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International year of millets - 2023: Revitalisation of millets towards a sustainable nutritional security

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Abstract

Millets are resilient cereals that can offer a cost-effective and nutrient-rich alternative and ensure food security, because they include minerals, protein, and antioxidants. The need to revitalise millet crops is highlighted by the fact that, as whole grains, distinct kinds and levels of fibre are available from each millet variety. However, this fibre plays an important role in the regulation of intestinal function, blood sugar level, and lipid metabolism. IYM 2023, the International Year of Millets 2023 was proclaimed at its 75th session by the United Nations General Assembly, in collaboration with the FAO. As the prevalence of under- and over-nutrition rises, so does the urgency of switching to diets that incorporate millets because of their health benefits, and low cost. However, India has committed to promoting itself as the 'Global Hub for Millets' and making 2023's International Year of Millets a 'People's Movement'. The Millet Revolution is motivated by initiatives to resuscitate ancient agricultural practises and provide assistance for small-scale farmers, as well as by rising awareness of the health and environmental advantages of millets. Efforts to revitalise traditional agricultural practises and provide assistance for small-scale farmers are major factors in the revolution of millet cultivation. However, it is considered as an answer to the problems of both public health and sustainable agriculture.

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Introduction

Several types of cereal grass with tiny grains are together referred to as millet. Major millets, such as sorghum and pearl millet, have been separated from tiny grain millets, such as finger millet (ragi), foxtail millet (kangni), kodo millet (kodo), proso millet (cheena), barnyard millet (sawan), and little millet (kutki), based on their relative sizes[1]. India, the world's biggest millet grower and second-largest millet exporter, has begun an initiative to increase the grain's popularity. The Indian government named the year 2018 as the National Year of Millets as part of the initiative, which helped bring back the ancient practise of using millet in daily diets[1].

Millets can be grown on arid soils without irrigation, in very low rainfall regimes, and over a wide latitudinal range[1]. Compared to rice and wheat, millets use less water[1]. In an era of climate change and dwindling natural resources, the crop is a clear choice for farmers due to its high tolerance for heat, drought, and flood[2,3]. Millets are the perfect answer for nations looking to boost their level of independence and lessen their reliance on imported cereal grains[2]. They require fewer inputs, have higher disease and insect resistance, and require fewer synthetic fertilizers and pesticides[3]. Additionally, compared to other cereals, they are more resistant to climate change. Millets can improve livelihoods for small farmers, locally and nationally in addition to diversifying the food chain[2]. Millets have been given high priority by the Indian government due to their enormous potential and compatibility with a number of sustainable development goals. Millets were rebranded as 'Nutri Cereals' in an effort to improve marketing and demand development[3].

Millets' diversity, nutritional worth, and ecological benefits must be highlighted to consumers, producers, players throughout the value chain, and decision-makers in order to strengthen connections between the food and agricultural industries[4]. As a result, the Government of India proposed the establishment of an International Year of Millets in 2023, which was approved by the 75th Session of the UN General Assembly and members of the FAO Governing Bodies[4]. However, the International Year of Millets - 2023 was officially launched on December 6, 2022, in Rome, Italy, by the FAO of the United Nations[2,3].

Meanwhile, according to scientists, the worldwide millets market is anticipated to grow at a CAGR of 4.5% from 2021 to 2026[2]. To achieve these objectives, the International Year of Millets - 2023 will focus on three main pillars: (i) raising public awareness of the importance of millets to food security and nutrition; (ii) encouraging stakeholders to boost the sustainable production and quality of millets; and (iii) increasing investment in extension services. The International Year of Millets 2023 is a chance to spread the word about the usefulness of millets in areas with diverse human health, the environment, and economic growth. The production of millets is the focus of this article, because it has the potential to maintain the productivity of arid areas and guarantee future food and nutritional security[1].

Food system divide and millet comeback

Millets, which have long been a traditional staple crop for millions of farmers, particularly in India, China, and Nigeria, are thought to be among the oldest domesticated plants[1]. Despite the multitude of advantages millets offer, they have

largely been left off the global food security agenda. In reality, their production has been steadily declining in recent years. The 'Food System Divide'[1] is attributed to market distortions, a lack of understanding of the advantages of millets, and policies that have favoured the development of the so-called big three cereals: rice, wheat, and maize[1]. Changes in food preferences, high transaction costs, and the difficulties in gaining access to better markets, particularly in Africa, all serve to exacerbate the issue[2].

In response to shifting customer tastes and market inputs, farmers have moved away from subsistence agriculture and toward more lucrative crops grown to sell for profit[3]. To spur demand for innovative and contemporary items, scientists underlined the importance of working to increase production and alter opinions of them[5]. The current trend can be halted by implementing government-led programs that encourage the production and consumption of millets as well as raising public knowledge of their advantages in terms of nutrition and health[5]. In addition, it would be essential to increase funding for research and development, and create possibilities for farmers to better connect with effective value chains and markets[5]. Additionally, scientists also emphasized the crucial role that farmers play in the preservation of millet's genetic variation by supporting local millets through programs like farmer networks, community seedbanks, and seed fairs[5].

The global impact economy of millets

In light of climate change, rural distress, hunger, and global food insecurity, millet production is becoming a viable choice. In the face of widespread food insecurity, malnutrition, agrarian distress, and climate change, millet production is starting to look like a viable alternative[5]. Around 700 million people globally suffer from hunger, with African and Asian nations being the most severely affected[5]. All of the continents are experiencing problems with food security. Millets' high nutritional profiles address these inadequacies and hold potential as remedies for creating wholesome dietary patterns. The Middle East and Africa are just two places where declining water levels have attracted international attention[5]. Making a case for millet cultivation is important in the current environment, where new land-use practices, more farmer income opportunities, and better consumer choices are the main areas of focus[5].

Increasing global demand and emergence of the Asia-Pacific in the global market

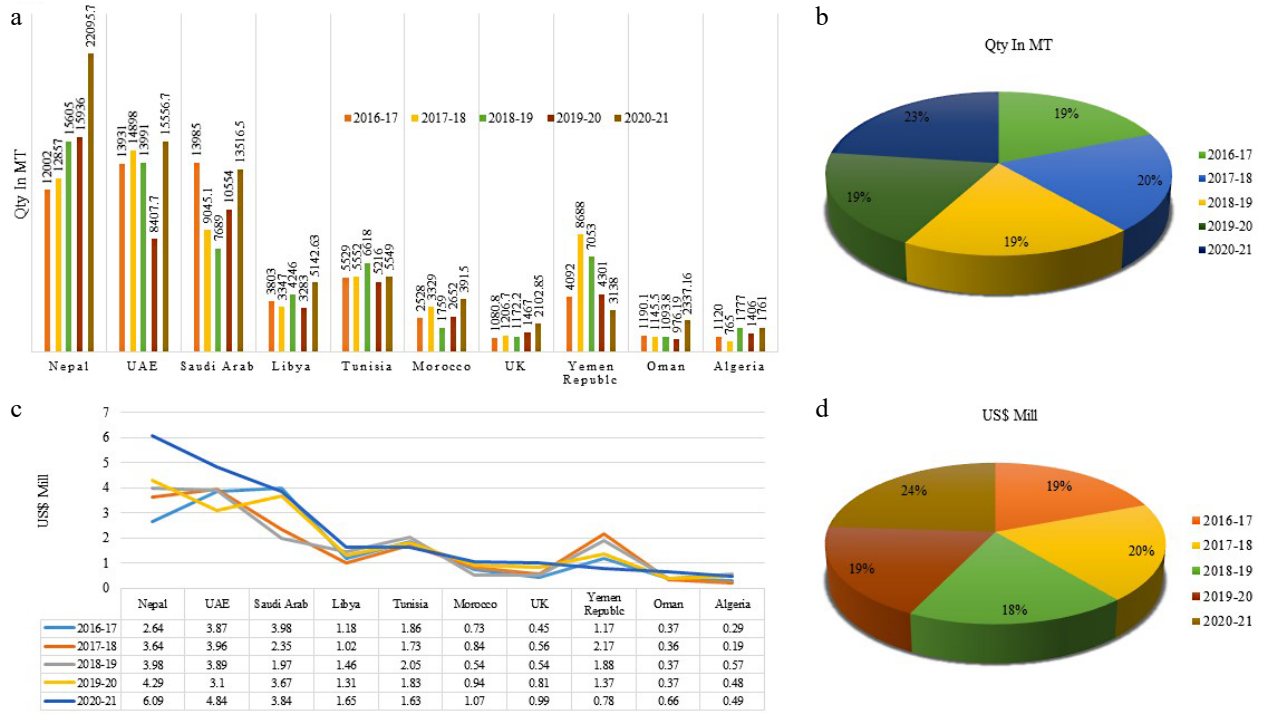
As Indian merchants discover new markets, the quantity of millets they ship abroad is expected to skyrocket. The Indian government is making significant efforts to improve export conditions. India's millets exports are in the top five worldwide. India earned USD $26.97 million from the export of millets in 2020–21[5]. The demand for millets has significantly increased during the previous few years, with global shipments rising by 44.8% between 2018 and 2019[5]. The demand for millets has significantly increased, with global shipments rising by 44.8% between 2018 and 2019[5]. India is the world's largest producer of these grains, but with a share of about 30%, the United States leads the world in exports[5]. Asia Pacific, the Middle East, and the EU are regions with significant global demand because they import 50% of the millets produced globally, along with additional countries including Indonesia, Germany, Iran, Belgium, and South Korea[5]. By 2025, it is anticipated that the millet market would reach a value of over 12 billion USD[5].

Millets are a growing industry in the Asia-Pacific region, with pearl millets ranking among the most sought-after products due to their significant volume in international trade[5]. India is a major participant in terms of its capacity to meet global demand because it accounts for close to 20% of the value of millets exported globally[5]. In addition to the fact that, millet has been grown in China for many years, the country is currently displaying a modest growth in millet yields[5]. The United Arab Emirates, Nepal, Saudi Arabia, and Germany are the biggest export destinations. The amount of millets exported to Nepal and the UAE has increased by more than 50%, indicating a growing demand for these grains[4,5]. Kenya and Oman, two nations that get a smaller proportion of millets supplied from India, have experienced even greater increase in recent years[1,5]. The Department of Commerce predicts that, Indian exporters would find new markets overseas, driving millets exports to skyrocket in the future years[6]. This is due to the increased demand for nutria-cereals throughout the world. India's millets exports were valued USD $26.97 million in 2020-21, down from USD $28.5 million the previous year[5]. The value of global millet exports is projected to rise to USD $402.7 million by 2020[6], up from USD $380 million in 2019[5,6]. The United States, Russia, Ukraine, India, China, the Netherlands, France, Poland, and Argentina are among the top destinations for imported millets[5]. In 2020[5,6], their combined millets exports were valued at USD $221.68 million[6]. In 2020–21, India's top three millets export destinations were the United Arab Emirates (USD 4.84 million), SaudiArabia(USD4.84 million), SaudiArabia(USD3.84 million), and Nepal (USD $6.09 million)[6].

India's top 10 export markets for millet include seven other countries: Libya, Tunisia, Morocco, the United Kingdom, Yemen, Oman, and Algeria (Fig. 1). According to DGCIS statistics[6], India exported millets to other countries for a total of USD $5.13 million in 2020-21, bringing the total amount of imports from India to USD $27.43 million. Indonesia (8%), Belgium (7.36%), Germany (4.65%), Mexico (4.1%), Italy (4.02%), United States of America (3.35%), United Kingdom (3.25%), Brazil (3.24%), and Netherlands (3.14%) are the major importers of millets in 2020, with the respective shares of the global import market. In 2020, India will account for around 41% of the world's total millets output. According to the Ministry of Agriculture and Farmers Welfare (Fig. 1)[6], India produces over 12 million MT of millets yearly.

Millets as viable crops in resource-constrained geographies

Millets are more relevant as an agricultural commodity in developing nations with similar geographical characteristics because of rainfed agricultural conditions, modest input requirements, and indigenous farming knowledge among farming people[4]. Millets account for less than 2% of the world's cereal consumption due to the dominance of wheat and rice[4]. Agricultural methods have impacted the carrying capacity restrictions on existing land during the last few decades and stressed water resources[4,5,6]. Millets are now regaining popularity as a staple cereal in many nations in the semi-arid tropical regions of Africa and India, where the



	Nepal	UAE	Saudi Arab	Libya	Tunisia	Morocco	UK	Yemen Republic	Oman	Algeria
2016-17	2.64	3.87	3.98	1.18	1.86	0.73	0.45	1.17	0.37	0.29
2017-18	3.64	3.96	2.35	1.02	1.73	0.84	0.56	2.17	0.36	0.19
2018-19	3.98	3.89	1.97	1.46	2.05	0.54	0.54	1.88	0.37	0.57
2019-20	4.29	3.1	3.67	1.31	1.83	0.94	0.81	1.37	0.37	0.48
2020-21	6.09	4.84	3.84	1.65	1.63	1.07	0.99	0.78	0.66	0.49

Fig. 1 Top destinations for India's millets exports. (a) Top ten destinations for India's millets exports (Qty in Metric Tonne: MT); (b) Share of top ten destination in India's export (Qty in Metric Tonne: MT); (c) Top ten destinations for India's millets exports (US Mill);(d) Share of top ten destination in India's export (US Mill).

cultivation of other important food crops is constrained by low precipitation and deteriorating soil quality[5].

Nearly 38% of the domestic produce used in India is consumed by the country itself[5,6]. Millets have gradually regained popularity, especially in areas where they were once a common staple grain. In an urban population with changing nutritional needs, there is a resurgence of interest in their health advantages. A global trend toward the consumption of ancient grains that have undergone minimal genetic change over the years and are farmed organically reflects this upward tendency. The best option to meet this requirement is millets that use the least amount of inorganic inputs. Products made from millet have also become appealing choices for those following gluten-free or plant-based diets[7].

Leveraging existing systems for millet promotion and policy attention on millets

There is a chance to profit from areas where favourable millet import patterns have been observed. Significant problems with millet cultivation and distribution can be resolved by multi-stakeholder cooperation. Government is in charge of promoting millets in several places[6]. But they are unable to make consistent progress because of a number of issues. Millets are mostly grown for domestic or animal feed due to the dominance of wheat and rice, thus farmers aren't motivated to produce them profitably. Additionally, there are problems with restrictions, especially for marginal and small farms. These include a shortage of storage, transportation, and timely inputs. Millets require a lot of processing and value-adding[6,7]. These are pricey activities because of the grains' gritty texture and flavor. In industrialized countries, it becomes more financially feasible to establish processing plants, which may assist to explain why countries like the US export more millets than they produce. Although the current status of the global market offers millets advantageous prospects, it also provides opportunities for stakeholders at all levels to become involved and create markets that are sustainable[7]. This is because there is a lack of stable pricing and untapped potential for profitable market conditions.

Bengaluru, India is swiftly becoming a millet hub thanks to a variety of inventive chefs who are reinventing traditional meals to make millet the preferred grain for an urban populace[7]. Given the variety of millets produced worldwide, it is crucial to research new grain varieties that are readily available locally and support the 'farm-to-table' concept for local farmers[7]. The production of millet still has a great deal of space for ecosystem-level interventions. There are a number of problems that must be tackled along the supply chain from the point of cultivation to the point of consumption. Paying farmers, a living income, educating customers, streamlining the supply chain, establishing processing, and expanding value-adding skills, particularly in developing countries, are a few of the challenges mentioned. Concentrated efforts, collaboration, and lesson sharing among stakeholders on a worldwide scale may be required to boost the appeal of millets for a sustainable future[5,6].

Population challenge and achieving zero hunger using millets

The world's population is projected to rise to over 8.5 billion by 2030 and a staggering 9.7 billion by 2050[6], necessitating increased food production. There is a growing demand for

agricultural diversification *via* supporting crops that can be cultivated in the harshest of settings as the climate problem and environmental stresses worsen. UN resolution[7] calls for increasing sustainable production and use of millets as a means of advocating for diverse, balanced, and nutritious diets due to its climate-resilient and nutritional advantages. This is a nod to the importance of millets as a solution to global food, farming, and weather problems. They are rich in essential nutrients including protein, fibre, resistant starch, iron, and calcium. Additionally, their low glycemic index makes them an excellent choice for managing or preventing diabetes[1,5].

According to some researchers, NGOs, cooperatives, and civil society groups that collaborate closely with farmers should disseminate knowledge about successful millets cultivation techniques and provide farmers with support, education, and methods for strengthening their ties to the market[7]. To improve millets' availability, affordability, and accessibility, civil society and NGOs should form networks and action groups[6,7]. Academic institutions and researchers should investigate millet, its nutritional value, attributes, and characteristics, as well as the correct automation and other ways that may make millet cultivation more sustainable. As the government of Zimbabwe continues to promote small grains *via* input support programmes like Pfumvudza[5–7], the FAO urges key value chain players in the food and agricultural sectors to support government efforts to regard millets as a strategic crop.

International year of millets – 2023 (IYM 2023) and glimpse of Odisha millets mission (OMM)

Millets' promise to address climate change and food security is not being fully realized as their cultivation is falling in many nations. This recently neglected and underutilized crop may be the vital link in the sustainable food supply chain as well as one of the answers for the growing climate crisis and other environmental challenges[5]. Millets can significantly contribute to family farmer nutrition, livelihoods, and incomes, particularly for small-scale family farmers, which can help to provide food security and end poverty. In order to accomplish the Sustainable Development Goals (SDGs), particularly SDG 2 (zero hunger), SDG 3 (excellent health and well-being), SDG 12 (sustainable consumption and production), and SDG 13 (climate action), millets are being made more widely available[5].

Millets might be a nutritious cereal alternative, which would lessen the impact of supply chain disruptions[1,5]. The International Year of Millet (IYM) 2023 and related measures to increase millet output[2] will help advance the 2030 Agenda for Sustainable Development. The importance of this crop is highlighted by this International Year, which serves as a timely reminder of its value[5]. In addition, it provides a unique opportunity to educate people about the positive effects millet has on one's health, as well as the advantages millets have in terms of nutrition, adaptability to varying climates, and the development of new, innovative markets for many countries around the world[8].

However, the objectives of the International Year of Millets 2023 will be: (i) increasing public knowledge of the nutritional and health advantages of millets and promoting millets as a significant part of the food supply; (ii) increasing awareness of millets' importance in preventing food waste and their impact on food security. Even after 10–12 years of growth, certain millets are still safe to eat; (iii) encouraging millets to be grown sustainably, even in harsh and changing climatic conditions, and enhancing their quality; (iv) emphasizing how they might open up fresh, sustainable market prospects for both producers and consumers. Increased millet output can help smallholder farmers support their families and also give young people and women respectable jobs; (v) promoting a better utilization of crop rotations and enhancing investment in research and development[9].

Odisha Millets Mission (OMM), which was introduced in 2017, is a pioneering agricultural initiative that promotes the growing of nutrient-dense millets in the eastern Indian state[10]. The mission's goal goes beyond reintroducing millets, the native meal of the tribes of Odisha, to tables. By promoting the adoption of the climate-resilient crop and simultaneously boosting demand, it seeks to improve the smallholder farmers' livelihoods and sense of security over their access to food. At the time of the debut, OMM had 14 districts and 72 blocks with a sizable tribal population. Its reach has grown to include 84 blocks spread throughout 15 districts, 1,510 gram panchayats, 15,608 villages, and 1,10,448 farmers in just four years[10]. The UN General Assembly enacted a resolution in 2021 backed by India designating 2023 as the International Year of Millets, giving the mission a substantial confidence boost.

Conclusions

Nutritionally sound and drought-resistant, millets are a common crop in Asia and Africa. In recent years, millets have received more attention and scrutiny. Although millets have been cultivated and eaten for centuries, the Food and Agriculture Organisation has designated 2023 as the 'Year of the Millets' at India's request. The end goal is to show how the nation can boost its millet output by integrating and demonstrating better production and post-harvest technology. It is hoped that by using various methods of processing and value addition, demand for millet-based food items may be stimulated in addition to production increases. In order to promote millet entrepreneurship and conduct millet awareness campaigns *via* Women SHGs in 14 districts of Odisha, India, the state of Odisha signed a memorandum of cooperation with the Mission Shakti and the Odisha Millets Mission. This effort may serve as a model for other states and nations. As a result, millets will be able to enter the consumer mainstream and the value chain will strengthen.

Conflict of interest

The authors declare that they have no conflict of interest.

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References

1. Baloni B, Choudhary A. 2022. The Global Impact Economy of Millets. https://impactentrepreneur.com/the-global-impact-economy-of-millets/. Accessed on: 6th June 2023.

2. Nesari TM. 2023. Celebrating International Year of Millets: Way towards Holistic Well-Being. *Journal of Ayurveda Case Reports* 6:1-4 https://journals.lww.com/jacr/_layouts/15/oaks.journals/downloadpdf.aspx?an=02273314-202306010-00001. (Accessed on 6th June 2023).
3. Mathew J, Joseph MK. 2022. International year of millets 2023: Millet promotion in India for food security. *Rajagiri Journal of Social Development* 14:2–17
4. Kumar A, Tripathi MK, Joshi D, Kumar V. (Eds.). 2021. *Millets and Millet Technology*. Singapore: Springer. 438 pp. https://doi.org/10.1007/978-981-16-0676-2
5. Drishtiias. 2023. International Year of Millets. www.drishtiias.com/daily-updates/daily-news-analysis/international-year-of-millets-2. (Accessed on 6th June 2023).
6. PIB. 2023. Exports of millets to increase exponentially as Indian exporters find new markets. https://pib.gov.in/PressReleaselframePage.aspx?PRID=1796514. (Accessed on 6th June 2023).
7. Theuri S, Burkhart S. 2023. Calling on all SNEB Members to Engage in the "International Year of the Millets 2023". *Journal of Nutrition Education and Behavior* 55(1):1
8. Datta Mazumdar S, Priyanka D and Akhila Y. 2022. Emerging Technologies in Millet Processing. In *Handbook of Millets-Processing, Quality, and Nutrition Status*, eds Anandharamakrishnan C, Rawson A, Sunil CK. Singapore: Springer. pp 231–63. https://doi.org/10.1007/978-981-16-7224-8_11
9. Mutingwende BA. 2023. International Year of Millets: Nutritional and health benefits of millets. https://spikedmedia.co.zw/international-year-of-millets-nutritional-and-health-benefits-of-millets/. (Accessed on 6th June 2023).
10. Mohanty B. 2020. Odisha millet mission: the successes and the challenges. https://vikalpsangam.org/article/odisha-millet-mission-the-successes-and-the-challenges/. (Accessed on 6th June 2023).