

3. Present Status of Millet Cultivation in India

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Abstract:

Millets in India have experienced a significant resurgence, particularly following the declaration of the National Year of Millets in 2018 and the International Year of Millets in 2023. Their cultivation offers numerous benefits such as shorter growth cycles, lower water requirements, and resilience to climate variations. This book chapter provides a comprehensive overview of current millet production in India, analyzing trends, potential opportunities, and outreach strategies. Over the study period from 1968-69 to 2022-23, there has been a notable decline in millet cultivation across India, particularly for crops like jowar, ragi, and small millets, although bajra has seen increased production due to higher yields. The overall contribution of millets to total foodgrain acreage and production has consistently decreased. State-wise analyses reflect similar trends, with Rajasthan, Maharashtra, Karnataka, and Uttar Pradesh emerging as key millet-producing states. Despite these declines, recent initiatives by the government, combined with promotional efforts and growing consumer awareness of the nutritional and ecological benefits of millets, have sparked a revival in their cultivation. Millets are increasingly recognized for their potential to enhance food security, public health, and agricultural sustainability in India. There is also a rising demand for millets both domestically and internationally, driven by consumers seeking nutritious and sustainable food options. To sustain this growth, outreach programs are essential. These include public campaigns,

awareness events, and capacity building for farmers, consumers, processors, and traders. By fostering continued support and promotion, millets can play a crucial role in addressing India's food and nutrition challenges while meeting global market demands for nutrient-rich grains.

Keywords:

Benefits, Food security, Millets, Nutritional challenges, Production and Programmes.

3.1 Introduction:

Millets are a group of small-seeded annual grasses grown as grain crops, highly nutritious and traditionally serving as a staple food among India's poorest communities (NAAS, 2013). They have historically been crucial in dryland areas due to their adaptability to challenging climates. However, following the Green Revolution and subsequent government policies promoting rice and wheat for food security reasons, millet consumption and cultivation have significantly declined in recent decades. Recently, there has been a resurgence of interest in millets due to growing awareness of their nutritional, health, and environmental benefits (Kane-Potaka et al., 2021).

Acknowledging their importance, the Indian government has launched various initiatives to promote millet cultivation and consumption. In 2018-19, the Government of India designated millets as 'Nutri-Cereals' and launched the 'National Mission on Nutri-Cereals' to boost their cultivation and encourage consumption. Additionally, several state governments, such as Kerala's 'Millet Village Scheme' and Odisha's 'Odisha Millets Mission (OMM)' launched in 2017, have implemented promotional programs. Despite these efforts, the consumption of millets in India remains relatively low compared to staples like rice and wheat.

Nevertheless, there is increasing interest in promoting millet cultivation and consumption as a healthy and sustainable dietary alternative to these cereals, with hopes for continued growth in popularity in the coming years (Singh, E. 2016). In 2023, the United Nations General Assembly designated it as the 'International Year of Millets' to raise awareness about the various benefits of millet crops, such as enhancing food security, nutrition, and health, as well as their potential contributions to sustainable agriculture, climate resilience, and reducing malnutrition (Kane-Potaka et al., 2021).

This declaration aims to promote millets globally and stimulate new research, innovations, and partnerships to maximize their utility in both food and non-food applications. The International Year of Millets is expected to garner increased public and political support for millets and catalyze initiatives for their cultivation, processing, and marketing across different regions and countries. Over time, it is anticipated to align with several Sustainable Development Goals (SDGs) including poverty alleviation, hunger eradication, improved health, gender equality, economic growth, responsible consumption and production, and climate action (Kane-Potaka et al., 2021).

In this chapter, we aim to provide a comprehensive overview of millet production in India, analyzing spatial and temporal trends, potential opportunities, outreach strategies, and policy implications to boost production, consumption, and trade.

3.2 Trend Analysis:

3.2.1 Area, Production, and Productivity:

The cultivation of millets in India has experienced fluctuations over the years due to changing food consumption patterns, government policies, and the impacts of climate change. Despite these challenges, there has been a growing interest in millets recently, with efforts from the government and various stakeholders aimed at increasing millet production to enhance nutrition and health. Table 3.1 provides data from the triennium ending (TE) 1968-69 to TE 2022-23, detailing the area, production, and productivity of millets. Bajra holds the largest share both in terms of cultivated area (56.84%) and production (62.16%), followed by jowar, ragi, and small millets. Overall, there has been a significant decline in acreage and production levels for jowar, ragi, and small millets, while bajra has seen an increase in production due to rising yields. Specifically, jowar saw the highest decrease in acreage (-14.45 million hectares), followed by bajra (-5.05 million hectares) and small millets (-4.28 million hectares). In terms of percentage decline, small millets showed the greatest reduction (-91%), followed by jowar (-79%) and ragi (-47%), as corroborated by Anbukkani et al. (2017). Analysis of growth rates (computed as compound annual growth) revealed negative trends for all millets, with small millets experiencing the most significant decline (-34.21%), followed by jowar and ragi (Table 3.1). Interestingly, despite declining acreage, bajra and ragi exhibited contradictory trends in production, with an increase of 6.12 million tonnes and 0.4 lakh tonnes, respectively, over the study period (TE 1968-69 to TE 2022-23).

Table 3.2 presents the share of millets in total foodgrain area and production, indicating a decline in their overall share during the study period, with jowar having the highest initial share. This decline can be attributed to the focus on rice and wheat cultivation during the Green Revolution era. Post-Green Revolution, there has been significant expansion in rice and wheat cultivation areas, driven by rising productivity levels over the years as shown in Table 3.1. Productivity rates have notably increased across all millet crops, with bajra productivity rising from 0.36 to 1.45 tonnes per hectare (almost quadrupling with a CAGR of 26.72%) and ragi increasing from 0.79 to 1.53 tonnes per hectare (almost doubling with a CAGR of 26.72%). Ragi has shown the highest productivity levels in both absolute and percentage terms. Due to concerns over food security, the area devoted to rice and wheat expanded significantly. Specifically, the area for rice increased from 35.25 to 47.67 million hectares, while wheat cultivation area expanded from 12.84 to 31.82 million hectares. between 1966-67 and 2022-23, showing the replacement for the millets and, thereby the declining share in the area as well as production (DES, 2023). Efforts must be unified and continuous to promote millets and maximize their potential for enhancing food security, nutrition, and sustainable agriculture in the long term. Recently, both state and central governments have renewed their focus on millets, leading to the launch of numerous programs and initiatives aimed at their promotion (APEDA, 2023).

Table 3.1: Trends in Area, Production and Productivity of Millets in India

Period	Bajra	Jowar	Ragi	Small Millets
Area ('000 ha)				
TE 1968-69	12366	18403	2171	4729
TE 1973-74	12508	16335	2371	4437
TE 1983-84	11520	16469	2527	3641
TE 1993-94	10183	12704	1973	1986
TE 2003-04	9294	9475	1576	1234
TE 2013-14	7962	2441	1167	745
TE 2022-23	7316	3952	1155	448
CAGR (%)	-9.17	-27.41	-12.64	-34.21
Production ('000 tonnes)				
TE 1968-69	4485	9692	1721	1733
TE 1973-74	5589	7929	2068	1729
TE 1983-84	6131	11578	2672	1514
TE 1993-94	6173	10773	2570	889
TE 2003-04	8371	7084	1885	533
TE 2013-14	9423	2842	1829	439
TE 2022-23	10604	4318	1766	370
CAGR (%)	15.10	-16.26	-1.83	-25.96
Productivity (t/ha)				
TE 1968-69	0.36	0.53	0.79	0.37
TE 1973-74	0.45	0.49	0.87	0.39
TE 1983-84	0.53	0.70	1.06	0.42
TE 1993-94	0.61	0.85	1.30	0.45
TE 2003-04	0.90	0.75	1.20	0.43
TE 2013-14	1.18	1.16	1.57	0.59
TE 2022-23	1.45	1.09	1.53	0.83
CAGR (%)	26.72	15.36	12.38	12.54

Table 3.2: Share of Millets in Total Foodgrains Area and Production

Period	Bajra	Jowar	Ragi	Small Millets
Share in foodgrains area				
TE 1968-69	10.4	15.5	1.83	3.98
TE 1973-74	10.2	13.3	1.90	3.60
TE 1983-84	9.00	12.8	2.00	2.80
TE 1993-94	8.30	10.4	1.60	1.60
TE 2003-04	7.70	7.90	1.60	1.00
TE 2013-14	6.45	1.98	0.94	0.60
TE 2022-23	5.60	3.02	0.88	0.34
Share in foodgrains production				
TE 1968-69	5.11	11.0	1.96	1.97
TE 1973-74	5.46	7.75	2.02	1.69
TE 1983-84	4.43	8.36	1.93	1.09
TE 1993-94	3.38	5.89	1.41	0.49
TE 2003-04	4.18	3.54	0.94	0.27
TE 2013-14	3.62	1.09	0.70	0.17
TE 2022-23	3.32	1.35	0.55	0.12

3.2.2 Consumption and Trade:

The global market for millets is expected to grow from US\$11.02 billion to US\$13.80 billion from 2023 to 2028, reflecting an annual growth rate of 4.60% (Research and Markets, 2023). Despite a projected 0.9% decline in consumption from 2019 to 2024 (APEDA, 2023), millet consumption in India has been evolving due to increased focus on their nutritional benefits (Umanath *et al.*, 2018). Sreekala *et al.* (2023) studied per capita millet consumption trends in rural and urban households from 1977-78 to 2011-12. They found that millet consumption declined in both rural and urban India, with rural areas showing higher per capita consumption. Jowar was the most consumed millet in rural areas, followed by bajra, ragi, and small millets. The steepest decline in consumption was observed in small millets, which decreased by 97.62%. Consumption of jowar declined by 88.41%, ragi by 83.33%, and bajra by 68.67% between 1977-78 and 2011-12 in rural households. On the other hand, urban households experienced significant decreases in per capita consumption rates: 82.44% for sorghum, 64.86% for bajra, and 59.44% for ragi. It's worth noting that the decline was more pronounced in rural households compared to urban ones. However, recent studies indicate a positive shift with rising millet consumption, driven by increased public awareness of the nutritional and health benefits associated with these crops (Sreekala *et al.*, 2023). Another study on millet consumption patterns conducted by Anbukkani *et al.* (2017) highlighted that in Assam and Bihar, small millets were prominently consumed at rates of 18.82 kg per household per month and 18.69 kg per household per month, respectively. These states exhibited the highest consumption levels not only in rural areas but also nationwide. In contrast, consumption in other states remained below the threshold of 10 kg per household per month, significantly lower than Assam and Bihar. Additionally, the study examined the consumption patterns of finger millet across rural, urban, and national contexts. Bihar showed the highest consumption rate for finger millet at 12.02 kg per household per month, surpassing Karnataka, which leads in the area and production of finger millet.

Table 3.3: Top 10 destinations for millets export from India (Source: APEDA, 2023).

Country	2022-23			% growth on the previous year	% share in 2022-23
	Quantity (tonnes)	Value (₹ Lakhs)	Value (US\$ Million)		
UAE	34,017.21	10,800.39	13.33	28.49	17.76
Saudi Arabia	24,518.69	8,313.96	10.39	68.38	13.67
Nepal	20,020.01	4,469.58	5.57	1.15	7.35
Bangladesh	12,629.45	2,994.36	3.69	70.65	4.92
Japan	6,588.15	2,695.49	3.37	23.3	4.43
USA	2,105.97	2,483.43	3.1	-24.16	4.08
Germany	2,009.52	2,295.80	2.88	19.87	3.78
Libya	6,811.77	2,197.12	2.71	111.01	3.61
Egypt	1,461.65	1,771.10	2.2	9.24	2.91
Oman	5,850.53	1,717.98	2.13	22.38	2.83
All Countries	1,69,049.25	60,811.23	75.43	29.56	100

Table 3.3 illustrate the export trends and key destinations. India ranks among the top five global exporters of millets. Since the declaration of the 'National Year of Millets', the export value has risen from US\$ 59 million to US\$ 75 million between 2019-20 and 2022-23. In terms of export volume, India experienced a growth of 29.56% during 2022-23 compared to the previous year, exporting to various countries including the United Arab Emirates, Saudi Arabia, Nepal, Bangladesh, and Japan (APEDA, 2023).

3.3 Prospects of Millets Produced in India:

Millets show promising potential for cultivation in India due to their ability to thrive in diverse agro-climatic conditions and their numerous benefits (Sreekala *et al.*, 2023). Figure 1 illustrates several prospects associated with millet cultivation in India.

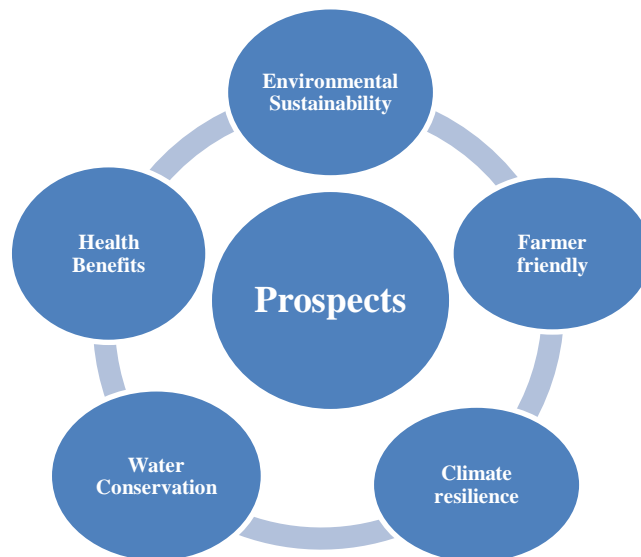


Figure 3.1: Prospects of Millets Cultivation in India

Health Benefits: Millets provide a nutritional advantage, containing higher levels of protein, dietary fiber, iron, and calcium compared to staple cereals such as wheat and rice, by 2-10 times. Incorporating millet-based foods, which are rich in nutrients with anti-inflammatory and antioxidant properties, can contribute to improved health outcomes.

Water Conservation: Millets thrive in arid regions and require only 300-400 mm of water, significantly less than the water needed for rice (1400-1500 mm) and sugarcane (1900-2000 mm) cultivation. This characteristic helps conserve precious water resources.

Environmental Sustainability: Millets are environmentally friendly crops as they are carbon-neutral, absorbing as much carbon from the environment as they emit. They produce only 0.1-0.2 CO₂eq kg per kg of production, contrasting with rice (0.4 CO₂eq kg per kg) and wheat (0.35 CO₂eq kg per kg).

Farmer friendly: Millets are highly favoured by farmers for their short growth cycle of 60-90 days, contrasting with other cereals that take 100-140 days to mature. They efficiently utilize nutrients and respond well to improved farming practices and inputs, sometimes tripling yields.

Climate resilience: Millets demonstrate exceptional resilience in tough, hot, and drought-prone conditions, often remaining viable when other crops fail. This resilience makes them a reliable food source amid worsening climate conditions and a significant benefit to small-scale farmers. Millets offer a potent solution to malnutrition, outstripping wheat and rice in nutritional value by releasing sugars slowly, thereby reducing hunger and supporting efforts toward achieving the Zero Hunger Goal.

The future of millet cultivation in India looks promising, with various initiatives aimed at promoting their production and consumption, aligning with multiple Sustainable Development Goals (SDGs) as previously discussed. To expand millet cultivation and production in India, several outreach activities can be implemented (Oswal, S. 2023).

Providing training and building the capacity of farmers.

1. Conducting demonstrations and field days.
2. Adding value to millets and improving their marketability for better economic returns.
3. Advocating for policies and implementing action plans by the government.
4. Assessing consumer awareness and creating opportunities to boost demand.
5. Increasing investment in research and development.

These activities aim to enhance millet farming and consumption, contributing to broader sustainability and nutritional goals. In recent times, both the Government of India and various state governments have initiated several development programs aimed at encouraging the cultivation and consumption of millets. These programs are designed to promote the growth of millets and enhance their utilization across different regions (Kumar *et al.*, 2018).

3.3.1 The Odisha Millet Mission (OMM):

The Odisha Millet Mission (OMM) stands as a pioneering state-level initiative in India aimed at promoting the cultivation and consumption of millets. This program is integral to enhancing food security, improving nutritional standards, and advocating for sustainable agricultural practices within Odisha. OMM employs various strategies such as supporting millet farmers, developing millet-centric value chains, and raising awareness about the nutritional benefits of millets. By emphasizing the importance of millets in Odisha's agriculture, the mission addresses food security challenges and aims to benefit the state's population overall.

National Food Security Mission on Millets: The National Food Security Mission on Millets (NFSM-Millet) is a central initiative of the Indian government aimed at promoting millet cultivation nationwide through financial and technical assistance to farmers.

The National Mission on Nutri-Cereals: The National Mission on Nutri-Cereals, launched by the Ministry of Agriculture and Farmers Welfare in the fiscal year 2018-19, emerged following the "National Year of Millets" in 2018. It seeks to encourage the cultivation of nutritious cereals, including millets, by increasing millet production, promoting consumption, and improving farmers' income.

Millets Magic-Recipes Contest: Since 2022, the Ministry of Agriculture and Farmers Welfare has launched the 'Millets Magic-Recipes Contest' to encourage public consumption of millets. The contest also aims to raise awareness about the nutritional benefits of millets and stimulate the creation of innovative recipes using millets.

3.4 Conclusions and Policy Recommendations:

In recent years, millets have experienced a notable resurgence in India due to their various cultivation advantages, including shorter growth periods, minimal water requirements, and resilience to diverse climates.

Millets also offer significant nutritional benefits and contribute to carbon-neutral farming practices, benefiting the environment. Revitalization efforts have involved collaborative initiatives among stakeholders.

However, analysis of production trends from TE 1968-69 to TE 2022-23 shows a significant decline in millet cultivation across India, particularly for jowar, ragi, and small millets, despite an increase in bajra production due to improved yields.

The overall share of millets, including bajra, jowar, ragi, and small millets, in total foodgrains area and production has decreased over this period, reflecting a similar pattern at the state level.

Nonetheless, recent years have seen a revival in millet cultivation driven by government initiatives, increased public awareness of millet's health benefits, and growing demand for sustainable and nutritious foods domestically and internationally.

Therefore, policy efforts are crucial to expanding and sustaining the cultivation, production, trade, and consumption of nutritious millets. In this context, the following policy recommendations are proposed:

A. Enhanced Support for Farming and Research:

- Provide millet farmers with high-quality seeds and essential inputs to enhance production.
- Prioritize and invest in millet research and development, particularly breeding programs aimed at developing high-yielding varieties and improving farming practices in regions with lower yields.
- Implement price support mechanisms to ensure fair compensation for millet farmers, thereby stimulating increased production.

B. Promotion and Market Expansion:

- Launch educational campaigns and events to educate consumers about the nutritional benefits of all millets, fostering sustained consumption.
- Actively engage in millet procurement and integrate millets into the public distribution system (PDS) to create a stable market for farmers.
- Facilitate exports by refining trade policies, ensuring food safety and quality standards, and facilitating international market access.

C. Strengthening Partnerships and Collaborations:

- Encourage and support the establishment of millet farmers' cooperatives to promote collective bargaining and resource-sharing, particularly among smallholders.
- Cultivate partnerships with processors and invest in infrastructure such as millet processing units, value addition facilities, transportation, and storage to minimize post-harvest losses and expand millet product markets.
- Enhance agricultural extension services through collaborations with NGOs and international organizations to provide millet farmers with up-to-date knowledge and practices for improved cultivation.

Ecological Sustainability:

1. Encourage and provide incentives for crop rotation involving millet crops to improve soil health and environmental quality, thereby reducing reliance on water-intensive crops.
2. Strengthen research and development efforts and invest in the development and deployment of climate-resilient millet varieties to mitigate the impacts of climate change.

In conclusion, millets hold promise for enhancing food and nutrition security, public health, and agricultural sustainability. Their potential is increasingly recognized both domestically and internationally as demand grows for healthier and more sustainable food options. A comprehensive approach involving collaboration and synergy among various stakeholders will be essential to increasing millet production, consumption, and trade effectively.

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