Journal of Experimental Agriculture International

Volume 46, Issue 10, Page 936-940, 2024; Article no.JEAI.112500
ISSN: 2457-0591
(Past name: American Journal of Experimental Agriculture, Past ISSN: 2231-0606)

The Millet Scenario in India during the Last Three Decades

K. Muthulakshmi [a*], R. A. Anshika [a], V. ArjunKumar [a], A.P. Mohana [a] and K.S. Meenatchi [a]

[a] Kalasalingam School of Agriculture and Horticulture, Kalasalingam Academy of Research and Education, Krishnan Koil, Virudhunagar, Tamil Nadu -626126, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/jeai/2024/v46i103020

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/112500

Original Research Article

Received: 28/01/2024
Accepted: 30/03/2024
Published: 04/11/2024

ABSTRACT

The nutrient rich millet crops are cultivated in marginal and poor soil as rainfed crop in India.Millets are rich in proteins, and minerals like Zinc, Iron and Phytochemicals, because of it rich nutrient status it's called as Nutri-cereals. The market demand on millets in increasing day by day. So, this study focussed on the growth performance and instability in area, production and productivity. This study considered the period from 1990 to 2021. The secondary data like area, production and productivity were collected from various publications like APEDA, Agriculture StatisticsHandbook and India Stat. Over the entire period the area, production and productivity showed a decreasing trend. The estimated CDVI (Cuddy-Della Valle Index) value revealed that the production of millets had high instability while the area had the lowest instability. Hence the government should create awareness among the farmers and consumers.

**Corresponding author: E-mail: muthulakshmi.k@klu.ac.in;*

Cite as: *Muthulakshmi, K., R. A. Anshika, V. ArjunKumar, A.P. Mohana, and K.S. Meenatchi. 2024. "The Millet Scenario in India During the Last Three Decades". Journal of Experimental Agriculture International 46 (10):936-40. https://doi.org/10.9734/jeai/2024/v46i103020.*

Keywords: Area; production; productivity; instability; growth rate.

1. INTRODUCTION

Millets have been an integral part of staplefood in the states of Odisha, Rajasthan, Madhya Pradesh, Jharkhand, Karnataka, and Uttarakhand and now it's getting popular in urban areas [1]. Millets are grown in about 131 countries, and it is a traditional food for around 60crore people in Asia and Africa [2]. India, Nigeria, and China are the largest millet producers in the world. India accounts for about 33-37 per cent [3] of total millet production. During the year 2022, India is known to have exported 1,69,049.11MT valued at Rs 608.12 crore (APEDA). The area under millet cultivation has decreased to 423 ha in 2021 from 2447 ha in 1990 [4-6]. Likewise, the production has also decreased from 375 tonnes in 2021 to 1190 tonnes in 1990 (Ref.). Major export destinations of millets include UAE, Saudi Arabia, Nepal, Bangladesh and Japan. The global area under millet cultivation has seen a decline of 25.7 per cent and it may be attributed to a lack of governmentpolicies and low farm profitability [2]. So, this study mainly estimates the growth performance and the variation in area of land cultivated for millet, production and productivity.

2. METHODOLOGY

The assessment of the growth rate in area, production, and productivity of millets in India utilized the compound annual growth rate. The formula applied in this study closely aligns with the one outlined by Muthulakshmi *et al.* [7] in their research paper.

$$Y_t = ab^t U_t \quad (1)$$

In conducting this analysis, annual time series data encompassing the years 1990–2021 were compiled from diverse published sources such as India Stat, Agricultural Statistics Handbook and APEDA. The ensuing description outlines the variables incorporated in formula (1).

Y_t = Area of land cultivated for millet(thousand hectares), Production (thousand tonnes) and Productivity (kg/ha)
a= Intercept
b= Regression coefficient
t = Time period (1990-2021)
U_t = Disturbance term

Subsequently, the recommended model was transformed into logarithmic form, as depicted below, and employed to ascertain the coefficients of selected study variables.

$$\ln Y_t = \ln a + t \ln b + \ln U_t \quad (2)$$

The Ordinary Least Squares (OLS) method was employed to compute estimates for the regression analysis. Subsequently, utilizing the provided formula, ascertain the calculated estimate (b) value for each variable utilized in deriving the compound annual growth rate (CAGR).

$$CAGR\ (r) = [Antilog\ (logb)-1] \times 100 \quad (3)$$

Where,
r = Compound growth rate in per cent
The t statistic was used to determine the standard error of growth rate and assess its significance.

$$t=bi/Se\ (bi) \quad (4)$$

Where,
bi= Regression coefficient
Se= Standard error of the regression coefficient

2.1 Instability Analysis

Using two distinct metrics of instability, such as the Coefficient of Variation and the Cuddy-Della Valle Index, the instability in the area, production, and productivity of millets was investigated (Rohini *et al*.,2022).

2.2 Coefficient of Variation

The simplest measure of instability, the coefficient of variation (C.V.), overestimates the degree of instability in time series data, which are distinguished by long-term trends. You can compute a CV in this way:

(C.V) = (Standard Deviation /Mean) * 100

2.3 Instability Index: Cuddy-Della Valle Index

The Cuddy-Delta Valle Index was used to analyse the instability in millets' areaof land cultivated for millet, production and productivity. The long-term trend's coefficient of variance is corrected by the Cuddy-Della Valle Index. As a result, it is a more accurate indicator of agricultural production instability. Reduced instability in area of land cultivated for millet, production and productivity is indicated by a low

value of this indicator, and vice versa. This is how the Cuddy-Della Valle Index fixes the CV:

Cuddy - Della Valle Instability Index (%) = CV√(1-R^2)
Where,
C.V. - Coefficient of Variation in per cent and
R^2 -The coefficient of determination (R^2) derived from a temporal trend regression was modified to account for its degrees of freedom.

2.4 The Ranges of CDVI are Given as Follows

Low instability = 0 to 15
Medium instability = 15 to 30
High instability = 30 and above

3. RESULTS AND DISCUSSION

A compound annual growth rate was examined,and Fig. 1 shows the trend in the area, production and productivity of millets for the period 1990-2021. From Table 1, we came to know that the growth rate of area and production were negative.

During the whole period of study(1990-2021), the compound annual growth rate of millets for the area and production wasdecreased due to urbanization, increased marginal cultivation and unconventional areas for fine cereals [8]. Likewise, productivity has increased to 2.12 due to the drought-tolerant nature of millet crops and the economic efficiency of millet cultivation [9 and 10]. From Table 2 it can be observed that the production and productivity showed a higher degree of variation during the study period 1990-91 to 2021-22. In the case of area, the variation was found less in millets. This study suggests encompassing some technologies to enhance productivity and reduce the variation in millet production and productivity [11-14].

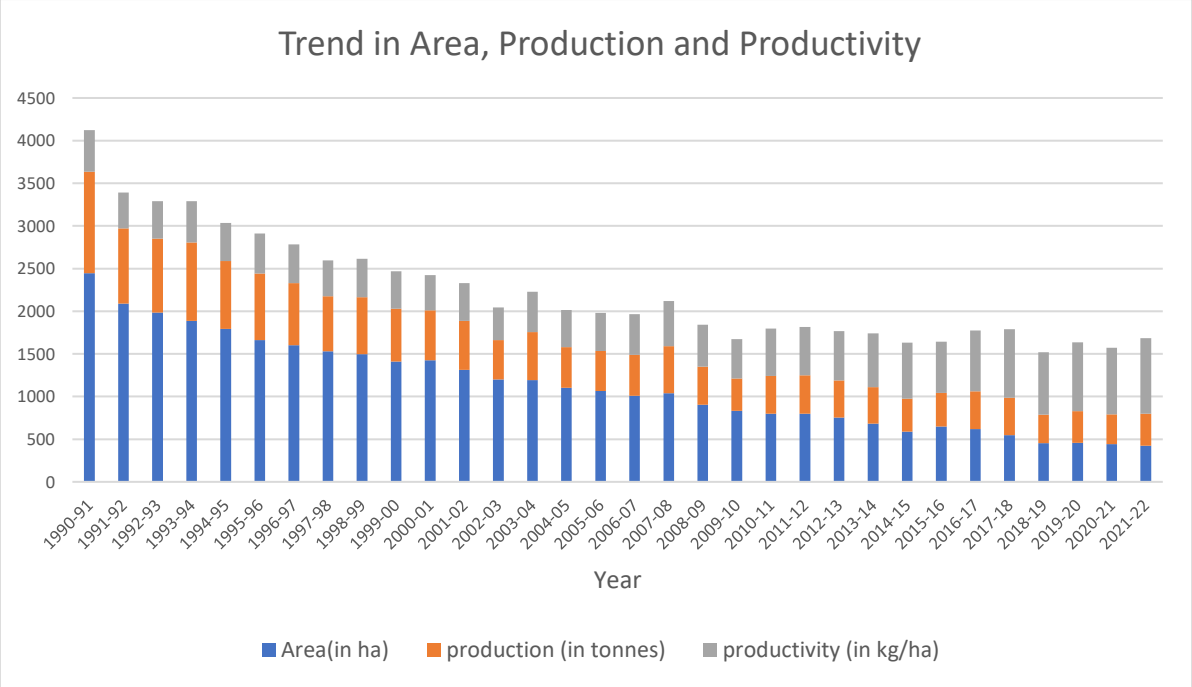

Fig. 1. Trend in the area, production, and productivity of millets for the period 1990-2021

Table 1. Compound annual growth rate of millets

Particulars	CAGR (Per cent) Period (1990-2021)
Area of land cultivated for millet	-5.19
Production	-3.17.
Productivity	2.12

Source: Authors calculation based on the data collected from the India stat (1990-2021)

Table 2. Instability analysis for area of land cultivated for millet, Production and Productivity of millets

Particulars	Area of land cultivated for millet	Production	Productivity
Mean	1130.96	560.46	542.56
Standard Deviation	542.66	202.31	137.68
Coefficient of variation	47.98	36.09	25.37
Adjusted R Square	0.95	0.78	0.69
CDVI	10.55	16.60	13.95

Source: Authors calculation based on the data collected from the India stat (1990-2021)

4. CONCLUSION

This study found that the milletarea and production have a negative growth rate however productivity has a positive growth rate. Instability analysis revealed the higher degree of variation for both production and productivity than the area of millets in India. Nowadays consumers areaware ofthe nutritional diet and millets plays a major role in the nutritional diet because of its high nutrients and minerals. Millets haveyet another advantagelike drought-resistant and adaptedtowards poor soils. Millets may be promoted by different extension activities among the small and marginal farmers to improve the area and production.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Uma Gowri M,Shivakumar K.M. Millet scenario in India. Economic Affairs. 2020;65(3):363-370.
2. FAO;2023. Available:https://www.drishtiias.com/daily-updates/daily-news-analysis/international-year-of-millets-2
3. Karuppasamy P. Overview on millets. Trends in Biosciences. 2015;8(13):3269-3273.
4. Bhat BV, Hariprasanna K, Ratnavathi CV. Global and Indian scenario of millets. Indian Farming. 2023;73(1): 16-8.
5. Hariprasanna K. Small millets in India: Current scenario and way forward. Indian Farming. 2023;73(1):38-41.
6. Sukumaran Sreekala AD, Anbukkani P, Singh A, Dayakar Rao B, Jha GK. Millet production and consumption in India: Where do we stand and where do we go? National Academy Science Letters. 2023 Feb;46(1):65-70.
7. Muthulakshmi KM, Thilagavathi, KM, Shivakuma, MR, Duraisamy M, Kavino, Uma Gowri M. Determination of growth and export performance of mango in India. Journal of Experimental Agriculture International. 2022;44(10):163-169.
8. Saraswathi R, Hameed RS. Value addition influenced in millet products. Austin Journal of Nutrition and Food Science (AJNFS). 2022;10(1):1161.
9. Vennila MA, Thangadurai R, Sivakumar C. Impact of millet value addition training in Dharmapuri District of Tamil Nadu. Journal of Krishi Vigyan. 2020;9(1):170-175.
10. Gangadharan S, Abhinav Pillai, Aravind S, Mavalluru Premsai, Vinupriya R. Growth performance of nutri-cereals in India. Journal of Experimental Agriculture International. 2023;45(12):197-200.
11. Dayakar Rao B, Bhaskarachary K, Arlene Christina GD, Sudha Devi G, Vilas AT, Tonapi A. Nutritional and health benefits of millet. ICAR-Indian Institute of Millets Research (IIMR) Rajendranagar, Hyderabad. 2017;112.
12. Abhik Patra, Singh RP, Kundu MS, Arnab Kundu, Sayon, Mukherjee. Millet production in India. Challenges and opportunities. Biotica Research Today. 2023;5(3):238-241.
13. Sharma BR, Rao KV, Vittal KPR, Ramakrishna YS, Amarasinghe U. Estimating the potential of rainfed

agriculture in India. Prospects for water productivity improvements. Agricultural Water Management. 2010;97(1):23-30.

14. India Stat; 2022. Available:https://www.indiastat.com/data/agriculture/small-millets

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/112500