Performance Analysis of Production and Marketing of Millets in India

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OPEN ACCESS

Manuscript ID:
ECO-2024-13018400

Volume: 13

Issue: 1

Month: December

Year: 2024

P-ISSN: 2319-961X

E-ISSN: 2582-0192

Received: 18.10.2024

Accepted: 27.11.2024

Published Online: 01.12.2024

Citation:
Athira, A., et al. "Performance Analysis of Production and Marketing of Millets in India." *Shanlax International Journal of Economics*, vol. 13, no. 1, 2024, pp. 1-10.

DOI:
https://doi.org/10.34293/economics.v13i1.8400

Abstract
Once considering an inferior food grains, increasing health consciousness and nutrition rich millets are gaining importance across the world. Realising the importance of nutri-rich millet crops, the UN declared 2023 as an International Year of Millets (IYOM). Millets have been cultivated in India for centuries, and the country is now a major global producer of these grains, with a wide variety across different agro-climatic condition. This article proposed to study the policy initiatives related to millets by the Government of India. The growth is area, production and yield from 1950-51 to 2020-21 and export of millets from 2003-04 to 2022-23, India's world share of millets are examined. The study analysed the instability of cultivation and exporting millets from while India. The result shows that while the area and production of millets has negative growth in the study period but the yield has a positive growth. Export of millets has higher positive growth rate in both quantity and value of export from India. The millets cultivation demonstrates low instability. Export of millets has higher instability. The result shows Indian millets has export potential in the years to come.

Keywords: Millets, Production, Export, Instability Index

Introduction

Millets, originating in Asia and Africa, were the initial crops cultivated by humans in the world. Over the passage of time, they spread globally and became a crucial food source for the development of human civilization. For centuries, millets have been a fundamental part of human diets, playing a crucial role in ensuring global food security. These resilient crops, which belong to the group of small-seeded grasses, are highly adaptable to different agro-ecological zones and can thrive in challenging growing conditions including on marginal land. Minor millets include a variety of species, including pearl millet, finger millet, sorghum, foxtail millet, kodo millet, small millet, barnyard millet, and proso millet. Millets, commonly referred to as dryland cereals, are typically farmed in arid and semi-arid area largely by resources poor farmers with limited inputs.

In 2021 India had the first rank in global production of millets, followed by China. In 2022, India ranked first and the share of global production has 19 percent. The second place gone to the Nigeria (10.01%) and third by Sudan (7.23%) followed by United States (6.9%) and China (6.34%). In 2023-24 also India hoped with first rank in millets production with, 40% of global production 40 percent and followed Niger 11 percent, China 9 percent, Nigeria 6 percent, Mali 6 percent, and Sudan 5 percent.

The 75th Session of the United Nations General Assembly supported the Government of India's proposal for the International Year of Millets (IYoM) in 2023 and after it was endorsed by members of the Food and Agricultural Organization (FAO) Governing Bodies in March 2021. The IYoM presents a distinctive chance to foster increased recognition of millet cultivation. This initiative will play an important role in enhancing food safety, nutrition, and overall wellbeing of farmers. Moreover, it will aid in poverty eradication ensuring nutrition security, and support livelihoods and incomes, especially in areas that are susceptible to drought or affected by climate change.

As a result of population growth, economic prosperity, and urban development, there has been a global surge in the need for food, accompanied by a change in dietary choices towards more resource-intensive options. Millets, which possess both nutritional richness and require minimal resources while being environmentally sustainable, are exceptionally well-suited to meet the escalating demand for nutritious sustenance. (Gowda et al.) observed the role of millets in addressing food insecurity and malnutrition with a focus on the impact of processing techniques on their nutritional value. Some millet like jowar are used as poultry feed and also in fish rearing.

The increase in millet export from India can be credited to the changing dietary choices, inactive lifestyles and the growing global consciousness regarding health. Over past few years, there has been a noticeable rise in the global trade of millets. This surge can be attributed to the growing recognition of their nutritional advantages and their ability to be used in a variety of culinary dishes. Countries like India, which have a substantial millet production, emerged as major contributor to the international millet export market. The export of millets encompasses a wide range of products, from unprocessed grains to processed items, catering to the needs of health-conscious consumers who are in search of gluten-free alternatives. During the 2021-22, despite the COVID-19 pandemic, the export of millets from India has maintained its upward trajectory, reaching an unprecedented milestone of US$62.95 Million. This achievement marks the highest ever recorded in the history of Millets export. During 2022, India's yield in pearl millet is became the highest in the world as reported by (Rajendran et al.) an encouraging aspect to improve the yield in their millets.

(Singh et al.) in their study on competitiveness, trade performance, and effects of millets on the growth of the agricultural sector in the country found that from 2011 to 2020, India primarily exported its millet to neighbouring countries such as Pakistan, Nepal, Vietnam, and Saudi Arabia. These countries accounted for over 50 % of India's millet export during above period. The study's findings as measured by Revealed Comparative Advantage (RCA), indicated that the top importers of millet were Yemen, Vietnam, Saudi Arabia, and Pakistan, with RCA values was more than one. This implies that, by exporting millets to these partners India had a considerable competitive advantage. Indian millet exports played a crucial role in the global market between the years of 2000 and 2020, making a substantial contribution to the international basket, to boost the country's GDP through increased exports. However, issues like quality of grains and standardisation of processed food need to be improved. Against this, The Indian government has been actively endeavouring to encourage the consumption of nutritious millets besides exporting.

(Gandhimathy) examined the growth and instability in area and yield of major food crops in India and Tamil Nadu. Paddy production in Tamil Nadu has only increased by 0.8%, indicating a need for policymakers to increase area under cultivation to avoid food shortage. Other food crops like Cholam, Ragi, Cumbu, and Maize also showed growth rates, with maize having the highest yield rate. However, ragi had the highest instability index. Decomposition analysis showed that acreages responses are more for changes in production, except for Ragi crop. Rice, Bajra, and Maize had positive growth rates, while Cholam and Ragi declined. Maize had the highest compound growth rate, followed by Paddy and Ragi.

Analysing the patterns of exports enables the identification of potential avenues for economic expansion. In the event of a rising global demand for millets, it could create new opportunities for export, thereby bolstering the area and production of

millets and income in India. Therefore the present study is focusing on millets from India with two fold objectives of to analyse India's share of millets export in the world, and to estimate the stability and growth in millet crop area, yield, production and export in India.

Methodology

The information for this study was obtained from secondary data sources. The data was taken from the Agricultural and Processed Food Product Development Authority (APEDA), Directorate of Millets Development, FAOSTAT, and Agricultural Statistics at a glance by the GOI, New Delhi. The period of the study has been taken from 1950-51 to 2020-21 for millet cultivation, and from 2003-04 to 2022-23 (latest two decades) for examining export of both quantity and value also from 2003 to 2022 year taken for India' share in global millets exports. The descriptive statistical techniques like percentages, averages, coefficient of variation and CAGR {CAGR = ((Final value / Beginning value)$^{(1/time)}$ - 1) * 100} have been used in the study and the instability index gives the direction of instability in the production and yield of millets and Indian millets export.

India is the largest producer of millets in the world. India's two varieties of millets namely Bajra and Jowar mainly contribute in the total millets production. Due to this, the study mainly focused Bajra and Jowar on production basis.

Instability index

Cuddy Della Valley Index was employed to identify the instability index and Cuddy-Della Valley provided it as it provides the direction of stability. In order to determine the fluctuations in millets' area, yield, and production from 1950–1951 to 2020–21 as well as their export from 2003–04 to 2022–23, the degree of instability of millets was measured.

Coefficient of Variation

Coefficient of variation (CV) = (SD / Mean) * 100

Instability Index = CV $\sqrt{(1-R^2)}$

Where, R^2 is the coefficient of determination and CV is a simple estimate of the coefficient of variation in percent.

According to (Sihmar), low instability is defined as less than 15, moderate instability as 15 - 30, and high instability as beyond 30.

Result and Discussion

The following section deals with the analysing and discussing the result of area, production, yield, share, export destination and instability.

Table 1 Patterns of Major Millet Cultivation in India from 1950–51 to 2020-21

Year	Jowar			Bajra			Other Millets			Total Millets		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y
1950-51	15.57	5.50	353	9.02	2.60	288	9.92	5.55	559	34.51	13.65	396
1960-61	18.41	9.81	533	11.47	3.28	286	10.67	6.57	616	40.55	19.66	485
1970-71	17.37	8.11	466	12.91	8.03	622	9.82	6.92	705	40.10	23.06	575
1980-81	15.81	10.43	660	11.66	5.34	458	8.30	6.29	758	35.77	22.06	617
1990-91	14.36	11.68	814	10.48	6.89	658	5.88	5.17	879	30.72	23.74	773
2000-01	9.86	7.53	764	9.83	6.76	688	3.96	4.75	1199	23.65	19.04	805

Source: Agricultural Statistics at a Glance 2022

Note: A-Area; P-Production and Y-Yield; Area in Mha, Production in million tonnes and Yield in Kg/ha.

The table 1 presents the production of different types of millets (jowar, bajra, and other millets) in India throughout the reference years, including the overall millet production. The area and production of jowar has experienced decreasing pattern throughout the study period in case for concerns. Over a span of seven decades, the CAGR for the area and production of jowar stands at -1.80% and -0.19%, respectively. But the jowar yield has increased with 1.64%. On the other, area in bajra, other millets, and total millets are depicting a negative growth rate. But, contradictory to the production of bajra and total millets shows positive growth rate over the period. The yield for bajra, other millets and total millets were showing

the positive growth rates. The total millets in growth of area, production, and yield from 1950-51to 2020-21 are -1.26%, 0.52%, and 1.80% respectively.

Millets have a small leaf area and thickened cell walls, which enhance their ability to withstand a biotic stress (Li and Brutnell). Millets possess unique qualities that enhance their resilience to climate change, including their ability to thrive in various ecological settings, lower water requirements, increased growth and productivity in nutrient-deficient environments, decreased dependence on synthetic fertilizers, and minimal vulnerability to environmental pressures (Tiwari et al.). Millets have the potential to ensure both food security and livelihoods, making them a viable option for the growing population (Bezbaruah and Singh).

Table 2 Area, Production and Yield Major Two Indian Millets

States	Jowar						Bajra					
	2020-21			2021-22			2020-21			2021-22		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Maharashtra	2.08	1.75	840	1.65	1.71	1038	0.69	0.66	955	0.53	0.48	903
Karnataka	0.75	0.90	1205	0.62	0.75	1204	0.22	0.28	1241	0.15	0.17	1161
Tamil Nadu	0.41	0.43	1054	0.40	0.29	735	-	-	-	-	-	-
Madhya Pradesh	0.11	0.22	1938	0.12	0.24	1941	0.33	0.74	2256	0.34	0.87	2533
Rajasthan	0.56	0.59	1054	0.62	0.54	864	4.35	4.56	1049	3.74	3.75	1004
Andhra Pradesh	0.12	0.41	3428	0.08	0.24	3166	-	-	-	-	-	-
Gujarat	0.04	0.06	1398	0.04	0.06	1346	0.46	1.01	2192	0.45	1.06	2368
Gujarat	0.04	0.06	1398	0.04	0.06	1346	0.46	1.01	2192	0.45	1.06	2368
Telangana	0.09	0.16	1711	0.07	0.10	1537	-	-	-	-	-	-
Haryana	0.03	0.02	525	0.02	0.01	527	0.57	1.35	2373	0.48	1.12	2318
Others	0.01	0.01	848	0.01	0.01	755	0.13	0.26	1950	0.12	0.23	1989
All India	4.38	4.81	1099	3.81	4.23	1110	7.65	10.86	1419	6.70	9.62	1436

Source: Agricultural statistics at a glance 2022.

Area in Million Hectares, Production in Million Tonnes, Yield in Kg./ Hectare

The provided table presents a comprehensive analysis of the area, production, and yield of two prominent Indian millets, Jowar (Sorghum) and Bajra (Pearl Millet), across various states during the periods of 2020-21 and 2021-22. There has been a decline in the area cultivated and total production of both Jowar and Bajra from 2020-21 to 2021-22. However, there have been slight improvements in yields for both millets at a national level, although there are notable differences among different states. Maharashtra, Karnataka, and other prominent states display diverse trends, with states like Madhya Pradesh and Gujarat experiencing increases in yield for both millets, while Tamil Nadu and Rajasthan witness declines.

Indian millets export presents significant opportunities for farmers, exporters, and the economy as a whole. Based on this, here analyses the India's share of world millets export.

Table 3 India's World share of Export Value From 2003 to 2022

Year	India World Share of Millets Export (%) (1000 USD)
2003	09.15
2004	12.70
2005	29.22
2006	19.95
2007	23.22
2008	32.91
2009	30.39
2010	35.63
2011	23.02
2012	23.02
2013	20.89
2014	16.66
2015	19.73

2016	19.96
2017	15.70
2018	17.58
2019	15.14
2020	12.88
2021	13.67
2022	18.06

Source: FAO

The table 3 shows the India's export share to world (millets) from 2003 to 2022. In 2003, India ranked 5thin millet exports, with a share of 9.15%. During 2004 India 2nd ranks in world of exporting millets with a share of 12.7 %. In 2005 India is the first largest exporter of millets (29.22%), followed by other major exporting countries are United States of America, France, China, etc. During 2006 India's share is 19.95 %, this year India as maintained the first rank. Up to 2013 India continuously maintain its first rank of export of millets, but 2014, India as shifted to 2nd rank (16.66%). In 2016 India get backed its first rank position. But the rank has fluctuating, 2017, 2018, and 2019 and USA has become the first largest exporter to the world. In 2020, India ranked third, with a share of 12.88%. In 2022 India came back to its first rank in world export of millets it share is 18.06 %. In the study period India has highest world share of export of millets in 2010 (35.63%) and very lowest in 2003 (9.15). The millets export share as increased from 9.15 to 18.06%.

Table 4 Major 10 Export Destinations of Indian Millets

2003-04		2008-09		2013-14		2018-19		2022-23	
Countries	**Value**	**Countries**	**Value**	**Countries**	**Value**	**Countries**	**Value**	**Countries**	**Value**
UK	0.21	South Africa	0.58	Pakistan	12.46	Pakistan	15.73	UAE	13.33
Japan	0.17	USA	0.57	Taiwan	8.07	Saudi Arabia	6.11	Saudi Arabia	10.39
Nepal	0.04	UAE	0.28	Yemen	5.55	UAE	4.84	Nepal	5.57
Netherlands	0.04	Taiwan	0.23	Ghana	5.55	Kenya	4.44	Bangladesh	3.69
UAE	0.03	Saudi Arabia	0.21	UAE	5.36	Nepal	4.03	Japan	3.37
Taiwan	0.03	Nepal	0.15	Saudi Arabia	4.48	USA	3.1	USA	3.1
USA	0.02	Netherlands	0.15	Cameroon	2.69	Philippines	3	Germany	2.88
Canada	0.02	Belgium	0.12	Nepal	2.59	Spain	2.35	Libya	2.71
Spain	0.02	Sri Lanka	0.09	Japan	2.27	Japan	2.23	Egypt	2.2
Cyprus	0.01	Yemen	0.09	USA	2.19	Germany	2.23	Oman	2.13
Top 10 Total	0.59	Top 10 Total	2.47	Top 10 Total	51.21	Top 10 Total	48.06	Top 10 Total	49.37
Other Countries	0.04	Other Countries	0.62	Other Countries	23.64	Other Countries	29.93	Other Countries	26.09
Total	**0.63**	**Total**	**3.09**	**Total**	**74.85**	**Total**	**77.99**	**Total**	**75.46**

Value in US$ Million; **Source**: APEDA

The above table 4 shows that 10 major export destination of Indian millets. It's noticeable that the distribution of value among the top 10 entities has changed over time. For instance, the top 10 total value was US$ 51.21 Million in 2013-14 but decreased to US$ 48.06 Million in 2018-19 before slightly increasing again to US$ 49.37 Million in 2022-23. But there is high improvement in export of top ten countries from US$ 0.59 Million 2003-04 to US$49.37 Million in 2022-23. Also total millets export showing increased in 2003-04US$ 0.63 Million to US$ 75.46 Million. Other countries importing also increased. UAE, Saudi Arabia, USA and Nepal have consistently maintaining their top positions.

Table 5 Growth of Export of Millet from India (2003–04 to 2022-23)

Year	Qty in MT	% Change over the Previous Year	Value in US$ Million	% change over the Previous Year
2003-04	2309.81	-----	0.63	-----
2004-05	6812.04	194.75	1.47	133.33
2005-06	2881.27	-57.71	0.60	-59.18
2006-07	2679.74	-6.99	0.86	43.33
2007-08	4983.02	85.83	1.67	94.19
2008-09	9619.35	92.95	3.09	85.93
2009-10	21836.60	126.9	14.41	366.21
2010-11	3543.55	-83.77	1.88	-86.91
2011-12	5805.15	63.78	3.80	106.88
2012-13	16322.64	181.25	7.30	92.11
2013-14	216418.78	1225.36	74.85	926.02
2014-15	257386.98	18.9	88.50	18.2
2015-16	188985.05	-26.59	64.16	-27.5
2016-17	166942.30	-11.64	58.53	-8.78
2017-18	156274.02	-6.39	57.36	-2
2018-19	219402.50	40.48	77.99	35.94
2019-20	129012.88	-41.23	59.45	-23.75
2020-21	146993.61	13.93	58.82	-1.061
2021-22	158509.98	7.83	62.95	7.04
2022-23	169049.21	6.64	75.46	19.9
CAGR	23.94	-	27.03	-

Source: APEDA, various years. MT – Metric Tonnes

During the period from 2003-04 to 2022-23, the export quantity and value shows high growth rate with 23.94 % and 27.03 % respectively. During the periods, the highest growth rate was reported in 2013-14 and 2014-15with 216418.78MTs and 257386.98 MTs respectively. After these years, there is a slowdown in exports. Overall the country's export of millets has been increasing. As it was potential out already changes in the dieting patterns nutritional values in millets would have contributed for the increase in trade.

During the recent decades,while the Indian millets export is increasing, the production of these crops has not increased correspondingly. In earlier times, millets were primarily consumed domestically in India, with minimal focus on their export. Nevertheless, there has been a notable transformation in recent years, as India has started emphasizing the promotion of millet exports. This change has been influenced by several factors, one of which is the increasing global demand for millets. The quantity and value of export growth rate over the years reflects a mix of positive and negative patterns. The export is fluctuating over the reference periods and hence the instability index check is prepared and discussed as below.

Instability Index

The Cuddy and Della Valle instability index was employed to measure the degree of variation around the trend.

Table 6 Instability in Production of Millets in India (1950-51 to 2020-21)

Commodity		Mean	SD	CV	R Square	1- R square	√(1-R square)	CV*√(1-R square	Level of Instability
Jowar	A	12.89	5.076	39.372	0.818	0.182	0.426	16.772	MI
	P	8.11	2.399	29.585	0.055	0.945	0.972	28.757	MI
	Y	704.75	251.50	35.686	0.937	0.063	0.250	8.921	LI
Bajra	A	10.33	1.665	16.123	0.263	0.737	0.858	13.834	LI
	P	6.76	2.997	44.303	0.783	0.217	0.465	20.601	MI
	Y	687.37	390.688	56.837	0.841	0.159	0.398	22.621	MI
Other Millets	A	6.69	3.423	51.151	0.932	0.068	0.260	13.299	LI
	P	5.44	1.077	19.789	0.652	0.348	0.589	11.656	LI
	Y	1008.75	462.53	45.852	0.896	0.104	0.322	14.764	LI
Total Millets	A	29.91	9.714	32.475	0.811	0.189	0.434	14.094	LI
	P	20.32	3.1856	15.678	0.146	0.854	0.924	14.486	LI
	Y	766	330.326	43.123	0.908	0.092	0.303	13.066	LI

Source: As is in table 1. LI - Low Instability, MI - Moderate Instability and HI – High Instability

The table illustrates the volatility in the region's millet cultivation, including area, production, and yield, in India. Based on the above table, jowar area shown medium instability, but bajra, other millets and total millets area shows low instability. Pertaining to production,jowar and bajra has medium instability. The other millets and total millets production from 1950-51 to 2020-21 showed low instability. Except bajra, the yield has low instability during the period. In short, the total millets area, production, and yield had low instability. It means that the Indian cultivation of total millets has stable. In the same line, an attempt is made to measure the instability in trading millets.

The results of this analysis revealed that Jowar both the area under cultivation and the production of millets fluctuated. Bajra production and yield exhibit moderate instability. This variability may be attributed to changes in cropping patterns and the low yield potential of these millets and the reduction in the cropping area under millets, as they are being replaced by other crops (Kumar et al.). Overall, millets have shown low variability in terms of area, production, and productivity due to their adaptability to diverse climatic conditions and resilient growth hence less instable (Yamuna et al.).

Table 7 Instability in Export of Millets in India (2003-04 to 2022-23)

	QTY (MT)	Value (US$ Million)
Mean	94288.42	35.689
SD	93005.86	33.88950325
CV	98.63975	94.95783925
R square	0.594	0.699
1- R square	0.406	0.301
√(1-R square)	0.637	0.548
CV*√(1-R square	62.833	52.036
Level of Instability	High Instability	High Instability

Source: As is in table 5.

The above table shows that instability of export of Indian millets from 2003-04 to 2022-23. The quantity and value of exporting millets show higher instability as the quantity is 62.83 and the export value is 52.04, respectively. The concept of export instability generally pertains to a scenario in which a country's export activities lack consistency, predictability, or reliability. This lack of stability can manifest in different forms and may be influenced by several factors. The stability of exports can be influenced by political turmoil, geopolitical changes, government transitions, or uncertainty in policies. Disruptions in international trade can occur due to abrupt policy changes or geopolitical

events. Further the stability of export markets can be influenced by rapid shifts in market demand, consumer preferences, or industry trends. The lack of proper infrastructure such as roads, ports, and cold storage facilities remains a major challenge for agricultural exports. An inappropriate infrastructure can cause delays and losses during transportation, which can lower the product's shelf life and impact its quality. Transportation expenses may rise as a result of delays and losses during transit. In addition to possible fines for late deliveries, this also involves additional costs for handling and storage. The extra expenses incurred can reduce the competitiveness of exported goods on the international market. Poor handling and storage conditions during transportation can be caused by inadequate infrastructure, which could lower the quality of the exported commodity. On the global market, exporters' and their goods' reputations might suffer from frequent delays and losses in transportation. Customers (traders) may grow wary of signing deals with exporters who have a track record of inconsistent delivery.

In addition to the above, the stability of millet exports from India can be impacted by various factors, including dietary trends, consumer preferences, and health considerations, which in turn influence the global market demand for millets. Unlike those days, there has been a significant change in recent times as India has begun to prioritize the promotion of millet exports. India's exports have increased over the last decade, creating new opportunities for millet exports. However, this growth has also contributed to instability in the millet sector.

Way Forward

The analysis focused on the growth of millet crop area, yield, and production in India, together with the growth in exports and the volatility of millets export and cultivation. The results show that area and production of millets have negative growth during the study periods. Nevertheless, yield growth rate is positive. Indian export of millets has higher positive growth rate in both quantity and value of export. The Indian total millets cultivation, area, production and yield showing low instability, but the Indian export of millets has higher instability. Indian millet cultivation is more stable, millets export hasunstable market in the world during the study periods. Instability may be caused due to unforeseen factors or situations. However, effort shall be made to improve the production and to develop scientific processing technique to improve the export of millets and value added commodities. Enhancing production methods and utilizing cutting-edge processing techniques can help broaden the export market for millets and value-added products, creating more avenues for growth within the global millet industry. This commitment to improving production and processing practices highlights the significance of innovation and effectiveness in positioning millets as a sought-after commodity in the global marketplace (Rao et al.). Similarly,maintaining hygiene during processing and packaging is important to improve the value addition of nutri-millets grains. Millets possess nutraceutical properties and can be utilized as substitute grains in the creation of nutritious therapeutic food items, including protein and energy-rich diets, diabetes-friendly diets, gluten-free diets, and diets for cardiovascular diseases. Research indicates that millets can be considered as a form of 'food medicine' due to their antioxidant content, which includes phenolic acids and glycosylated flavonoids. Additionally, millet-based foods are recognized for their potential prebiotic properties, which can support the growth of probiotics and offer various health advantages (Singh and Sarita).

Innovation and value addition enhance the income of enterprises. Although innovation and value addition increase costs, value-added products ensure higher income for farmers. Collaboration was found to be significant, though not to a great extent. Regular skill training and market-driven techniques could serve as driving forces for marginal and small farmers to overcome poverty and move out of the low-income group. Furthermore, internal factors such as age, marital status, family support, financial stability, and scale of operations, along with external factors like policy governance and public relations, play a crucial role in influencing farmers' decisions to engage in millet-based enterprises within FPCs (Pani et al.). FPCs, particularly those focused on millet cultivation, offer training programs and grant access to improve livelihoods and agricultural practices. FPCs, particularly those focused on millet

cultivation, face challenges in direct marketing, collaboration, and institutional support. FPC faces weaknesses in modern techniques, processing facilities, and climate resilience, with opportunities for credit, market linkages, and skill development counterbalanced by price fluctuations and competition. Future interventions should strengthen organizational capacities (Malaisamy). More research in the form of processed items like millets cake, are to be developed for generating foreign earnings though exports. And the Government made effort to more involvement of the Farmer Producer Companies (FPCs) in the processing and packing of millets.

Limitations of the Study

The study based fully secondary data, so there is a chance to inaccuracy of data. The study periods, basis of production 1950-51 to 2021-22 and on export data 2003-04 to 2022-23 and export share from 2003 to 2022. The study period was extended due to inadequate availability of data, and while India has historically prioritized production over export, recent trends indicate a shift towards placing greater emphasis on export. So the study has taken recent to decades to export analysis, but it is limitation of the study.

References

Agricultural Statistics at a Glance 2022. Ministry of Agriculture and Farmers Welfare, Department of Agriculture and Farmers Welfare, Economics and Statistics Division, Government of India, 2023.

Bezbaruah, R., and A. K. Singh. "Millets as Nutricereal Climate Resilient Smart Crop: A Review." *Journal of Experimental Agricultural International*, vol. 46, no. 5, 2024, pp. 795-803.

Cuddy, J. D. A., and P. A. Della Valle. "Measuring the Instability of Time Series Data." *Oxford Bulletin of Economics and Statistics*, vol. 40, no. 1, 1978, pp. 79-85.

Gandhimathy, B. "Growth and Instability of Principal Food Crops in India and Tamil Nadu." *Annals of Agricultural Research*, vol. 44, no. 3, 2023, pp. 379-86.

Gowda, N. Nanje, et al. "Modern Processing of Indian Millets: A Perspective on Changes in Nutritional Properties." *Foods*, vol. 11, 2022.

Kumar, Punith, et al. "Export Performance and Direction of Trade of Millets from India." *International Journal of Agriculture Extension and Social Development*, vol. 6, no. 1, 2023, pp. 91-95.

Li, Pinghua, and Thomas P. Brutnell. "*Setaria viridis* and *Setaria italica*, Model Genetic Systems for the Panicoid Grasses." *Journal of Experimental Botany*, vol. 62, no. 9, 2011.

Malaisamy, A., and S. Arun. "Evaluating the Socio-Economic Status and Economic Performance of Farmer Producer Companies in the Southern Districts of Tamil Nadu, India." *Journal of Experimental Agriculture International*, vol. 46, no. 10, 2024, pp. 700-11.

Pani, Saswat Kumar, et al. "Millet-based Enterprises and Sustainability: Evidences from Farmer Producers Company in Kalahandi District, Odisha." *Indian Journal of Agricultural Economics*, vol. 78, no. 3, 2023, pp. 462-72.

Rajendran, S., et al. *Dynamics of Rural Transformation in India*. Excel India Publishers, 2023.

Rao, B. Dayakar, et al. *Technologies of Millet Value Added Products*. Centre of Excellence on Sorghum and Indian Institute of Millets Research, 2016.

Sihmar, Rakesh. "Growth and Instability in Agricultural Production in Haryana: A District Level Analysis." *International Journal of Scientific and Research Publications*, vol. 4, no. 7, 2014, pp. 1-12.

Singh, E., and Sarita. "Nutraceutical and Food Processing Properties of Millets: A Review." *Journal of Nutritional and Food Sciences*, vol. 4, no. 1, 2016.

Singh, Pardeep, et al. "Indian Millets Trade Potential-cum-Performance: Economic Perspective." *Indian Journal of Agricultural Sciences*, vol. 93, no. 2, 2023.

Takeshima, Hiroyuki, and Latha Nagarajan. "Minor Millets in Tamil Nadu, India: Local Market Participation, On-Farm Diversity and Farmer Welfare." *Environment and Development Economics*, vol. 17, no. 5, 2012, pp. 603-32.

Tiwari, Himanshu, et al. "Millets for Food and Nutritional Security for Small and Marginal Farmers of North West India in the Context of Climate Change: A Review." *International Journal of Plant and Soil Science*, vol. 34, no. 23, 2022, pp. 1694-1705.

Yamuna, N., et al. "Trend and Instability Analysis of Area, Production, Productivity of Millets in India." *Journal of Scientific Research and Reports*, vol. 30, no. 8, 2024, pp. 686-99.

Yes Bank and APEDA. *Indian Super Food Millets: A USD 2 Billion Export Opportunity*. 2022.

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