

## **Growth and Instability in Area, Production, Productivity and Consumption of Millets in India: an Analysis**

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### **ABSTRACT**

Since the dawn of human civilization humans have depended on a large number of crops which are now being reduced to few only. Due to this growing dependency on few and fewer crops diversity of our food basket is also decreasing. Millets are very nutritious and healthy food which is gradually losing its area to commercial crops. Instability analysis by coefficient of variation (CV) and instability index suggested by Cuddy and Della revealed that over the years production and productivity of both pearl millet and finger millet showed higher degree of variation. Compound annual growth rates (CAGR) indicated that over time production and productivity of pearl millet has increased despite decrease in area under cultivation. In case of finger millet area under cultivation and production has declined and productivity has increased.

**Keywords:** Compound annual growth rate, coefficient of variation, instability index, millet.

### **INTRODUCTION**

Since the dawn of human civilization, humans have utilized as many as 40,000 to 100,000 plant species for their livelihood purpose, which has now come down to only few thousand plant species as reported by IPGRI (2002). There has been an increased dependency on few and fewer plant species for fulfilling the demand for food and nutrition. But the growing dependency on few plant species is posing a greater risk to our food and nutrition security as it limits the food basket of people, mainly for the people who belong to marginalized sections of society who have inadequate livelihood opportunities. Simplification of diets leading to a reduction in the diet diversification further makes the picture worse especially in regions where poverty and malnutrition remain at alarming levels. Millets are the ancient grains domesticated by men even before rice and wheat. During green revolution production of rice and wheat gained importance and gradually millets lost areas to rice, wheat and other commercial crops due to accessibility to irrigation, better inputs and high yielding varieties thus making commercial crops more profitable. Millets are

nutritionally superior over our staple cereals rice, wheat and maize, rich in micronutrients and thus gaining popularity in India as there is increasing incidence of malnutrition which can be mitigated by including millets in our regular diet. The present study thus aimed to understand the current trend in area, production, productivity and consumption of millets in India.

### **METHODOLOGY**

Status implies state or condition of something with respect to circumstances. Status of millet was measured in terms of area, production, productivity and consumption of selected millets over the years. Pearl millet and finger millet were selected for the present study as these are most widely cultivated millets in India in terms of area and production. Thus, secondary data concerning area, production, and productivity of pearl millet and finger millet was collected from the year 2000-01 to 2016-17. Secondary data was also collected for overall millet production and domestic consumption in India from 1959-60 to 2017-18.

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**Trend analysis:** The exponential growth function was used to estimate the growth rates of the selected economic variables and the model is

$$Y = ab^t e$$

Where,

Y= Dependent variable for which the rate of increase/decrease is estimated (area, production, productivity and consumption)

a= intercept

b= regression coefficient

t = time variable (2000-01 to 2016-17 and 1959-60 to 2017-18)

e= error term

The compound growth rate was obtained from the logarithmic form of the equation  $Y = ab^t e$  as below

In  $Y = \ln a + t \ln b$ , the percent compound growth rate (y) was derived using the relationship  $y = (\text{Anti ln of } b - 1) \times 100$

Instability analysis: The coefficient of variation was used as a measure to study the variability in the area, production, productivity and consumption of millets. The coefficient of variation (CV) was computed using the following formula.

$$CV = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

Linear trend was fitted to the original time series data on area, production and productivity for 2000-01 to 2016-17 and total production and consumption for 1959-60 to 2017-18.

In order to study the variability in the area, production and productivity of millets, an instability index suggested by Cuddy and Della (1978) was used:

$$CDVI = CV \times \sqrt{1 - R^2}$$

CV = Coefficient of variation

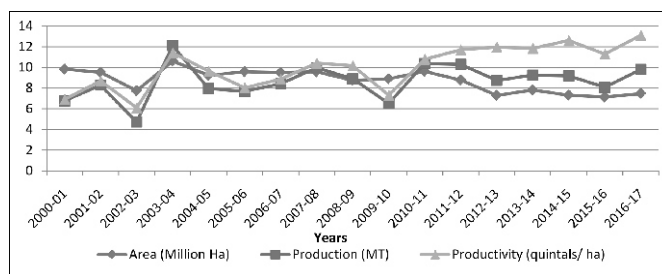
$R^2$  Adjusted coefficient of multiple determination

Coefficient of variation was multiplied by the square root of the difference between the unity and coefficient of multiple determinations ( $R^2$ ).

### RESULTS AND DISCUSSION

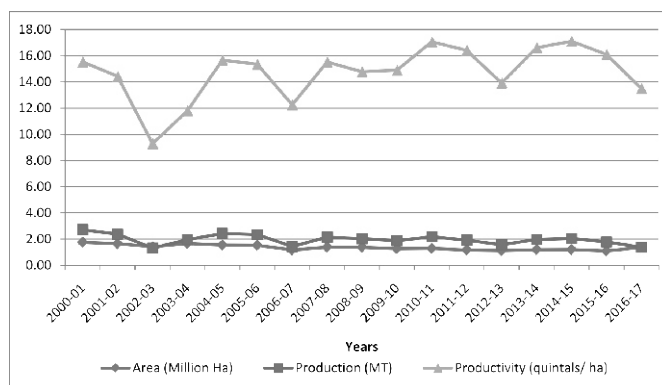
Figure 1 showed change in the total area under cultivation of pearl millet over the period of 2000-01 to

2016-17. The trend showed that over the years area under pearl millet cultivation has reduced from 9.83 million hectares to 7.47 million hectares. However, there increasing trend in the production pearl millet in India during the year 2000-01 to 2016-17. The total production of pearl millet was 6.76 million ton in 2000-01 which has increased to 9.8 million ton during 2013-6-17. The increase in production can be attributed to increase in productivity of pearl millet which has more than doubled from 6.9 quintals/hectare to 13.1 quintals/hectare in the face of reduction in area of cultivation during the period 2000-01 to 2016-17.



**Figure 1: Trends in area, production and productivity of pear millet in India (2000-01 to 2016-17)**  
Source: Directorate of Economics & Statistics, DAC & FW

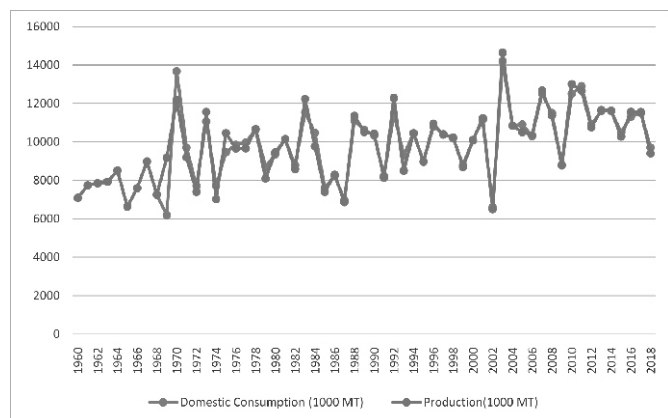
Figure 2 demonstrated the decreasing trend in area under finger millet cultivation from 1.76 million hectares during 2000-01 to 1.37 million hectares during 2016-17. At the same time productivity has also decreased from 15.5 quintal/hectare in 2000-01 to 13.5 quintal/hectare in 2016-17. As a result, total finger millet production at the same period has gone down from 2.73 million ton during 2000-01 to 1.39 million ton in the year 2016-17.



**Figure 2: Trends in area, production and productivity of finger millet in India (2000-01 to 2016-17)**  
Source: Directorate of Economics & Statistics, DAC & FW

Figure 3 showed the overall trend in total production and domestic consumption of millets in India during the period of 1960 to 2017. The overlapping of production and consumption lines indicates the consumption of substantial part the millets within the country itself.

Overall there has been an increasing trend in total production and consumption of millets.



**Trends in total production and total domestic consumption of millets in India (1960 to 2018)**

Source: Directorate of Economics & Statistics, DAC & FW

Compound annual growth rates (CAGR) for the area, production and productivity of pearl millet and finger millet and total production and consumption of millets was analysed using the exponential growth function. From Table 1 it can be observed that for pearl millet over the time area under cultivation has decreased, production and productivity, However, has increased and in case of finger millet, both area under cultivation and production has decreased but productivity has increased over the period of 2000-01 to 2016-17. The total millet production and domestic consumption both has increased over the period of 1960 to 2017. Compound annual growth rates (CAGR) for the area, production and productivity of pearl millet and finger millet was analysed using the exponential growth function. The compound annual growth rate analysis showed that in the case of pearl millet area of cultivation has decreased and production and productivity have increased over the period 2000-01 to 2016-17. In the case of finger millet, both areas under cultivation and production have decreased but productivity has increased over the period of 2000-01 to 2016-17.

**Table 1: Growth in area, production and productivity of pearl millet and finger millet during 2000-01 to 2016-17 and total production and domestic consumption of millets during 1960 to 2017 (in %)**

Crop	Parameter	CAGR
Pearl millet	Area	-1.78
	Production	1.65
	Productivity	3.37
Finger millet	Area	-2.25
	Production	-1.53
	Productivity	1.32
Millets	Total production	0.613
	Domestic consumption	0.637

From Table 2 it can be observed that pearl millet production and productivity showed higher degree of variation during the period (2000-01 to 2016-17). On the other hand, production of finger millet displayed higher degree of variation as compared to area and productivity during the period (2000-01 to 2016-17). The total production and domestic consumption of millets both exhibited high level of variation during the period 1960 to 2017. In case of area the variation was found less in pearl millet and in case of productivity the instability was found less in case of finger millet. In case of total millet production and domestic consumption, high degree of variation was observed. During the period 2000-01 to 2016-17, production of pearl millet and finger millet and the productivity of pearl millet displayed a higher degree of variation. The total production and domestic consumption of millets both exhibited a high level of variation during the period 1959-60 to 2017-18. Similar findings were reported by Bellundagi *et al.* (2016) and Mehta (2013).

**Table 2: Variations in area, production, and productivity of pearl millet and finger millet during 2000-01 to 2016-17 and total millet production and domestic consumption during 1960 to 2017 (In %)**

Crop	Parameter	CV	CDVI
Pearl millet	Area	11.92	8.51
	Production	19.22	18.68
	Productivity	20.22	13.34
Finger millet	Area	14.26	8.76
	Production	19.14	17.77
	Productivity	13.61	12.70
Millets	Total production	18.56	15.66
	Domestic consumption	18.37	15.30

The present study revealed that for pearl millet over the time area under cultivation has decreased, production and productivity however has increased and in case of finger millet, both area under cultivation and production has decreased but productivity has increased over the period, whereas the total millet production and domestic consumption both has increased over time. While studying instability of area, production, productivity and consumption it was found that pearl millet production and productivity showed higher degree of variation and production of finger millet displayed higher degree of variation as compared to area and productivity. In case of total millet production and domestic consumption, high degree of variation was observed.

The possible reason for decrease in area under millets cultivation can be attributed to many factors. During green revolution emphasis was given on cultivating high yielding varieties of cereals like rice and wheat which were input responsive. Being supplied with better

technologies, inputs and mechanization, wheat and rice showed significant increase in production and productivity. But the indigenous varieties of millets are not much input responsive and give less yield compared to improved varieties of wheat and rice. So, when farmers got access to fertilizers, agro-chemicals and high yielding varieties of wheat, rice and other commercial crops, millets were replaced by those more profitable crops. The findings of this study are in line with the findings of Nagaraj *et al.*, (2012).

Moreover, millets are generally grown by resource poor small and marginal farmers of our country and they are the main consumer of millets too. But over the years millets have been tagged as 'poor man's food' and 'inferior food' as compared to wheat and rice reasoning that they are consumed by poor people. Due to this stigmatization people with higher income have moved towards wheat and rice that has contributed to less demand of millets and, less and less area under cultivation which is consistent with the findings of Lentz, C. (1991).

### CONCLUSION

The study it was found that for pearl millet over the time area under cultivation has decreased, production and productivity however have increased and in case of finger millet, both area under cultivation and production has decreased but productivity has increased. The total millet production and domestic consumption both has increased over time. Instability analysis found higher degree of variation for both pearl millet and finger millet production and productivity.

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