madhya Pradesh is the major small millets producing state in India, with estimated production of 76.5 thousand tonnes during 2021-22, constituting a share of 20.8% in the total small millets production in India. Uttarakhand is the other major small millets producing state, with estimated production of 73.3 thousand tonnes during 2021-22, a share of 19.9% in the small millets production during the year. Other major small millets producing states during 2021-22, included Tamil Nadu (a share of 8.1% in India's small millets production), Arunachal Pradesh (7.6%), Chhattisgarh (7.1%), Maharashtra (7.1%), and Karnataka (6.5%) (Exhibit 19).

Exhibit 19: Major Small Millets Producing States (2021-22)



Source: Ministry of Agriculture and Farmers' Welfare, Government of India, Exim Bank Research

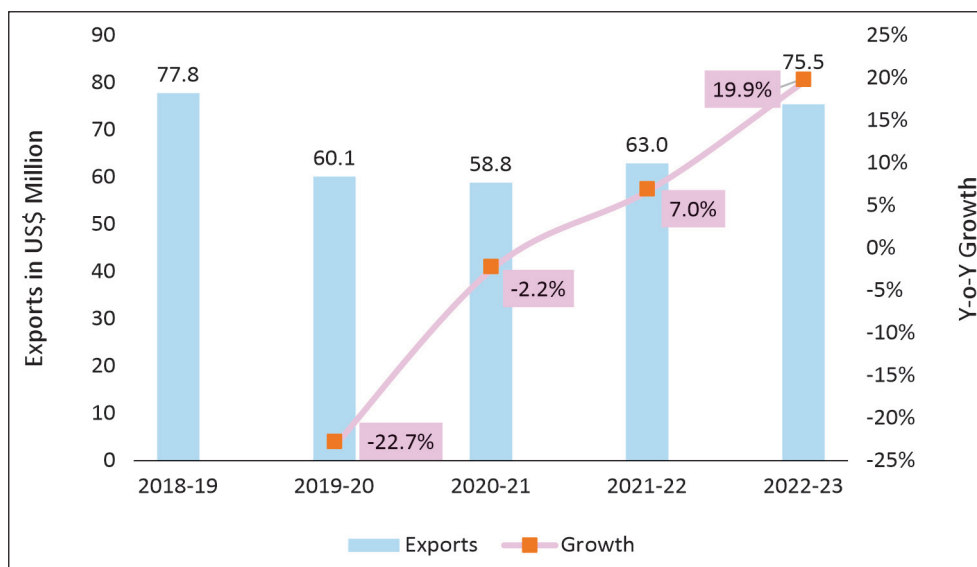
Trade

As discussed in the previous chapter, India's export orientation is low at 0.9%, in spite of being the largest producer of millets. As against this, export orientation in millets for the USA stood at 57.1%, Australia was 95.7% and Argentina was 63.3% during 2021. This is because, majority of the production is directed towards domestic consumption.

India's exports of millets³⁵ were estimated at US\$ 63.0 million during 2021-22, witnessing a y-o-y increase of 7.0%. The exports increased further to US\$ 75.5 million during 2022-23, witnessing a y-o-y increase of 19.9% (Exhibit 20). The increase in value of exports is largely attributable to higher global prices.

Middle East and South Asia regions are the top destinations for India's exports of millets. The UAE was the largest destination for India's exports of millets during 2022-23, with exports amounting to US\$ 13.3 million. The share of UAE in India's millet exports has increased significantly from 6.2% during 2018-19 to 17.7% in 2022-23 (Exhibit 21).

Exhibit 20: India's Millets Exports



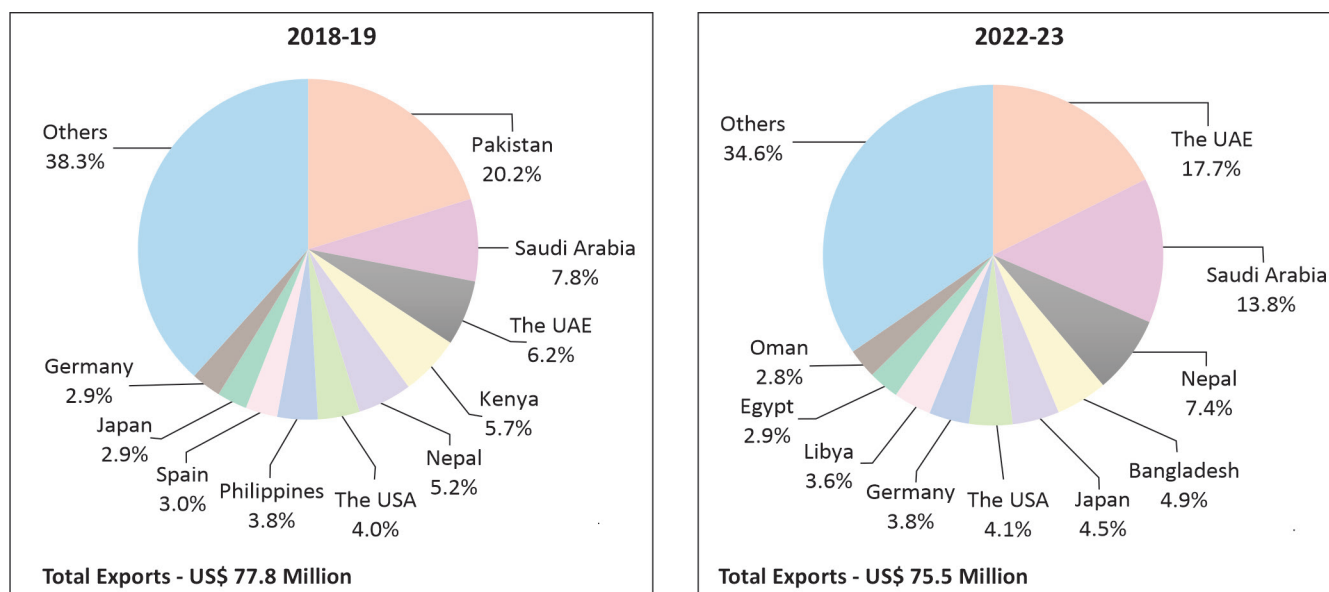
Source: DGCIS, Exim Bank Research

Saudi Arabia was the second largest destination for India's millet exports, with exports valued at US\$ 10.4 million during 2022-23. Saudi Arabia accounted for 13.8% of millets exports from India during the year, a considerable increase over its share of 7.8% in India's millet exports during 2018-19 (Exhibit 21).

Nepal emerged as the third largest export destination for India's exports of millets during 2022-23, with estimated exports of US\$ 5.6 million, a share of 7.4% in India's millet exports during the year. Other major export destinations for India's millet exports during 2022-23 were Bangladesh (a share of 4.9% in India's millet exports), Japan (4.5%), the USA (4.1%), Germany (3.8%), Libya (3.6%), and Egypt (2.9%).

³⁵ HS Codes as mentioned in the Introduction Chapter

Exhibit 21: Major Destinations for India's Millets Exports (2018-19 vs 2022-23)



Source: DGCI, Exim Bank Research

Millet (excluding grain sorghum, and seed for sowing) (HS 100829) was the major category of millets exported from India during 2022-23, with estimated exports of US\$ 30.0 million. The export under this category registered a strong CAGR of 25.3% during 2018-19 to 2022-23. Other cereals including small millets and pseudo millets (HS 100890) was the other major category of millets exported from India during 2022-23, with estimated exports of US\$ 14.4 million (Table 5).

Table 5: Category-wise Export of Millets from India

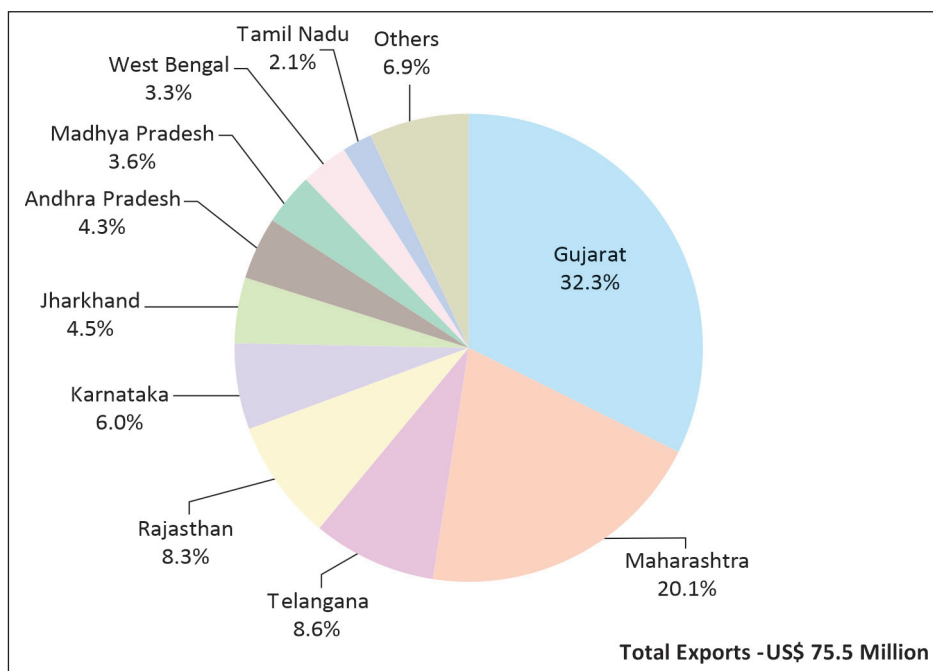
HS Code	Description	Exports in 2018-19 (US\$ Million)	Exports in 2022-23 (US\$ Million)	Y-o-Y Growth in 2022-23	CAGR (2018-19 to 2022-23)
100829	Millet (excl. grain sorghum, and seed for sowing)	12.2	30.0	78.5%	25.3%
100890	Other cereals including small millets and pseudo millets	13.5	14.4	4.0%	1.7%
100790	Grain sorghum (excl. for sowing)	22.5	11.3	-10.6%	-15.8%
100821	Millet seed for sowing (excl. grain sorghum)	13.5	9.8	-15.9%	-7.7%
100710	Grain sorghum, for sowing	14.2	8.7	45.2%	-11.5%
100810	Buckwheat	1.8	0.7	50.0%	-20.5%
100830	Canary seed	0.1	0.4	-69.5%	34.5%

Source: DGCI, Exim Bank Research

Gujarat is the leading millets exporting state in India, with estimated exports of US\$ 24.4 million during 2022-23, a share of 32.3% in India's millet exports during the year. Maharashtra was the other largest

exporter of millets during 2022-23, with estimated exports of US\$ 15.2 million, a share of 20.1% in India's millet exports during the year. Other major millet exporting states included Telangana (a share of 8.6% in India's millet exports during 2022-23), Rajasthan (8.3%), Karnataka (6.0%), and Jharkhand (4.5%) (Exhibit 22).

Exhibit 22: Major Millets Exporting States in India (2022-23)



Source: DGCIS, Exim Bank Research

Table 6: Category-wise Top Millets Exporting States in India (2022-23)

	Category/State	Exports in US\$ Million
1.	Millet (excl. grain sorghum, and seed for sowing) (HS 100829)	30.0
	Gujarat	13.5
	Maharashtra	6.0
	Rajasthan	5.3
	Madhya Pradesh	1.8
	Karnataka	1.0
	Others	2.4
2.	Other cereals including small millets and pseudo millets (HS 100890)	14.4
	Gujarat	7.6
	Maharashtra	2.1
	Karnataka	1.9
	Tamil Nadu	0.9
	Madhya Pradesh	0.6
	Others	1.4

	Category/State	Exports in US\$ Million
3.	Grain sorghum (excl. for sowing) (HS 100790)	11.3
	Maharashtra	6.0
	Andhra Pradesh	1.8
	Gujarat	1.3
	Karnataka	0.9
	Telangana	0.7
	Others	0.6
4.	Millet seed for sowing (excl. grain sorghum) (HS 100821)	9.8
	Jharkhand	3.0
	Gujarat	1.8
	Bihar	1.1
	Telangana	1.0
	Rajasthan	0.6
	Others	2.4
5.	Grain sorghum, for sowing (HS 100710)	8.7
	Telangana	4.3
	West Bengal	1.3
	Delhi	1.1
	Punjab	0.6
	Andhra Pradesh	0.4
	Others	0.9
6.	Buckwheat (HS 100810)	0.7
	Maharashtra	0.2
	Tamil Nadu	0.1
	Rajasthan	0.1
	Chhattisgarh	0.1
	West bengal	0.1
	Others	0.2
7.	Canary seed (HS 100830)	0.4
	Gujarat	0.2
	Tamil Nadu	0.1
	Karnataka	0.1
	Others	0.1

Source: DGCI, Exim Bank Research

Government Initiatives

To create domestic and global demand and to provide nutritional food to the people, the Government of India proposed to the United Nations to declare 2023 as the International Year of Millets. Subsequently, the United Nation's General Assembly (UNGA) declared 2023 as the International Year of Millets, with the proposal from India supported by 72 countries. As part of the effort to promote millets, the Government of India has been organising International Year of Millets (IYoM) 2023 events both domestically and internationally to raise awareness about Indian millets and their value-added products. To boost exports, the government is facilitating the participation of exporters, farmers, and traders in various international trade expos and buyer seller meets.

The Government of India has been focusing on millets in the recent Union Budgets. The Government announced support for post-harvest value addition and branding of millet products in the Union Budget 2022-23. In the Budget 2023-24, there was significant emphasis on agricultural innovation, with plans to transform the Indian Institute of Millet Research in Hyderabad into a Center of Excellence. This transformation is aimed at facilitating exchange of cutting-edge practices, research discoveries, and advanced agricultural technologies in the area of millets on a global scale. This initiative underscores the government's commitment to promoting collaboration and knowledge-sharing in the field of millet research.

The Government is supporting branding and publicity abroad through Indian missions, engaging international chefs, and connecting with potential buyers such as departmental stores, supermarkets, and hypermarkets for organising B2B meetings and direct tie-ups. Additionally, 30 e-Catalogues have been developed for targeted countries, containing information on Indian millets, value-added products, exporters, start-ups, and other stakeholders.

The Government of India is also encouraging state/UTs to consider introducing millets under the Pradhan Mantri Poshan Shakti Nirman (PM POSHAN) Scheme, particularly in districts where millet consumption is culturally accepted. Additionally, nutrition literacy programmes are being conducted to raise awareness about the nutrient richness, health benefits, and versatile culinary applications of millets. The National Rural Health Mission (NRHM) initiatives are also utilising millets to provide essential nutrients like iron, calcium, and folic acid. Millets are being introduced into mid-day meal programmes in schools to promote healthy dietary habits among children, and address issues like stunting and wasting. Even occasional public-funded events such as Maha Kumbh mela and Pushkaraalu are encouraged to feature millet foods as part of their offerings, promoting healthier eating on a broader scale. These initiatives collectively aim to enhance nutrition, food security, and economic prospects of the millet sector in India.

On the front of millet processing, the Government has allowed 100% FDI in the food processing industry through the automatic route to attract investments³⁶. Additionally, there is a 100% exemption of Income Tax on profits and gains for new food processing units in the initial five assessment years³⁷. Millet production is now classified under 'agricultural activity,' making it eligible for Priority Sector Lending as well, ensuring improved credit availability in the sector³⁸. This comprehensive approach seeks to improve millets processing in India.

³⁶ Policy Measures to Support Food Processing Sector, PIB (August 2022)

³⁷ Ministry of Food Processing Industries, Government of India

³⁸ Food Processing -Towards Sustainable Growth Opportunities, Ministry of Food Processing Industries, Government of India

Furthermore, the government has been actively promoting the cultivation of nutritious cereals by offering higher Minimum Support Prices for these crops. The Government of India fixes MSP for twenty-two (22) mandated crops based on the recommendations of the Commission for Agricultural Costs & Prices (CACPC) after considering the views of concerned State Governments and Central Ministries/Departments. Millets such as Ragi, Jowar and Bajra are covered under MSP. There has been a substantial increase in the MSP of Jowar, Bajra and Ragi in the last few years. According to the food and consumer affairs ministry data, between 2014-15 and 2023-24 the MSP of Jowar (hybrid) rose from ₹ 1530 to ₹ 3846 per quintal. The MSP of bajra increased from ₹ 1250 to ₹ 2500 per quintal during the same period. The MSP of Ragi increased from ₹ 1550 per quintal in 2014-15 to ₹ 3846 per quintal during 2023-24. The Government is also implementing various initiatives such as the Rashtriya Krishi Vikas Yojana (RKVY) and the National Food Security Mission (NFSM) to incentivise farmers to diversify their crops. The NFSM-Coarse Cereals programme encompasses a range of interventions, including cluster demonstrations, seed distribution, local initiatives, and NGO-led demonstrations in remote areas, all aimed at improving coarse cereals production. This initiative covers 265 districts across 28 states.

To promote the export of millets and other nutritious cereals APEDA has also established the Nutri Cereals Export Promotion Forum. Furthermore, APEDA is conducting sensitisation programmes for millet start-ups to familiarise them with the export opportunities. To further this agenda, APEDA has also planned programmes for the promotion of millets and their value-added products in various countries, including the UAE, Indonesia, the USA, Japan, the UK, Germany, Australia, Republic of Korea, South Africa, and Saudi Arabia. These programmes will include Buyer Seller Meets, Road Shows, and participation in major international events³⁹.

Various stakeholders are adopting a collaborative approach to millets promotion. For instance, APEDA and the Department of Agriculture and Farmers' Welfare are collaborating to increase the cultivation area, production, and productivity of millets, including bajra, jowar, and ragi. In another example, the NITI Aayog has signed a Statement of Intent with the United Nations World Food Programme to promote millets globally. Further, APEDA has signed a Memorandum of Understanding with the Indian Institute of Millets Research to enhance value addition and farmers' income.

State Support

Odisha Millet Mission

The Government of Odisha launched a special programme for promotion of millets in tribal areas known as Odisha Millet Mission (OMM) in 2017 with the aim to revive millets on farms and plates and simultaneously focus on production, processing, consumption, marketing, and inclusion of millets in government schemes.

The key objectives of the mission are promoting household level consumption, improving productivity of millet crops by improved agronomic practices, promoting Farmer Producers Organisations (FPOs) for marketing, setting up decentralised processing unit, inclusion of millets in Integrated Child Development Services (ICDS), Mid-day Meal (MDM) and Public Distribution System (PDS). The entire project has been implemented by FPOs with support of local NGOs under the guidance of line departments at district and block level. Between 2017-18 and 2022-23, there has been significant improvements in millet farming due to these interventions.

³⁹ Ministry of Commerce and Industry, Government of India

The outreach of the OMM initiative extended to approximately 26,811 villages across 177 blocks in 30 districts of the state. The gross agricultural yield per farmer household saw a remarkable increase, more than tripling from ₹ 3957 in 2018-19 to ₹ 12486 in 2020-21. Similarly, the gross agricultural yield per hectare also witnessed substantial growth, more than doubling from ₹ 9447 to ₹ 20710, during the same period. Millet production per hectare exhibited a similar trend, more than doubling from 0.6 MT/hectare to 1.3 MT/hectare. Additionally, the average land area cultivated per farmer household expanded from 0.42 hectare to 0.60 hectare between 2018-19 and 2020-21⁴⁰.

Out of the total millet cultivation area spanning 47.2 thousand hectares in Odisha, ragi occupied a dominant share, accounting for over 86% of the cultivated land. In the year 2019-20, OMM procured 94,745 quintals of millets from 20,328 farmers at a rate of ₹ 3,148 per quintal. Additionally, the initiative established 38 Custom Hiring Centers (CHCs) at the cluster level, benefiting 30,285 farmers, and supplied 99 quintals of seeds in 2020-21. CHCs are basically a unit comprising a set of farm machinery, implements and equipment meant for custom hiring by farmers.

The mission successfully distributed ragi through the PDS to 16 lakh beneficiaries across seven districts in 2018-19. Furthermore, ragi laddu was introduced as a morning snack for pre-school children under the ICDS programme in select districts. The mission also set up “Millet Shakti Cafe” outlets in various locations to serve hot cooked millet-based items and bakery products, promoting millet consumption and awareness.

The Odisha Millets Mission also stood out because it exclusively relied on bio-inputs, resulting in the cultivation of organic millets. This approach led to enhanced soil quality and reduced grain losses due to pests. Obtaining organic certification for these crops would guarantee fair market prices for farmers. The OMM also played a crucial role in increasing the involvement of women-led Self-Help Groups and facilitating their active participation in the entire millet value chain. Women were assigned responsibilities in processing, adding value to the products, and marketing, all while retaining their traditional roles in post-harvest operations and seed management.

Andhra Pradesh Millet Mission

In 2016, the Government of Andhra Pradesh initiated a programme with the primary aim of revitalising millet cultivation among tribal communities residing in the northern coastal region. This ambitious project seeks to transform tribal and rain-fed areas into thriving Millet-Hubs, promote millet production, stimulate demand, and integrate millets into the broader grain economy.

Before the implementation of this initiative, the cultivation of millets had significantly declined by 70% over the past two decades. This decline was primarily attributed to changing dietary preferences within tribal communities, resulting in the gradual disappearance of once staple crops like little millet and pearl millet from their diets. The shift had adverse effects on food and nutrition security in these areas. With the support under the Andhra Pradesh Millet Mission, millet production witnessed a substantial growth, with each Mandal producing an estimated 2.4 lakh quintals (approximately 23,500 metric tons) of millets. This success story extended to about 5,000 Mandals, positively impacting over 100,000 households by increasing their millet consumption. The surplus production was then channelled into critical support systems such as the PDS,

⁴⁰ Development Monitoring and Evaluation Office, Government of India

ICDS, and MDM programmes. Furthermore, the initiative spurred the expansion of local millet processing businesses and establishment of millet markets and value chains, ultimately leading to improved returns for farmers.

Key activities within this mission included the creation of a dedicated Millets Promotion Board in the state and formation of a committee responsible for setting the MSP for Sorghum grown within the state. To raise public awareness and highlight the nutritional benefits of millets, the authorities published a book on Millet Recipes and Sri Ragi Cultivation in Telugu language. This initiative targeted specific groups, including pregnant and lactating women, TB patients, and diabetic patients, among others.

Recognising that the lack of modern processing facilities was a major hindrance to millet promotion nationwide, the Government of Andhra Pradesh also established processing units equipped with graders, dehullers, and destoners in 10 Mandals since 2018. This move provided a significant boost to farmers by making the cultivation of this nutritious grain more viable, and addressing issues related to low yields, weak market access, and challenging processing methods.

Tamil Nadu Millet Mission

Tamil Nadu Millet Mission was started in 2014-15 under the National Agriculture Development Programme (NADP), under which millet farmers are given incentives for cultivation and distribution of millets. A total of 11,500 kits have been supplied comprising liquid biofertiliser, micronutrients, fungicides, pesticides, etc., to the beneficiary farmers at the subsidy of ₹ 3000/ha for major millets and ₹ 2000/ha for minor millets, subject to maximum area of 2 hectare in millets mandated under the mission. Other activities under the Mission included organising frontline demonstration in millet-growing districts and providing training to farmers on farming and value addition of millets.

The Agriculture Department of Tamil Nadu also launched the Mission on Sustainable Dryland Agriculture in 2016 for dryland farming, focusing on improving the production and productivity of millets, pulses and oilseeds. The overall budget of the mission was ₹ 802 crore, covering various aspects such as formation of dry land clusters, village clubs, comprehensive land development, value addition, strengthening FPOs, custom hiring centres, animal husbandry, etc.

Conclusion

The production, area harvested, yield, and trade of millets from India have experienced noteworthy developments in recent years. While millet cultivation suffered a decline in area harvested over the past few decades due to changing dietary preferences and agricultural practices, there has been a renewed focus on their cultivation driven by their nutritional benefits and sustainability aspects. There has been a concerted effort to revive millet cultivation, driven by both government initiatives and changing consumer preferences. The inclusion of millets in government programmes like the PDS, ICDS, and MDM schemes has increased their domestic demand. Furthermore, India's trade in millets has also gained momentum. India's initiatives to promote millets, both domestically and internationally, have led to enhanced trade opportunities. As the awareness of health benefits, sustainable agriculture, and dietary diversity continues to grow globally, India's efforts to revive millet cultivation and promote their consumption are poised to positively impact not only the country's agricultural sector but also the international trade and nutritional landscape.



Strategies for Enhancing Production and Exports of Millets

As noted in the previous chapters, India's share in global millets exports stood at 1.6% in 2022, which is substantially low when compared to India's share of 18.7% in the global production of millets. While a large share of the production is consumed domestically, there is substantial scope for enhancing exports of millets from India. According to a recent report, India has the potential to export millet grains and millet based value-added products worth US\$ 2 billion by 2030, with the exportable surplus in millet grains projected to reach 0.56 million MT during the year⁴¹. The growth in exports is expected to be driven by value-added millet products and beverages, animal and bird feed, millet starches, and seeds. This chapter focuses on actionable strategies that can be adopted to augment production and exports of millet and millet products from India.

Target Markets for Enhancing Millet Exports

As noted in the previous chapters, India's current export orientation i.e. exports as percentage of production, stood at a meagre 0.9%. This is significantly lower than several other top millet producing and exporting countries.

There are 4 millet categories at HS 6-digit level where India featured among the top 5 global exporters in 2022. India had the largest shares of 28.9% in the global exports of millet seed for sowing (HS 100821) during 2022. India was also the largest exporter of millet (excluding grain sorghum, and seed for sowing) (HS 100829), with a share of 16.1% in the global exports of the product during 2022. Besides these, India was also an important exporter of other cereals including small millets and pseudo millets (HS 100890) and grain sorghum for sowing (HS 100710), with shares of 7.4% and 5.8% in exports of these products respectively, during 2022. However, in several other categories, India's exports performance has been lacklustre. Despite being the 6th largest producer of grain sorghum during MY 2023, India's share in global exports of grain sorghum was only about 0.3% in 2022. Moreover, during FY2015 to FY2023, India has not exported grain sorghum to China, which is the largest importer of the product. Clearly, there is scope for further enhancing exports of millets from India, particularly in categories in which India is among the top producers globally.

⁴¹ APEDA & YES BANK (2022), Indian Superfood Millets: A USD 2 Billion Export Opportunity

Table 7: Product-wise Top Global Exporting Countries and India's Performance in Millets (2022)

HS Code	HS Description	India's Share in Global Exports	Share of Product in Global Millet Exports	Top Exporting Countries for the Product (Rank of the Country in Global Exports of the Product)	
100829	Millet (excluding grain sorghum, and seed for sowing)	16.1%	3.8%	India	1
				The USA	2
				Russia	3
				Ukraine	4
				France	5
100890	Other cereals including small millets and pseudo millets	7.4%	4.4%	France	1
				The USA	2
				Sweden	3
				India	4
				Belgium	5
100790	Grain sorghum (excluding for sowing)	0.3%	81.2%	The USA	1
				Australia	2
				Argentina	3
				France	4
				Ukraine	5
100821	Millet seed for sowing (excluding grain sorghum)	28.9%	0.8%	India	1
				The USA	2
				Uzbekistan	3
				France	4
				Russia	5
100710	Grain sorghum for sowing	5.8%	2.3%	The USA	1
				Australia	2
				France	3
				Uganda	4
				India	5
100830	Canary seed	0.6%	3.8%	Canada	1
				Argentina	2
				The UK	3
				The Netherlands	4
				Turkey	5
100810	Buckwheat	0.4%	3.7%	Russia	1
				Poland	2
				The USA	3
				Lithuania	4
				Latvia	5

Note: Product categories are arranged in descending order of the value of India's exports of the product; Cells shaded in green highlights where India is among the top 5 exporting countries.

Source: ITC Trade Map, Exim Bank Research

According to data from ITC Export Potential Map, India has an untapped potential of US\$ 47.1 million in export of millets (not including value added products), given India's current supply capabilities, target market demand, market access conditions, and current bilateral linkages. Tapping the latent potential in exports of millets could help increase the millets exports from India to over US\$ 122 million. With focus on value added products, exports from this segment could be even higher.

Of the total untapped potential, India has the largest export potential in millets (excluding grain sorghum) of US\$ 26 million, followed by grain sorghum (US\$ 14 million). For millets (excluding grain sorghum), India could target markets such as Indonesia, Nepal, the UAE, the USA, Germany, South Africa, South Korea, Turkey, Oman and Sri Lanka. Meanwhile, for grain sorghum, the largest untapped potential for India lies in China at US\$ 6.8 million, followed by markets such as Sudan, Djibouti, Zimbabwe, Spain, Ethiopia, Eritrea, Italy, South Africa and Japan (Table 8). India could target these markets to expand exports of millets in the short term.

Table 8: Untapped Potential in Millets Exports from India

Product Category	Unrealised Export Potential (US\$ Million)	Top Markets with Untapped Potential for India
Millets (Excl. grain sorghum)	26.0	Indonesia, Nepal, The UAE, The USA, Germany, South Africa, South Korea, Turkey, Oman, Sri Lanka
Grain Sorghum	14.0	China, Sudan, Djibouti, Zimbabwe, Spain, Ethiopia, Eritrea, Italy, South Africa, Japan
Other cereals incl. small millets	5.6	The USA, Thailand, Spain, France, The UK, Canada, Italy, Australia, Saudi Arabia, Oman
Canary Seeds	1.2	Spain, Belgium, Italy, Egypt, Algeria, Brazil, Portugal, Mexico, Turkey, Saudi Arabia
Buckwheat	0.3	Japan, China, The USA, France, Italy, Poland, Germany, South Korea, The UAE, The Netherlands
Total	47.1	

Note: The above analysis does not include value-added products of millets

Source: ITC Export Potential Map; Exim Bank Research

Analysis of the millet exports indicates that the top 10 export destinations accounted for approximately 67.6% of India's millet exports in 2022, suggesting significant market concentration. For comparative assessment of the extent of market concentration in each category of millets (at HS-6 digit level), a Market Concentration Index (MCI) has been constructed. The MCI index measures the degree of export market concentration by indicating if a large share of exports is accounted by a small number of countries, or on the contrary, exports are well distributed among the export destinations. It is calculated as per the following formula:

$$H_j = \frac{\sqrt{\sum_{i=1}^N \left(\frac{X_{ij}}{X_j}\right)^2} - \sqrt{\frac{1}{N}}}{1 - \sqrt{\frac{1}{N}}}$$

where, H_j is the market concentration index of the product exported from country j , $X_{i,j}$ is the value of exports of the product from country j to country i , X_j is the total value of exports of the product from country j and N is the total number of destinations for exports of the product from country j .

This index ranges from zero to one, with a larger value denoting a higher concentration in the export markets. A value of H_j equal to one indicates a single country is the market for all merchandise exports from country j , while a value of zero means that the exports are homogeneously distributed among all export destinations. Analysis indicates that the MCI is highest for India in the categories of millet seed for sowing (excl. grain sorghum) (HS 100821) with MCI value of 0.43, followed by grain sorghum for sowing (HS 100710) (Table 9). Products with high market concentration would require appropriate market diversification strategy.

Table 9: Category-wise Market Concentration Index for Millets Exports from India (2022-23)

HS Code	Product Description	Market Concentration Index
100821	Millet seed for sowing (excluding grain sorghum)	0.43
100710	Grain sorghum, for sowing	0.40
100830	Canary seed	0.29
100790	Grain sorghum (excluding for sowing)	0.27
100890	Other cereals including small millets and pseudo millets	0.25
100829	Millet (excluding grain sorghum, and seed for sowing)	0.23
100810	Buckwheat	0.19
Total Millets		0.19

Source: ITC Trade Map, Exim Bank Research

Analysis also indicates that majority of the top 5 global importers across all categories of millets exports do not feature among the top 5 export destinations for India. For example, China, which is the leading importer of grain sorghum does not feature among India's export destinations for the product. Apart from China, other top importers of sorghum including Japan, Spain, Mexico, and Sudan, also do not feature among India's top 5 export destinations. Likewise, none of the top 5 importers of millets (excl. grain sorghum and seed for sowing) featured among the top 5 destinations for India in 2022 (Table 10). There is a need for market penetration strategies for the top importing markets of millets.

Table 10: Comparison of Top Global Importers vis-à-vis Top Export Destinations for India in Millets (2022)

HS Code	HS Description	Global Import (US\$ Million)	Top 5 Global Importers	Share in Global Imports	India's Export (US\$ Million)	Top 5 Export Destinations for India	Share in India's Exports of the Product
100829	Millet (excluding grain sorghum, and seed for sowing)	218.8	Indonesia	18.4%	26.1	Saudi Arabia	26.0%
			Germany	7.3%		The UAE	16.2%
			Belgium	6.1%		Libya	8.6%
			South Korea	4.1%		Morocco	5.5%
			Canada	4.0%		Yemen	5.1%

HS Code	HS Description	Global Import (US\$ Million)	Top 5 Global Importers	Share in Global Imports	India's Export (US\$ Million)	Top 5 Export Destinations for India	Share in India's Exports of the Product
100890	Other cereals including small millets and pseudo millets	144.9	Italy	12.0%	14.0	Germany	19.9%
			Belgium	8.9%		The USA	19.5%
			The USA	7.6%		Japan	17.4%
			Germany	6.1%		The Netherlands	6.3%
			Greece	5.9%		Thailand	3.1%
100790	Grain sorghum (excluding for sowing)	4,340.0	China	86.2%	11.1	Saudi Arabia	22.4%
			Japan	2.4%		The UAE	19.2%
			Spain	1.7%		Kuwait	9.3%
			Mexico	1.5%		Iran	9.0%
			Sudan	1.4%		Philippines	8.1%
100821	Millet for sowing (excluding grain sorghum)	24.3	South Africa	10.2%	10.5	Nepal	47.1%
			The UAE	9.8%		The UAE	21.4%
			The UK	8.6%		Libya	7.1%
			Belgium	8.5%		Egypt	6.5%
			The USA	7.5%		Oman	3.2%
100710	Grain sorghum for sowing	96.2	Mexico	24.2%	5.8	Bangladesh	39.1%
			Bolivia	10.7%		The UAE	31.4%
			Spain	7.7%		Egypt	16.6%
			France	7.2%		Saudi Arabia	4.8%
			Rwanda	6.9%		Japan	2.0%
100830	Canary seed	141.5	Belgium	14.7%	0.9	The UAE	50.1%
			Brazil	9.4%		Saudi Arabia	23.8%
			Spain	8.0%		The USA	7.6%
			Colombia	6.1%		Canada	5.5%
			Algeria	6.1%		Malaysia	2.4%
100810	Buckwheat	183.1	Japan	15.4%	0.7	Nepal	3.4%
			Lithuania	8.5%		South Korea	2.3%
			Italy	8.1%		Chinese Taipei	1.2%
			Poland	7.3%		The USA	0.7%
			Azerbaijan	6.1%		Libya	0.2%

Note: Countries in bold are the ones which feature among India's top 5 export destinations and also among the top 5 global importers of the product.

Source: ITC Trademap, Exim Bank Research

Encouraging Export of Value-added Products

In addition to promoting exports of millet grain, there is need for India to focus on enhancing exports of millet flour and other millet-based value-added food products. The process of adding value to millets begins with primary processing, which separates the glumes and other foreign components to produce fine edible grains. These grains then undergo secondary processing by being ground into millet flour. Thereafter, products like as cookies, noodles, puffs, extruded snacks, ready to eat mixes like dosa, upma, millet malt, and drinks are produced through tertiary processing of millets.

Information on value-added millet products as well as millet flour exported from India is not captured in the trade data due to absence of separate HS Codes. As per APEDA, currently, India's exports of millet-based value-added products are miniscule⁴².

Enhancing exports of high value-added millets preparations like snacks, ready to cook/ ready to eat products including pasta and noodles made from millets, fermented millet flour, puffed or flaked millets items, can help fetch premium price for exporters and in turn garner greater export revenues. In fact, according to a recent analysis by APEDA, diverting about 0.25 million MT of millets for secondary and tertiary value addition has the potential to yield up to 0.59 million MT of value-added products, which is more than double the quantity of the millet grains used in value addition⁴³.

Processed millets hold significant potential for exports from India, owing to the high nutritional content and gluten-free characteristics of millets, and the rising global demand for gluten-free food products in the recent years. In the wake of rising incidence of lifestyle issues such as gluten sensitivity, as well as rising fitness consciousness across the world, the consumer preference is shifting towards food products that are gluten-free, high fibre and have low caloric content. According to recent research, the global market for gluten-free food products stood at an estimated US\$ 6.45 billion in 2022 and is expected to register a robust CAGR of 9.8% during 2023 to 2030. Developed countries in North America and Europe including the USA, Canada, Germany, and France are expected to be the top markets for gluten-free products⁴⁴.

Leveraging the market opportunities, several major players in the processed foods industry in India are entering the processed millet products segment. In addition to catering to the domestic demand, these processed food businesses should be encouraged to leverage the growing demand for healthier and more sustainable food options in the international markets.

A focus area for value-added exports could be millet malt. There is substantial global demand for malt, particularly in the alcoholic beverages industry, as also in other segments like baked goods such as biscuits, bread rolls, pancakes, non-alcoholic beverages etc. Malt is also an extensively traded commodity, with the global exports in malt (HS-1107) amounting to US\$ 4.7 billion in 2022, although currently it predominantly consists of glutenous malts such as barley malt and wheat malt. Millet malt could become a substitute to glutenous malts considering the growing demand for gluten-free products.

The global gluten-free beer market was estimated to be valued at US\$ 12.2 billion in 2022⁴⁵. Malt derived out of gluten free cereals is an opportunity that is currently being tapped by many multinational brands, particularly in the beverage industry, which are catering mainly to developed markets in North America

⁴² APEDA & YES BANK (2022), Indian Superfood Millets: A USD 2 Billion Export Opportunity

⁴³ Ibid.

⁴⁴ ISI Emerging Markets- Grand View Research

⁴⁵ ISI Emerging Markets- Technavio Research

and Europe. In India as well, leading beverage manufacturers are embracing millets for brewing unique and innovative gluten-free variants of alcoholic beverages using millets such as locally grown Bajra and Ragi. Indian manufacturers should also focus on catering to the growing global demand for gluten-free beverages by focussing on enhancing exports of millet-based malt products.

Apart from human consumption, value added millet products in the bird feed segments could also be explored for enhancing exports. Currently, proso millet is being widely used as a mix in bird feed. India is both an exporter and importer of bird feed⁴⁶. Focus on high quality millets, with due consideration to the seed size and traceability to ensure that they fall within Minimum Permissible Limits, could help enhance exports of these products⁴⁷.

Enhancing Exports of Organic Millets

Over the recent years, the demand for organic products has been on a rise due to growing awareness of the health advantages and a resultant shift in consumer purchasing behavior. The global market for organic food and beverages reached an estimated value of US\$ 208.2 billion⁴⁸ in 2022, and is expected to register a CAGR of 11.7% during 2023 to 2030. With consumers globally valuing non-genetically modified organisms (GMO) options and preferring organic produces, the market's growth trajectory is anticipated to remain positive in the coming years. In particular, markets such as North America, Europe, and the Asia Pacific are likely to drive the demand for organic products in the coming years⁴⁹.

Indian firms, including small enterprises, have already begun tapping the export market for organic millet products. Over the recent years, internationally certified organic start-ups have been engaging in export of millet-based food products like noodles, cookies, namkeen, and pasta from India to international markets such as the UAE, the USA, the Netherlands, and Australia. Such enterprises are not only providing farmers with high quality millet seeds and bio-natural pesticides for supporting organic cultivation, but are also offering purchase assurance, and assisting in post-harvest processing and packaging in their certified facilities. These efforts exemplify potential for a greater number of firms, including start-ups, to capitalise on the nutritious and versatile nature of millets.

Institutional support from government bodies such as APEDA is also helping Indian firms to tap into the export market for organic millets from India. In 2021, the first batch of millets cultivated in the Himalayas in Uttarakhand was exported to Denmark, which was driven by the collaborative effort between APEDA, the Uttarakhand Agriculture Produce Marketing Board (UKAPMB), and the exporter firm. The millets, specifically ragi (finger millet) and jhangora (barnyard millet), were sourced and processed from Uttarakhand farmers, which met the organic certification standards required by the European Union. The UKAPMB procured millets directly from these farmers, which were then processed at a state-of-the-art facility managed by the exporting firm⁵⁰. The exports to Denmark not only opened up the European markets for millets but has also encouraged farmers in Uttarakhand to venture into organic farming of millets. Going forward, more such institutional support and joint efforts, including awareness programmes and marketing campaigns, would be required to boost exports of organic millet products from India.

⁴⁶ APEDA & YES BANK (2022), Indian Superfood Millets: A USD 2 Billion Export Opportunity

⁴⁷ Ibid.

⁴⁸ ISI Emerging Market: Grand View Research

⁴⁹ Market Intelligence Report, APEDA

⁵⁰ PIB (2021), India begins exports of organic millets grown in Himalayas to Denmark

Addressing Non-tariff Barriers

Analysis of trade barriers faced by India's exports of millets in the top 5 importing countries globally indicates that while the effectively applied tariff faced by India on exports of millets is relatively low, in the range of 0% to 10.39%, it is the non-tariff measures (NTM) and related regulations that present significant obstacles for Indian millet exporters. Various countries impose specific import requirements on millets, such as quarantine protocols or mandatory testing, before allowing their entry into the country. In some of the markets, the number of NTMs faced by millet products from India are substantially large, even while the effectively applied tariff on these products is low. For instance, in the case of China, India's sorghum exporters face as many as 97 NTMs (Table 11), which is substantially higher when compared to 24 NTMs faced by Indian rice exporters in China. Likewise, in the UAE, India's exports of millets (for sowing) face as many as 122 NTMs (Table 11), as opposed to 10 NTMs on India's exports of rice to the UAE.

Table 11: Non-tariff Measures Imposed by the Top Importing Countries in the Product Category

HS Code	Product Description	Global Top Importing Countries (2022)	Number of NTMs	Effectively applied tariff faced by India (%)
100710	Grain sorghum for sowing	Mexico	18	0%
		Bolivia	13	10%
		Spain	25	3.2%
		France	25	3.2%
		Rwanda	0	25%
100790	Grain sorghum (excluding for sowing)	China	97	2%
		Japan	13	0%
		Spain	19	0%
		Mexico	18	7.5%
		Sudan	0	0%
100810	Buckwheat	Japan	6	0%
		Lithuania	25	5.55%
		Italy	25	5.55%
		Poland	25	5.55%
		Azerbaijan	16	5%
100821	Millet for sowing (excluding grain sorghum)	South Africa	1	0%
		The UAE	122	0%
		The UK	0	8.1%
		Belgium	25	8.76%
		The USA	21	0.19%
100829	Millet (excluding grain sorghum and for sowing)	Indonesia	19	0%
		Germany	25	10.39%
		Belgium	25	10.39%
		South Korea	34	0%
		Canada	8	0%

HS Code	Product Description	Global Top Importing Countries (2022)	Number of NTMs	Effectively applied tariff faced by India (%)
100890	Other cereals including small millets and pseudo millets	Italy	25	1.32%
		Belgium	25	1.32%
		The USA	21	1.1%
		Germany	25	1.32%
		Greece	25	1.32%

Source: ITC Market Access Map; Exim Bank Research

NTMs applied on millets primarily include geographical restrictions due to sanitary and phytosanitary measure (SPS); technical barriers to trade (TBT); pre-shipment inspection and other formalities; contingent trade-protective measures; non-automatic import licensing; quotas, prohibitions, quantity-control measures and other restrictions not including SPS or TBT measures; price-control measures, including additional taxes and charges; intellectual property; rules of origin; and other export-related measures. The major types of NTMs faced by the Indian millet sector in top importing markets for millets are summarised in Table 12.

Table 12: NTMs faced by India's Millet Exports in Major Markets

Broad Category of NTM	Category Name	Major Type of NTMs for India's Millet Exports	Description
A1	Prohibitions/restrictions of imports for sanitary and phytosanitary reasons	A11	Prohibitions for sanitary and phytosanitary reasons
		A13	Systems approach (Combining two or more interrelated measures and conformity-assessment requirements)
		A14	Authorization requirement for sanitary and phytosanitary reasons for importing certain products
		A15	Authorization requirement for importers for sanitary and phytosanitary reasons
		A19	Prohibitions or restrictions of imports for sanitary and phytosanitary reasons, not elsewhere specified
A2	Tolerance limits for residues and restricted use of substances	A21	Tolerance limits for residues of or contamination by certain (non-microbiological) substances
		A22	Restricted use of certain substances in foods and feeds and their contact materials
A3	Labelling, marking and packaging requirements (directly related to food safety, which should be provided to the consumer)	A31	Labelling requirements
		A32	Marking requirements
		A33	Packaging requirements
A4	Hygienic requirements related to sanitary and phytosanitary conditions	A41	Microbiological criteria of the final product
		A42	Hygienic practices during production related to sanitary and phytosanitary conditions

Broad Category of NTM	Category Name	Major Type of NTMs for India's Millet Exports	Description
A5	Treatment for elimination of plant and animal pests and disease-causing organisms in the final product or prohibition of treatment	A51	Cold or heat treatment
		A52	Irradiation
		A53	Fumigation
		A59	Treatments to eliminate plants and animal pests or disease-causing organisms in the final product not elsewhere specified or prohibition of treatment
A6	Other requirements relating to production or postproduction processes	A63	Food and feed processing
		A64	Storage and transport conditions
		A69	Other requirements relating to production or postproduction processes not elsewhere specified
A8	Conformity assessment related to sanitary and phytosanitary conditions	A81	Product registration and approval requirement
		A82	Testing requirements
		A83	Certification requirements
		A84	Inspection requirements
		A85	Traceability requirements
		A851	Origin of materials and parts
		A852	Processing history
		A859	Traceability requirements not elsewhere specified
		A86	Quarantine requirements
A89	Conformity assessment related to sanitary and phytosanitary conditions not elsewhere specified		
A9	Sanitary and phytosanitary measures not elsewhere specified	A9	Sanitary and phytosanitary measures not elsewhere specified
B2	Tolerance limits for residues and restricted use of substances	B21	Tolerance limits for residues of or contamination by certain substances
B3	Labelling, marking and packaging requirements (regulating the information to be printed on packages, that should be provided to the consumer)	B31	Labelling requirements
		B32	Marking requirements
		B33	Packaging requirements
B7	Product quality, safety or performance requirements	B7	Product quality, safety or performance requirements

Broad Category of NTM	Category Name	Major Type of NTMs for India's Millet Exports	Description
B8	Conformity assessment related to technical barriers to trade	B83	Certification requirements
		B84	Inspection requirements
		B851	Origin of materials and parts
		B89	Conformity assessment related to technical barriers to trade not elsewhere specified
B9	Technical barriers to trade measures not elsewhere specified	B9	Technical barriers to trade measures not elsewhere specified
C1	Pre-shipment inspection	C1	Pre-shipment inspection
C3	Requirement to pass through specified port of customs	C3	Requirement to pass through specified port of customs
C4	Import monitoring, surveillance and automatic licensing measures	C4	Import monitoring, surveillance and automatic licensing measures
C9	Other formalities not elsewhere specified	C9	Other formalities not elsewhere specified
D3	Safeguard measures	D321	Volume-based special agricultural safeguards
D3		D322	Price-based special agricultural safeguards
E1	Non-automatic import-licensing procedures other than authorisations covered under the chapters on sanitary and phytosanitary measures and technical barriers to trade	E113	Licensing linked with local production
		E119	Licensing for economic reasons not elsewhere specified
		E125	Licensing for the protection of public health
E3	Prohibitions	E32	Prohibition for non-economic reasons
		E325	Prohibition for the protection of public health
E9	Quantity-control measures not elsewhere specified	E9	Quantity-control measures not elsewhere specified
F6	Additional taxes and charges levied in connection with services provided by the Government	F61	Custom inspection, processing and servicing fees
		F62	Merchandise-handling or -storing fees
F7	Internal taxes and charges levied on imports	F71	Consumption taxes
G1	Advance payment requirements	G13	Advance payment of customs duties

Broad Category of NTM	Category Name	Major Type of NTMs for India's Millet Exports	Description
G9	Finance measures not elsewhere specified	G9	Finance measures not elsewhere specified
I1	Local content measures	I1	Local content measures
I2	Trade-balancing measures	I2	Trade-balancing measures
M	Government Procurement Restrictions	M	Government Procurement Restrictions
N9	Intellectual property not elsewhere specified	N9	Intellectual property not elsewhere specified
P1	Export measures related to sanitary and phytosanitary measures and technical barriers to trade	P12	Export registration requirements for technical reasons
		P13	Production and post-production requirements to export
		P15	Labelling, marking, or packaging requirements
		P163	Certification required by exporting country
		P169	Conformity-assessment measures not elsewhere specified
P2	Export formalities	P21	Requirements to pass through specified port of customs for exports
		P22	Export monitoring and surveillance requirements
P3	Export licences, export quotas, export prohibition and other restrictions other than sanitary and phytosanitary or technical barriers to trade measures	P33	Licensing, permit or registration requirements to export
P4	Export price-control measures, including additional taxes and charges	P43	Export charges or fees levied in connection with services provided
P6	Export-support measures	P6	Export-support measures
P9	Export measures not elsewhere specified	P9	Export measures not elsewhere specified

Source: UNCTAD TRAINS; Exim Bank Research

Stringent NTMs lead to higher cost of compliance and longer processing times, thereby affecting the market access. There is a need to strengthen the quality testing and inspection infrastructure in the country for millets exports, to encourage adherence to quality standards, effectively tackle non-tariff measures and ensure market access. The current domestic laboratory testing infrastructure is highly skewed across India. The topmost exporter of millets viz. Gujarat has 17 such labs. Meanwhile, Rajasthan, which is the largest producer and fourth largest exporters of millets, has only 15 labs, while Telangana, which is the third largest

exporter of millets has only 7 such labs, as of end-August 2023. Given the high levels of NTMs faced by millet exports, development of testing infrastructure in the top millet producing states will be imperative for furthering exports of millets from the country. In this context, a comprehensive and dedicated programme for millets could be introduced by the GOI, for building technical infrastructure by investing in setting up and equipping labs.

Besides this, in order to help exporters to better navigate the complex regulatory and standards requirement for exports of millets from the country, a comprehensive manual for millet exporters could be developed comprising export protocols, quality guidelines for millets exports, details of various processing machinery and certification requirements for end-products, among others.

Addressing Data Issues for Informed Policy Decisions

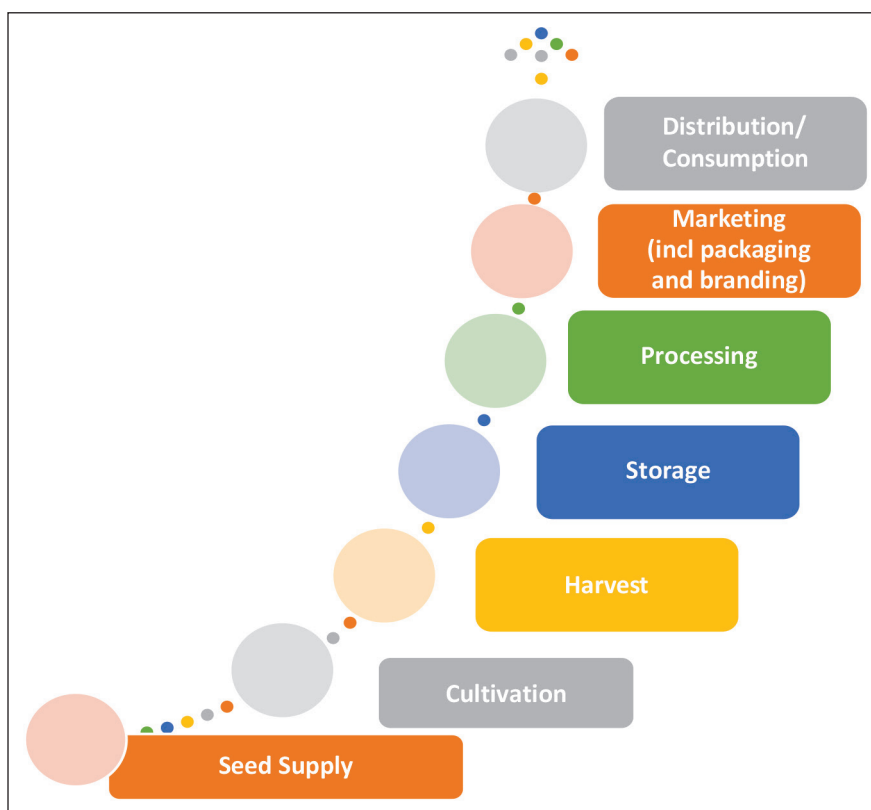
The existing data on trade in millets is available for millet grains only. Data for products such as millet flour and value-added millet products is not being captured under separate HS-codes and is currently being classified under the broader category of preparations of other cereals (including HS 110290- Other cereal flour; HS- 110319 - groats and meal of other cereals; HS 110419 - rolled/flaked grains of other cereals; HS 230240 - bran sharps and residues of other cereals). As against this, processed products of other cereals such as wheat flour, wheat starch, wheat gluten, wheat bran etc., have their separate HS code classifications. The absence of specific HS-Codes for processed millet products makes it challenging to assess the performance and trajectory of trade in processed millet products at both India and global level, and in turn impacts informed policy making for the sector. Thus, given the importance being accorded to millets at the international level, India should consider making representations at the World Customs Organisation (WCO) for the creation of separate HS-Codes for processed millet products such as millet flour, millet starch, millet gluten, millet bran, millet malt, etc. Additionally, the ITC-HS in India could have eight-digit classification for processed millet products as well as small millets that currently do not have separate HS codes at 8-digit level.

Strengthening the Millets Value Chain in India to Enhance Exportable Surplus

The millet value chain includes seed supply, cultivation, harvest, storage, processing, marketing (incl packaging and branding), distribution and consumption (Exhibit 23). Addressing specific issues across the value chain and increasing the efficiency of processes would be important for positioning India as a stable and dependable source of price competitive and good quality millet and millet products in international markets. This section focuses on some of the value-chain related challenges for enhancing millet production and strategies to alleviate these challenges.

Further, addressing logistical challenges related to storage and transportation would also be crucial to enhance the production as well as exportable surplus.

Exhibit 23: Millets Value Chain



Source: Exim Bank Research

Augmenting Seed-hubs Capacities for Minor Millets

In India, hybrid seed development in sorghum and pearl millet has advanced rapidly. The ‘seed village’ concept involving multiplication of specific cultivars in particular villages has been effectively used to undertake seed production programme in non-traditional areas. During the last decade alone, more than 220 cultivars⁵¹ of millets have been introduced for different agro ecologies⁵². These new cultivars should be brought in seed production chain to augment millet productivity.

Indian farmers are willing to adopt the technologies for producing genetically pure seed with high seed vigour and quality as evident from the contractual arrangements of small farmers with seed corporations and private seed companies for seed production. Over the past two decades, yield levels in production plots of hybrid seeds have doubled, largely as a result of introduction of high-yielding parental lines and improved crop management techniques among farmers. Seed processing period has also shortened considerably, reducing the time from harvest to delivery of seeds in the target regions to a month. This has circumvented the need for storage of seeds over seasons, resulting in reduced overhead costs and better seed quality⁵³.

However, the success of hybrid seed development has been limited to sorghum and pearl millet, while the adoption of hybrid seeds in other minor millets that have significant export potential has been limited. Cultivars of these other varieties need to be developed depending on the location specific requirements of

⁵¹ A cultivar is a kind of cultivated plant that people have selected for desired traits and when propagated retain those traits. Methods used to propagate cultivars include division, root and stem cuttings, offsets, grafting, tissue culture, or carefully controlled seed production.

⁵² National Academy of Agricultural Sciences (2022), Promoting Millet Production, Value Addition and Consumption

⁵³ Ibid.

soil, rainfall, temperature, humidity, day length and cropping patterns. Nutrient-use efficiency, particularly nitrogen, both native and applied, also needs to be enhanced as small millets are generally sown in poor soils⁵⁴.

The establishment of seed-hubs could reinforce the seed supply chain, facilitating the commercialisation of new cultivars and improving the rate of seed replacement for minor millets. These seed-hubs would help supply high-quality breeder seeds needed to further enhance the production of high-quality seeds⁵⁵. This would improve the exportable surplus from the country.

Promoting Adoption of Bio-fortified Millet Seeds

Bio-fortification of millet refers to development of nutritionally enriched millet varieties through genetic manipulations. Under this, micronutrient dense grains are produced by the crop itself through agricultural interventions. This seed-based approach is farmer-empowering and can also go a long way in reducing deficiency of micronutrients, particularly iron, zinc and vitamin A.

According to a recent report by the National Academy of Agricultural Science, pearl millet already has a biofortified variety named “Dhanashakti”⁵⁶. Currently, India is growing more than 70,000 ha of biofortified pearl millet⁵⁷. Three independent studies have shown that consumption of 200 g of ‘Dhanashakti’ can meet 100% of recommended daily allowance (RDA) of iron in adult men and children in India and 60% of the RDA in non-pregnant and nonlactating women. Studies also indicate that feeding iron rich pearl millet is an efficacious approach to improve iron status in school-age children⁵⁸.

Research efforts are also ongoing for the development of biofortified sorghum varieties combining high yield and micronutrients, as well as biofortified small millet varieties with high iron and zinc content⁵⁹. Given the potential of biofortification in millets as a feasible strategy to alleviate the micronutrient malnutrition, there could be greater focus on cultivation of biofortified millets as well as production of biofortified millet seeds for exports to partner countries. These biofortified millets would have export appeal in the African region where nutritional security is a major concern and millets are also widely consumed. Biofortified millet variants can also be promoted for use by the food processing industries. Companies can be encouraged to engage in contract farming of specific biofortified millet varieties for secondary and tertiary processing, with a focus on catering to both domestic and international markets.

Promoting Cluster Farming of Millets

Millets can help India’s agricultural exports become more sustainable. A shift away from water-intensive crops such as rice towards millets could significantly alleviate the water scarcity issue. However, the cultivation would require more land because of the lower yield of millets compared to crops such as rice. Thus, improving the productivity of millets would be crucial to ensure that the trade-off is beneficial for farmers. Select farmers’ collectives or millet-producing clusters in the country, such as in the Gajapathi district of Odisha (Box 1), have been successful in ensuring cost reduction and increased productivity. Such model could be further scaled up for enhancing productivity and in turn, the exportable surplus, and integrating with export markets.

⁵⁴ ICAR (2023), Small millets in India: Current scenario and way forward, K Hariprasanna

⁵⁵ National Academy of Agricultural Sciences (2022), Promoting Millet Production, Value Addition and Consumption

⁵⁶ Ibid

⁵⁷ ICAR (2023), Enhancing Productivity And Nutrition With Biofortified Pearl Millet Cultivars

⁵⁸ ICAR (2023), Biofortified Millets To Alleviate Micronutrient Malnourishment

⁵⁹ Ibid.

Box 1: Case Study of Cluster Approach: Taptapani Farmers Producer Organisation, Gajapati district, Odisha

During 2016-17, the Government of Odisha formally established the Taptapani FPO in Mohana Block, Gajapati district of the state, under the Odisha Millets Mission. The FPO is responsible for the promotion, marketing and value addition of Millet-based products in the block. The FPO has promoted 2500 acres of millet crops through a millets mission programme. As of 2020-21, there were 699 shareholders in the FPO, with a shared capital of Rs. 6,99,000.

The FPO is actively engaged in supplying finished millet products to the markets of Bhubaneswar. It has its outlets at Luhagudi, Mohana Gobidpur and Chandiput for delivering its services. In 2019, the FPO was appointed as the primary procurement agency for Mohana Block and the FPO facilitated record procurement of 1400 quintals of Ragi in Gajapati district during the year.

The Taptapani FPO has received the best FPO cash award for the Gajapati district from the Government of Odisha under the Krushi Odisha Programme. It is also registered with the Regulated Market Committee of Gajapati district and has a trading license for millets and maize. Additionally, it is also running a community managed seed centre and custom hiring centre with the requisite farm implements.



Source: Annual Report 2020-21, Taptapani Farmers Producer Company Ltd.

By aggregating resources and procuring inputs in bulk, cluster-based approaches can reduce production costs, enhance farm productivity, and increase profitability. It could also be helpful in enhancing farmers' access to modern processing technologies that are vital for millet cultivation. Further, it could facilitate stronger linkages between producers and the market, which is vital to minimise the disparity between millet procurement prices and the retail price, and ensure that farmers receive a higher share of consumers' spending. The cluster approach can also help in cost-effective quality control, meeting packaging standards and obtaining certifications for targeting export markets.

Increasing Farmer's Income through Carbon Markets

Farmers across several states including Maharashtra, Chhattisgarh, Haryana, and Odisha, among others, face disincentives in millet cultivation as the cultivation is labour intensive and has lower returns as compared to other cash crops. These disincentives have resulted in the shrinking acreage of millets⁶⁰.

⁶⁰ Niti Aayog (2022), Promoting Millets in Diets: Best Practices across States/UTs of India

As noted previously, millets are more climate-resilient and can tolerate diverse abiotic stresses as compared to conventional cereals such as rice. Besides, recent research suggests that methane and nitrous oxide emissions from rice cultivation, which contribute to around 20% of the agriculture sector Green House Gas (GHG) emissions in India, can also be reduced by replacing 50% of the rice with coarse cereals including millets⁶¹. In fact, research suggests that around 300 billion cubic metres of water, and close to 50 Mt of CO₂e can be saved per year through this intervention.

As sustainable development goals gain prominence, carbon markets offer opportunities to generate revenue while promoting environmental sustainability. Carbon markets are a system where companies and governments can buy and sell credits to offset their greenhouse gas emissions. Growing carbon footprint of agricultural activities impacts the environment negatively, with CO₂ emissions from agricultural production accounting for nearly 11% of global greenhouse gas emissions⁶². Carbon markets can reward farmers for practices that reduce their emissions, such as cover cropping, no-till farming, and rotational grazing. Millets cultivation can also lead to significant revenue generation through participation in carbon trading initiatives. Given the low carbon intensity of millet cultivation, participating in carbon trading and offsetting initiatives would help millets farmers and exporters tap into potential revenue streams, while also enhancing India's environmental sustainability.

Policy level intervention would be of paramount importance for India to ensure verifiable management of GHG emissions in agriculture sector. In this context, the Government of India is working towards the development of the Indian Carbon Market (ICM) with an objective to decarbonise the Indian economy by pricing the Green House Gas emissions through trading of Carbon Credit Certificates. The GOI has recently come out with the Carbon Credit Trading Scheme for this purpose. However, the scheme does not specify whether carbon trading in the agricultural sector could be regulated under this scheme. The GOI could consider including a section under the scheme for regulations pertaining to carbon trading in agriculture. This would help formalise the system and also help safeguard farmers' interest. Once a carbon market for agriculture is adequately developed, there could be greater incentives for the private sector to provide support services for lower carbon intensive agricultural segments such as millets. This would also help encourage exports of carbon credit from the agriculture sector, going forward. India is already among the top producers and exporters of carbon credits in the world, with about 35.94 million carbon credits, which is nearly 17% of all voluntary carbon market credits issued globally⁶³.

Addressing Cost Issues

One of the key reasons for relatively lower millet cultivation as compared to major cereals is the associated low profit margins on millet cultivation. A recent analysis by the NABARD indicates that the returns on cultivation of millets such as jowar, bajra, and ragi remain substantially lower than wheat and rice, despite higher MSP for millets as compared to rice and wheat, over the recent years. This holds true even as the cost of cultivating rice remains higher than that of millets⁶⁴ (Table 13).

⁶¹ CSTEP (2021), Energy and Emissions Implications for a Desired Quality of Life in India via SAFARI

⁶² S&P (2022), Carbon Farming Opportunities for Agriculture And Farmers To Gain From Decarbonization

⁶³ CII (2023), Indian Carbon Credit Market

⁶⁴ NABARD (2023), Millet for Health and Wealth

Table 13: Return on Cost of Cultivation of Major Cereals vis-à-vis Millets

Cereal Type	Gross Returns (₹ Per Ha)	Return On Cost of Cultivation (%)	MSP (₹ Per Quintal) for 2021-22
Wheat	43,549	108.1%	2,015
Paddy**	23,495	42.1%	1,940
Maize	20,247	42.2%	1,870
Jowar*	7,214	19.3%	2,738
Bajra	8,294	25.3%	2,250
Ragi	2,277	4.1%	3,377

Note: ** MSP for common paddy; *MSP for hybrid jowar

Source: NABARD; Farmers' portal, Ministry of Agriculture and Farmers' Welfare, Government of India

Better post-production linkages, promotion of cluster farming, strengthening of farmer producers' organisations, improved processing value chains and development of carbon markets could improve returns on millets cultivation. In addition, there a need to introduce MSP for small millets such as foxtail millet and little millet. Alternatively, state governments could introduce benchmark prices for procurement of small millets to encourage production of these millet varieties. Currently, this is being done by the Government of Odisha under its Odisha Millets Mission, wherein the state government is set to launch a benchmark price for non-ragi millets, calculated using the same formula as that of MSP. Similar measures could also be taken up by other millet producing states.

Addressing cost issues would be crucial from the point of view of incentivising production of millets and improving price competitiveness of millets exports. Given the significant cost disadvantages, the GOI could also consider increasing the Remission of Duties and Taxes on Exported Products (RoDTEP) rates for millets exports, up from the current rate of 1% to a suitable higher rate. This would help make Indian millet exports more competitive in the global market and increase export volumes.

Marketing Strategy for Enhancing Millets Consumption

Popularising Consumption of Millet-based Dishes

While efforts are being made by various state governments as also by the Government of India for mainstreaming millets in the recent years, the GOI could undertake specific food promotion campaigns for popularising consumption of millet-based dishes including millet khichdi/pulao, millet dosa/idli, millet chips/crackers etc., both domestically and in the international markets.

The Government of India has undertaken several food promotion campaigns in the past, including the 'Incredible Tiffin' initiative. Other countries have also popularised their food items through similar campaigns. In South Korea, for example, a group of young Koreans undertook a promotional campaign for a well-known Korean dish, Bibimbap. Known as the Bibimbap Backpackers, this group travelled to over 20 cities in 15 countries on a 255-day trip to cook bibimbap. The campaign started in 2011 and was mostly paid for by the Ministry of Agriculture, Government of Korea, and a major Bibimbap chain. They served over 9,000 bowls of bibimbap at 100 events at universities and other places, and received substantial domestic and international media coverage. Similar project was undertaken by a group of Turkish volunteers, who started

the Turkish Coffee Truck initiative to promote Turkish coffee culture across the USA. In 2012, a group of volunteers travelled to five cities in the USA to spark interest in coffee from Turkey. Similar programme could be sponsored by the Indian government for popularising Indian millet-based dishes. This programme could also be used as a platform for popularising the nutritional and health benefits of millets. Focus on quality and hygiene aspects in such initiatives could also help in dissipating the negative perception about Indian food being greasy and unhealthy.

Geographical Indications Tags

Geographical Indications (GIs) are considered important tools for marketing strategies, and function as product differentiators. Geographical Indication-certified products possess unique characteristics associated with their specific geographical origin. By actively working on identifying new millet products for GI certification and marketing them, the state governments can boost the exports of GI certified millet products from India. To reap the benefits of GI status, it is important for the GI brand to be recognised as a reliable and preferred brand in the market with a distinguished positioning. Products such as Darjeeling Tea have been able to gain substantial market share on account of this brand building. In order to attain similar levels of success, key value proposition needs to be defined for the millet products having GI status. Initiatives are also needed for identifying more local rare millet variants as well as millet products which can be accorded with GI status. Currently, several states have applied and obtained GI-tags for their unique varieties of locally grown millets. For instance, Uttarakhand's local variants of millets viz. Mandua (Himalayan Ragi) and Jhangora millets were recently accorded GI-tag in November 2023. Likewise, an FPO in Dindori district of Madhya Pradesh has also applied for GI tag for Sitahi kutki and Nagdaman variants of little millet grown in the region⁶⁵. Other states could adopt a similar approach for identifying local rare millets to apply for GI-tags.

In addition to identifying new products, the logo and name of the GI brand needs to be developed and marketed, and mechanism needs to be devised for ensuring that all the millet products marketed under the GI brand meet the minimum specified standards. The GOI could also introduce regulation pertaining to the minimum proportion of millets in various processed millet products to be eligible to claim the millet branding. Besides, the central and state governments could also focus on linking FPOs, food producer companies, and exporters with international business communities to facilitate marketing of GI-tagged millets. Export related brochures, interactive CDs, etc., can be created for popularising the GI-tagged millet products in international markets.

Conclusion

With an untapped export potential of US\$ 47.1 million, there is significant scope for enhancing India's exports of millets. The Study recommends tapping this latent potential through focusing on market diversification, enhancing exports of organic and value-added millet products, and addressing tariff barriers. Besides, the Study also recommends strategies for strengthening the millet value chain to increase the country's exportable surplus in millets. This includes addressing cost related issues in millet cultivation, augmenting seed-hubs capacity for minor millets, adopting bio-fortified millet seeds, promoting cluster farming of millets and promoting carbon credit trading in agriculture for enhancing farmers' income. The Study also lays emphasis on marketing strategies such as popularising millet consumption through food campaigns, identification of rare millets for obtaining GI-tags, and branding and promotion of GI-tagged millet products.

⁶⁵ Geographical Indications Registry, Intellectual Property India

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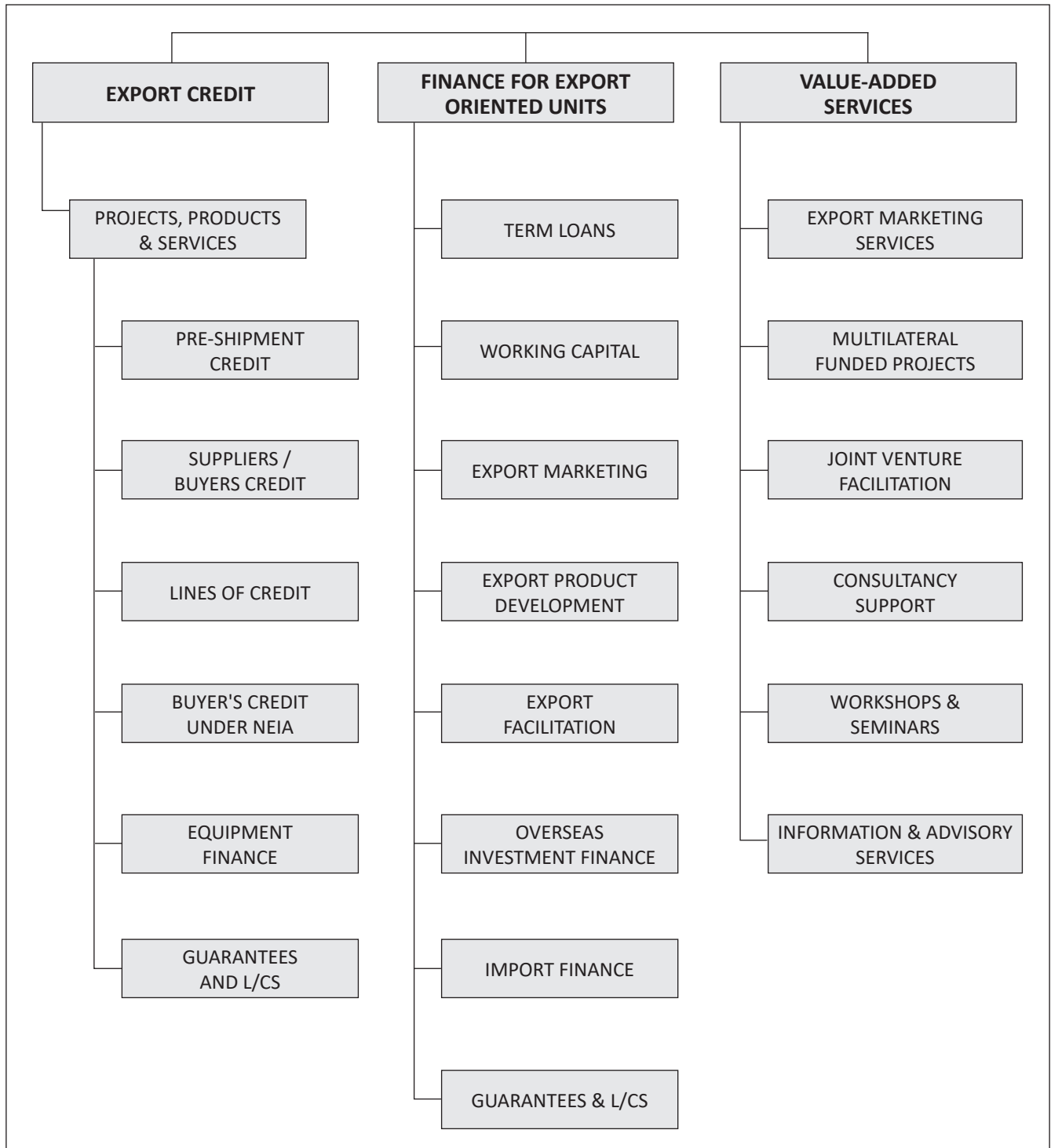
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