

Promoting the Integration of Millets in G20 Nations: An Examination of Integrated Behavioural and Policy Transformations

Table of Contents

Table of Contents	1
Abstract	2
Introduction	2
Global Production of Millets	2
Drivers to millet trade	3
India's role in promoting millets	5
The G20 Summit	7
Way Forward	8
Conclusion	9
References	10

Abstract

Millets are a group of small-seeded grasses that have been cultivated for thousands of years in various parts of the world as cereal crops. These climate- resilient crops are high in dietary fibre and serve as a good source of proteins, phytochemicals and micronutrients. Millets were among the first crops to be domesticated and remained a staple crop for millions in Asia and Sub-Saharan Africa. Despite their health benefits, the area under millet production and their inclusion in diets is significantly declining among consumers due to a lack of awareness. However, based on the recommendation of India , the UN's mandate to celebrate 2023 as the International Year of Millets has redirected the world's attention towards millets and their potential in addressing global challenges. The initial sections of the paper analyze the factors that contribute to an increase in millet's trade, the existing challenges of low productivity, a lack of quality seeds, millet processing and the policy initiatives taken by India to integrate millet into mainstream consumption. During the presidency of the G20 Summit, India has proposed various initiatives such as MAHARISHI and MIIRA, which are further aimed at mainstreaming millets through research collaborations. The paper ends with suggestions for the G20 countries on how to raise consumer demand and address supply- side challenges.

Introduction

In the contemporary era, the global economy is confronted with three major challenges of depleting resources, repercussions of the pandemic and a rising population. According to the State of Food Security and Nutrition in the World 2023, approximately 2.4 billion individuals did not have consistent access to nutritious and sufficient food in 2022.¹ The rise in urbanisation has led to an increase in the consumption of processed foods, resulting in a surge in obesity cases across both urban and rural areas. Amidst these issues, climate-resistant millets have emerged with the potential to ensure global food security. Millets encompass a varied group of small-grained and dryland cereals, characterised by high nutritional value. These include pearl, proso, foxtail, barnyard, little, kodo, browntop, finger and sorghum. These crops have been rooted in ancient cultures and are primarily grown in Africa and Asia.

In the year 2021, India's proposal for declaring the year 2023 as " International Year of Millets" was supported by 72 countries and approved by the United Nation's General Assembly. With the alignment of celebrating the International Year of Millets (IYOM) and the presidency of the G20 summit, various initiatives are being undertaken by India to promote the sustainable production of millets among G20 nations in order to alleviate the problem of food security, reduce health risks and advance the attainment of Sustainable Development Goals 2030.

1

<https://www.fao.org/publications/home/fao-flagship-publications/the-state-of-food-security-and-nutrition-in-the-world>

Global Production of Millets

The production of millets varies widely among countries depending upon the quality of soil, agricultural practices and the climatic conditions. Millets require warm temperatures ranging from 20-30 degrees celsius for seed germination and are highly adaptable to a variety of soil conditions . Alluvial, sandy and loamy soils are ideal soils for millet cultivation. India is the largest producer of millets in the world. In the global production of millets, India's production of Bajra accounted for 40.51% and Sorghum's production was 8.09% in 2020.²

According to data from the US Department of Agriculture's Foreign Agricultural Service, as of August 2023, India, Niger, China, Nigeria and Mali are top five producers of the millet in the world.³ The top 3 producing countries account for 89% of the world production and except India and China, the rest of the top 10 millet producing countries are in Africa. The top 10 millet importing countries including —China, Japan, Ethiopia, Mexico, Nigeria, Spain, Belgium, Italy, Indonesia, and the United Kingdom draws 77% of the total world imports of millets. The global millet market is divided into breakfast foods (32.1% market share), followed by bakery food and beverages (16.9%), fodder (14%), infant foods (11.1%) and others (9.0%).⁴ Among the G20 nations, millets are produced in India, China, Russia, United States, Australia, Mexico, Argentina, South Africa, Brazil and Turkey.

In India, major foodgrains cultivated include rice, wheat , maize, barley and pulses. Between 2008-09 and 2021-22, the data reveals a 30% increase in the production of rice and a 34% rise in the production of wheat. Since 2008-09, the production of pulses has increased by 87%. The millets' production, which stood at 200 lakh tonnes in 2010-11, witnessed a decline to 137.1 tonnes in 2018-19. ⁵The production improved in the following two years due to various initiatives such as an increased Minimum Support Price, implementation of Sub Mission on millets etc. However, despite the various interventions, the data reveals that the scale of production of millets is still lower than that of rice and wheat. As per the third advance estimates of major crops production(2022-23), the estimated production of rice (1355.42 lakh metric tonnes) and wheat (1127.43 lakh metric tonnes) is more than the production of millets(547.48lakh tonnes).⁶ The consumption of millets is growing at a 1% decadal CAGR from 16.1 million tonne in 2012 to 17.8 million tonne in FY2022.

Table: Top 10 millets producers in the world

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<https://apeda.gov.in/milletportal/Production.html#:~:text=India's%20two%20varieties%20of%20millets,production%20of%20Millets%20in%202020>.

³ <https://ipad.fas.usda.gov/cropexplorer/cropview/commodityView.aspx?cropid=0459100>

⁴ <https://www.nabard.org/pdf/2023/millets-for-health-and-wealth-eng.pdf>

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<https://factly.in/data-despite-awareness-other-efforts-production-of-millets-is-largely-stagnant/#:~:text=India%20produced%20about%20120%20lakh.of%20the%20millets%20produced%20globally>

⁶ [advance estimates](#)

Top 10 Millets producers in world (2023)	Production (1000MT)	% of production
India	13,200	42
Niger	3,400	11
China	2,700	9
Nigeria	2,000	6
Mali	1,800	6
Sudan	1,600	5
Ethiopia	1,100	3
Burkina Faso	1,000	3
Senegal	1,000	3
Chad	700	2

Source : U.S. Department of Agriculture

Drivers to millet trade

Millets are known for their high nutritive value and have been a dietary staple in various parts of Asia and Africa for thousands of years and have proven to be a healthy alternative for people who may not have access to other costly grains. In this section, we will discuss the elements that are likely to contribute to a future rise in millet trade.

1. **Behavioural shifts:** The major obstacles to millet consumption have been the social stigma attached to them and a lack of awareness regarding their health benefits. In some societies, including certain parts of India, there is a negative perception associated with the consumption of millets, often considering it to be food for the marginalised. The poor have been traditionally relying on these crops because of their accessibility and the ability to grow in difficult climatic conditions. This social stigma abstains people from including millet in their everyday diet. Also, the people have either a limited understanding of different types of millet or lack knowledge about the ways of cooking them. With regard to the assessment of awareness, several studies have been conducted. A study conducted in Kerala(2021)

revealed that from a sample size of 641, only 278 of them consumed millets. Among the various millet based products, Ready to Cook items were consumed by half of the respondents, while less than 10% consumed Ready to Eat millet based products. A similar study was conducted among the school going students of standard 8th and 9th Telangana, India (2021). The students from both urban and rural areas were evaluated and the findings revealed that in rural areas, more than half of the students were aware of millets, whereas in urban areas, only 46.88% students reported being aware of millets.

- a. However, post-pandemic the inclination of the urban population towards millet is on the rise. In present society, lifestyle choices and food habits such as the consumption of processed food have led to a rise in the prevalence of various health issues such as hypertension, diabetes, obesity, micronutrient deficiency, cardiovascular diseases etc. According to a report , about 1.5 billion adults will be hyperintense worldwide by 2025 and the number of patients with cardiovascular diseases are likely to go beyond 23.6 million by 2030.⁷ Millets are rich in proteins and minerals that can aid in preventing such diseases. The consumption of millets in infant food is also growing. It contains the required calcium, iron and fibres, which are vital nutrients to support the healthy growth of children and prevents the instances of malnutrition.
 - b. Due to their gluten-free and hypoglycemic properties, millets are gaining prominence in Europe and North America and serve as an alternative for people suffering from celiac disease and related challenges. The global market for gluten-free products is expected to reach \$7.5 billion by 2027.⁸
2. **Limited resources :** According to UNICEF, by the year 2025, around half of the world's population will be residing in areas facing water scarcity. In terms of consumption patterns, the agriculture sector utilizes 70% of the available freshwater.⁹ Among the various crops grown, rice and wheat are the most water intensive crops and about 8,000-12,000 litres of water is required to produce 1kg of wheat. Thus, as freshwater resources are continuously declining around the world, rice and wheat are likely to be unsustainable in the future. On the other hand, millets have a short harvesting period and can be easily grown in less water regimes. The slower composting process of millet helps in improving the soil

⁷ https://agriexchange.apeda.gov.in/Weekly_eReport/Millets_Report.pdf

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<https://www.alliedmarketresearch.com/gluten-free-products-market#:~:text=The%20gluten%2Dfree%20products%20market.causes%20inflammation%20in%20small%20intestines.>

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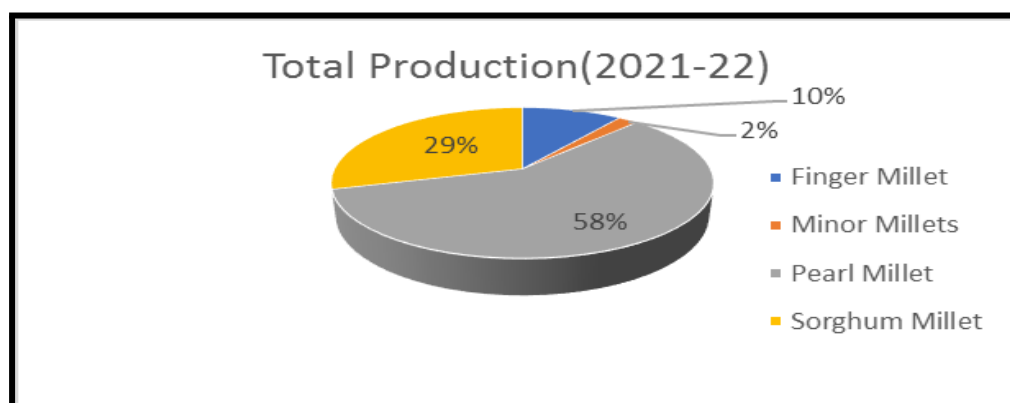
https://energypedia.info/wiki/Water_Use_in_Agriculture#:~:text=Around%2070%20percent%20of%20freshwater.fertilizer%20application%2C%20and%20sustaining%20livestock.

texture. Therefore, with the merits of healthy soil structure and a limited need for harmful chemicals such as fertilizers and pesticides, millets have emerged as an alternative environmentally-friendly grain.

In the following section, we will discuss various policy initiatives taken by India to promote millets among the consumers.

India's role in promoting millets

In India, the primary millet producing states are Rajasthan, Karnataka, Gujarat, Haryana, Maharashtra and Uttar Pradesh, collectively contributing to 83% of the total production. Among the diverse varieties of millets grown, Pearl millet and Sorghum millet are the most extensively cultivated.¹⁰



Source: <https://idronline.org/article/agriculture/millet-cultivation-history-and-trends/>

Despite being the largest producer of millets in the world, the per capita consumption has significantly declined from 30.94 kg in 1960 to 3.87 kg in 2022. From 1950-55 to 2015-20, the area under cultivation has decreased by 56% whereas the usage of high yield variety seeds has led to a rise in productivity by 228%.¹¹ The millets have been an essential part of our diets since earlier times. However, due to the success of the Green Revolution, the government shifted its policy support towards the supply of rice and wheat at subsidised prices. Due to the reduced profit margin in comparison to other crops, the farmers were disincentivized to engage in millet production. Furthermore, with the dominance of wheat in the market and the influence of western dietary practices, the perception of people changed towards millets. Rice and wheat were considered superior food items and millets were believed to be the food for the marginalized sections. As a result, the consumption of millets experienced a significant decline.

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<https://apeda.gov.in/milletportal/Production.html#:~:text=India's%20two%20varieties%20of%20millets,production%20of%20Millets%20in%202020.>

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<https://www.thehindu.com/business/watch-business-matters-why-did-un-declare-2023-as-international-year-of-millets/article66366169.ece>

Challenges in Millet Sector

1. **Lower productivity:** The Green Revolution increased the productivity of hybrid crops through various measures including the use of HYV seeds, inorganic fertilizers, pesticides, improved irrigation facilities etc. whereas, the production of indigenous crops faced a setback. The productivity of millets is lower in contrast to rice and wheat due to their cultivation in marginal lands and the non- adoption of improved cultivars which results in reduced income for farmers.
2. **Quality seeds:** The quality seeds for millet production are available only in limited quantities. The seeds available in the market are either of inferior quality or contaminated with weeds or disease , making it difficult for farmers to get the desired yield from their crops. However, with the entry of private players in the production of Sorghum and Pearl millet, this particular segment doesn't face such issues.
3. **Pests & diseases:** Although millets are hardy crops and very less infestation happens due to pests and diseases, certain pests(shoot fly, stem borer) and diseases(blast, grain mold) often cause significant losses in millet production. There is a lack of productive cultivars resistant to these pests and diseases.
4. **Millet processing:** The millet processing machines have a low recovery of 70-80% of grains. Due to this challenge, the output has more unhulled and broken grains. Since their morphological features differ mainly in shape, size, and husk content, one type of dehuller is not suitable for all types of millets. Further, millets being gluten-free, it becomes difficult to make some products solely from millet ingredients.

However, with the passage of time, various policy initiatives have been taken by the Indian government to reintroduce millets into mainstream consumption. The Union Budget of India (FY2024)referred to millets as 'Shree Anna' or super food.

1. The Ministry of Agriculture and Farmers Welfare launched ***Initiative for Nutritional Security through Intensive Millet Production(INSIMP)*** as a part of the Rashtriya Krishi Vikas Yojana, wherein the states received financial assistance to advance important areas in the millet value chain like seeds production and the installation of processing units. In order to improve the productivity of millets, various technology demonstrations were organized in farmer's fields for four categories of millets- Pearl millet, Sorghum, Finger Millet and Small millets. In order to promote the new varieties, an incentive of ₹ 3,000 per quintal for hybrids and ₹1000 per quintal for HYVs was proposed. Under this initiative , three national Centres of Excellence were also established. As a result, 16 states demonstrated improvements in production and post harvest techniques. The cultivation area for Sorghum has increased in Tamil Nadu, while areas for Finger millet have increased

in the regions of Jharkhand, Maharashtra and Tamil Nadu . Under small millets, larger yields have been recorded in UP (33%), Karnataka (28%), Tamil Nadu (13%) and Uttarakhand (3%). 30 processing machines originally designed for rice and wheat processing were modified for suiting millet processing such as biscuits making, extrusion etc. These technologies have been adopted by more than 300 millet-producing clusters spread across the various states.¹²

2. In 2018, the Government declared the year as “ ***National Year of Millets***” in order to adopt sustainable agricultural practices and achieve nutritional security in the country. Later, under the Ministry of Women and Child Development, millets were included under the Poshan Mission Abhiyan. The government has also prompted the marketability of millets by establishing value chains in collaboration with the Farmer Producer Organization. Lastly, the Indian Government put forward the proposal of declaring 2023 as “International Year of Millets”. With the support of 72 countries, this idea was approved by the UN in 2021.
3. The World Food Programme, National Institute of Disaster Management and Niti Ayog launched the ‘***Mapping and Exchange of Good Practices***’ initiative for scaling up the production of millets in Asia and Africa on 19 July 2022. The initiative aims to foster support for good practices in food security across the developing countries of Asia and Africa.
4. **APEDA Action Plan** : Agricultural and Processed Food Products Export Development Authority has devised a comprehensive five year strategy(2021-26) to promote the export of millets from India.
 - a. The millet promoting activities will be organised in various countries around the world including Japan, South Korea, Indonesia, Saudi Arabia, Sydney, South Africa, USA and United Kingdom.
 - b. The millets and their value added products will be showcased at various international platforms such as Foodex, Saudi Agro Food, Belgium’s Food and Beverages Show, San Francisco’s Winter Fancy Food Show etc.
 - c. The government is also encouraging startups for export promotion in the Ready to Eat category such as cookies, pasta, biscuits, sweets etc.

Case study of Odisha

In line with the aim of comprehensive revival of millets in the Indian market, the State governments have also implemented several initiatives in their respective states. Among these, one of the most successful missions was “***Odisha Millet Mission***”. It was initiated in 30 blocks with a significant tribal population spread across 7 districts in 2017 and subsequently extended to 84 blocks covering

¹² [insimp outcomes](#)

15 districts by 2021. The aim of this mission is to improve the livelihood of marginal farmers in rainfed regions and to revive millets in plates through end-to-end value chain interventions.

Initiatives

- 1. Promoting household-level consumption :** Various awareness campaigns through food festivals, school rally, street plays, millet recipe events, millet mother events etc. are taken up by Women Self Help Groups at village and Gram Panchayat level. The Program Secretariat prepares various brochures in Odia language for distribution highlighting the importance of millets and their nutritional value.
- 2. Decentralized processing facilities:** One of the major bottlenecks in the revival of millets is the absence of modern processing facilities. With the aim of promoting decentralized processing facilities, threshers and tarpaulins are provided to Women Self Help Groups to provide post-harvest services to farmers at the village and Gram Panchayat level.
- 3. Improving productivity of millets:** Various incentives are provided to farmers for adopting the agronomic practices such as millet intensification, line transplantation and line sowing including intercropping in millets . Additionally, various Custom Hiring Centres for providing implements and machines at subsidized price to marginalized farmers are established at the Gram Panchayat level.
- 4. Inclusion of millets in social safety net:** Under the Odisha Millet Mission, Tribal Development Cooperative Corporation Ltd (TDCCCL) has been chosen as nodal procurement agency. The TDCC partners with various FPOs and Women Self Help Groups to procure ragi, which is further distributed in the Public Distribution System and Integrated Child Development Scheme. The SHGs provide ragi laddus to the Anganwadi centres to incorporate in the ration for children.
- 5. Community Managed Seed System:** It is an attempt to integrate the procurement, processing and distribution of grains within the district. The established Seed Centres support various activities like distribution of processed and subsidized seeds to selected farmers, payment of subsidies and related documentation etc.
- 6. Farmer Producer Organizations (FPO):** Under OMM, various Farmer Producer Organizations are formed with the aim of dealing with the constraints that confront farmers by leveraging bargaining power to access financial and non financial inputs, appropriate technologies, reduce transaction costs and enter into partnerships with private entities on equitable terms. In order to add considerable value to member's produce, FPOs offer various investments in storage, irrigation, processing etc

Impact

- Odisha became the first Indian state to include millets, pulses and vegetables in mid-day meal schemes and the ration scheme. In FY 2020-21, 1.10 lakh quintals of Ragi were

distributed to 50.60 lakh ration card holders which further rose to 5.14 lakh quintals among 18,038,187 ration cardholders.¹³

- The guaranteed market for Ragi through their integration into PDS and the provision of Minimum Support price, has led to an increase in the area under millet production. During FY 2021-22, the OMM reached out to 1.18 Lakh farmers covering 54,495 hectares. It further plans to cover 1.50 Lakh farmers for an area of 81,700 hectares.¹⁴
- The mechanized and decentralized processing of millets at block level has resulted in reducing women's drudgery in producing millets. From FY 2018-19 to FY 2021-22, 6.39 lakh quintals of Ragi have been procured and 209.94 crores have been transferred to farmers through Direct Benefit Transfers.

Due to the remarkable results of the Odisha Millet Mission, Odisha received the award of "Best Millet Promoting State" at the National Convention on Nutri Cereals in 2021. The World Food Programme has recognized OMM as one of the best practices that can be replicated in other states as well as other countries in Africa as a part of South-South Collaboration.

The G20 Summit

The G20 is a premier international forum comprising 19 countries and the European Union. It plays a crucial role in steering the global economy through various challenges such as health, trade, agriculture, climate change, sustainable development etc. The G20 countries and the European Union constitute about 85 percent of the world's GDP, 75 percent of global trade, and two-thirds of the world's population. Despite being the world's largest economies, the food security issue remains a significant challenge among the nations and has been exacerbated due to the pandemic. Among the G20 countries, the problem of malnutrition varies across the countries. The prevalence of malnutrition including stunting, wasting in children and micronutrient deficiencies is highest in India, South Africa and Indonesia. In order to tackle these alarming issues of food security and malnutrition, India called on G20 nations to follow a "3S" strategy i.e. Smart and Sustainable agriculture which should Serve everyone. The low maintenance and drought resistant millets satisfies all of these attributes. These "nutri-cereals" possess calcium, zinc, iron and amino acids, which plays a key role in fighting malnutrition.

The various initiatives to mainstream millet among the G20 nations include:

1. ***Millets And Other Ancient Grains International Research Initiative (MAHARISHI)*** : In the wake of the ongoing International Year of Millets, India tabled a MAHARISHI proposal in the G20 meeting of Agricultural Chief Scientists. Along with the technical support from ICRISAT, One CGIAR Centres and other International

¹³ [millets in mid day meal](#)

¹⁴ [planet.outlookindia.com](#)

organizations, its secretariat will be located at the Indian Institute of Millets Research, Hyderabad. The aim of this initiative is to advance research collaborations among the member countries and to create awareness regarding the crops that have been cultivated since ancient times. It will enable the researchers and institutions to identify the research gaps and work collectively on various crops.

2. ***Millet International Initiative for Research and Awareness (MIIRA)***: During the first Agriculture Disputes Meeting at Indore, Madhya Pradesh, a draft was introduced by India on MIIRA. Its secretariat will be in Delhi. Under this initiative, India will contribute the “seed money” whereas the other G20 member countries will contribute to its budget by paying a membership fee. The objective of MIIRA will be to coordinate research at the global level through various meetings and by creating connections with various research organizations around the world.
3. ***Millet Hub*** : In accordance with the celebration of the International Year of Millets, a special food stall “Millet Hub” was established by the Government of Jammu and Kashmir. It was a joint venture of Jammu and Kashmir Rural Livelihood Mission (JKRLM) and the Grassroots Innovation Augmentation Network (GIAN) and aimed at indulging the G20 delegates in the flavours and heritage of millet based cuisine. The stall offered a variety of dishes, highlighting how millets can blend with various regional and international flavors. The “Millet Hub” also served as a proper platform for local entrepreneurs of self- help groups so that they can set up their own units in the future.

Way Forward

1. In spite of the various global efforts to promote millet consumption, the challenges related to both the demand and supply sides still persist. From the demand-side perspective, while the recognition of millets is on the rise, numerous behavioural interventions are required to effectively encourage their consumption. Advertisements have a positive psychological influence on consumers with regards to the product. Various advertising campaigns outlining the health issues faced by the targeted audience and the potential of millet to resolve them must be adopted. The installation of “Millet Hub” stalls can be replicated at small scale events as well, wherein, an entire millet based menu can be designed. The government can promote millet based dishes in hospitals, office canteens and train pantries. Lastly, school textbooks can integrate chapters in books and organize events to highlight their importance.
2. The research and development initiatives must concentrate on addressing challenges related to the supply side. Since the cultivation of millets takes place in more challenging agro systems, their average productivity is lower than that of other fine cereals. In order to make millets competitive with other crops, there is a need to place significant research emphasis

on their genetal improvement to develop new cultivars. Apart from this, more viable options for improving the quality of seeds and their shelf life must be explored.

3. Despite the success of the Odisha Millet Mission, millets have not been adopted as an intercrop in various places. The agricultural sustainability of drylands faces several challenges including moisture stress, poor soil fertility and lack of irrigation facilities. Growing two or more crops in a specific pattern within the same field increases the productivity of millets by improving the efficiency of resource use and lowering the incidence of pests.
4. The growing interest in alternative healthy grains provides a profitable opportunity for millet exporting countries. The production can be increased by policy support and investment initiatives such as providing subsidies, insurance, credit, allocating funds for value addition for millet products, improving logistics and by promoting public-private partnerships.

Conclusion

Thus, millets are the reservoir of nutrition, vitamins , minerals and offer a range of health benefits. The consumption of this “super food” could enhance the prosperity of small farmers, combat the climate change crisis and boost the nutrition level of people. Due to minimal input requirements, farmers won't have to worry about the high maintenance costs and the investments needed for millet production. The rising export opportunities in the millet sector will boost various entrepreneurs to initiate startups. As the global economy endeavours to achieve the Sustainable Development Goals, the G20 countries must promote millets through various behavioural interventions. Awareness must be increased through various events, advertisements, textbooks and millet based menus. With collaborative research and development initiatives across the world, current challenges on the supply side can be eradicated and millet's productivity can be increased.

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