



## Trends in Production and Comparison of Cost of Production and Minimum Support Price of Coarse Cereals

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**In the rainfed regions of the country coarse cereals form the staple diet of the majority of the poor. Keeping in view of the importance of coarse cereals, this study estimates the Compound Growth Rate (CGR) of area, production and productivity of major coarse cereals and analyzes the trends in cost of production of coarse cereals and the Minimum Support Price (MSP) announced by the Government. The study is based on time series data on area, production and productivity of coarse cereals (bajra, maize, ragi, jowar) from 1970-71 to 2007 - 08. The 38 years data were classified at decadal intervals and the decadal trends in area, production and productivity were analyzed through CGR. The data on cost of cultivation and MSP were collected from the reports of Commission on Agriculture Costs and Prices, Government of India and compared. The difference between MSP and cost of production was highest in ragi followed by cumbu, maize and Jowar.**

**Key words:** Coarse cereals, production trends, cost of production

In the rainfed regions of the country coarse cereals form the staple diet of the majority of the poor. Bajra, Jowar, and Ragi are largely consumed by the poor in Rajasthan, Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. Maize has become an important crop in recent years due to its uses in feed industry and its industrial applications. These crops are drought resistant and relatively resistant to common pests and diseases, and less prone to production risk. Small and marginal farmers show preference towards these crops. The resource requirement for these crops is also low and need a minimum cash component in their total cost of cultivation. These crops provide nutrients at lowest cost compared to rice and wheat and form an important component of livestock feed.

At all India level Rajasthan accounted for 42 percent of the bajra production in 2007-08. The other major bajra producing states are Uttar Pradesh (13 percent), Gujarat (13 percent), Haryana (12 percent) and Maharashtra (11 percent). Tamil Nadu was in 8th position in bajra production and ranks third in Productivity with 1635kg per ha in 2007-08 in India. All India bajra Production was 9.97mt from 9.57mha in 2007-08. Major maize producing States in India were Andhra Pradesh (19 per cent), Karnataka (17 per cent), Rajasthan (10 per cent) and Maharashtra(9 per cent) during 2007-08. Tamil Nadu ranked 9th in maize Production, accounting only 4 percent of all India production. Tamil Nadu recorded second position in maize Productivity with 3627 kg per ha in 2007-08. All India maize production was 18.96 m.t from an area of 8.12 m.ha in 2007-08.

The major ragi producing states were Uttaranchal (8.32 per cent), TamilNadu (8.17 per cent), Maharashtra (5.76 per cent) and Andhra Pradesh (3.21 per cent) in India in 2007-08. Tamil Nadu recorded the highest yield in India with 1897 kg per ha. All India production of ragi was 2.2mt from an area of 1.4m ha in 2007-08. Maharashtra (50.44 per cent), Karnataka (22.95 per cent), Madhya Pradesh (7.44 per cent) and Andhra Pradesh (5.93 per cent) were the major jowar producing States. All India production of jowar was 7.93mt from 7.76 m. ha of cultivated area in 2007-08. Tamil Nadu ranked 6<sup>th</sup> in production and productivity in India during 2007-08. The major districts of coarse cereal production in Tamil Nadu are given in Table 1.

Keeping in view of the importance of coarse cereals this study estimates the Compound Growth Rate (CGR) of area, production and productivity of major coarse cereals and analyzes the cost of production of coarse cereals and the Minimum Support Price (MSP) announced by the Government.

### Materials and Methods

The present study is based on secondary data for the last 38 years, from 1970-2008. Time series data (1970-71 to 2007-08) on area, production and productivity of coarse cereals (bajra, maize, ragi, jowar) were collected from Agriculture Statistics at a Glance 2009 and the Season and Crop Report of Tamil Nadu. The 38 years data was classified at decadal intervals, namely 1970-71 to 1979-80 (I Period), 1980-81 to 1989-90 (II Period), 1990-91 to 1999-2000 (III Period) , 2000-01 to 2007-2008 (IV Period) and 1970-71 to 2007-2008 (Over all period)

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**Table 1. Major coarse cereal producing districts in Tamil Nadu**

Districts	Production in tonnes (average of triennium ending 2007-08)	Per cent to State total
<b>Cumbu</b>		
Thoothukudi	28302	30
Villupuram	13245	14
Virudhunagar	11162	12
Madurai	6662	7
Theni	5799	6
<b>Maize</b>		
Dindugul	122493	20
Coimbatore	84562	14
Perambalur	82950	14
Erode	70267	12
Virudhunagar	51717	9
Theni	35039	6
<b>Ragi</b>		
Krishnagiri	65930	43
Dharmapuri	35006	23
Salem	17162	11
Vellore	13761	9
Erode	9114	6
<b>Sorghum</b>		
Dindugul	44003	17
Coimbatore	41170	16
Theni	28039	11
Dharmapuri	19823	8
Namakkal	19611	8
Trichy	16196	6

and the decadal trends in area, production and productivity were analyzed. The data on Cost of Cultivation and Minimum Support Price were collected from the reports of Commission on Agriculture Costs and Prices (CACP), Government of India. The decadal trends in area, production and productivity were studied through Compound Growth Rate (CGR) following Hemant Kumar and Purushottam (2009), Sonia and Sexana (2009) and Mohammad Taher and Ahmadi Shadmeri (2008). CGR was estimated by fitting the following exponential model:

$$Y = a b^t \text{ ----- (1)}$$

Where,

y = Production/area/yield

t = Time in year

a and b = Parameters to be estimated

The equation (1) in log form is written as:

$$\ln Y = \ln a + t \cdot \ln b \text{ ----- (2)}$$

Compound Growth Rate (CGR) was then calculated as:

$$\text{CGR (per cent)} = [\text{antilog}(\ln b) - 1] \times 100$$

The above mentioned equation was estimated through OLS method and the significance of b was tested with t-test.

## Results and Discussion

### i) Bajra

Bajra or pearl millet is an important crop of rainfed areas. Grain is comparatively high in protein and has a good amino acid balance. It contains twice as much methionine than sorghum, an important trait for organic poultry production. The grain is used to feed livestock such as cattle and pigs. The stalks are used as building material, fuel and livestock feed. The grain has the potential as a feedstock for ethanol production. The results of the analysis presented in Table 2 reveals that in India the area under bajra declined at the rate of 0.81 per cent per annum in the period from 1970-71 to 2007-2008. But the production of bajra registered significant positive growth in the same period due to growth in productivity at the rate of 2.23 per cent per annum.

**Table 2. Trends in bajra Production** (in per cent)

Time Period	Area	Production	Productivity
India			
1970-71 to 1979-1980	-1.85	-3.18	-1.36
1980-81 to 1989-1990	-1.05	0.02	1.07
1990-91 to 1999-2000	-1.46	0.95	2.45
2000-01 to 2007-2008	0.36	4.68	4.30
1970-71 to 2007-2008	-0.81	1.40***	2.23***
Tamil Nadu			
1970-71 to 1979-1980	-1.35	4.46*	5.82**
1980-81 to 1989-1990	-2.46	1.57	4.61***
1990-91 to 1999-2000	-6.19	-3.53	2.88*
2000-01 to 2007-2008	-11.02	-8.14	3.24
1970-71 to 2007-2008	-4.76	-2.95	1.91

\*\*\*, \*\* and\*, significant at 1,5and 10 percent level of significance

In Tamil Nadu the rate of decline in area under bajra was more than the decline in India. Despite the increase in productivity by 1.91 percent, the production of bajra declined at the rate of 2.95 per cent.

### ii) Maize

Maize is an important cereal in many developed and developing countries. It has multiple uses but it is chiefly grown for human and livestock consumption. It has also got number of industrial uses such as in plastics, glues, adhesives, rayon, resin, fermentable sugars, solvents, liquid fuels, pulp, paper and hard boards, corn sweeteners etc. The data on the trend in maize production given in Table 3 show that there is significant positive growth in the area, production and productivity of maize both in Tamil Nadu and India unlike in other coarse cereals. In India in the last four decades the annual compound growth of maize was 0.67 percent in area, 2.82 per cent in production and 2.15 per cent in yield. Similarly in Tamil Nadu the annual compound

growth rate was 6.32 percent in area, 9.47 per cent in production and 2.00 per cent in yield. Thus in Tamil Nadu the growth in the production of maize was substantial, particularly during the period 2000-01 to 2007-2008.

**Table 3. Trends in maize production** (in per cent)

Time Period	Area	Production	Productivity
India			
1970-71 to 1979-1980	-0.13	-0.63	-0.51
1980-81 to 1989-1990	-0.18	1.92	2.10
1990-91 to 1999-2000	0.94***	3.29***	2.26
2000-01 to 2007-2008	3.34***	5.68***	2.25
1970-71 to 2007-2008	0.67***	2.82***	2.15***
Tamil Nadu			
1970-71 to 1979-1980	7.60	5.38*	0.08
1980-81 to 1989-1990	6*	7.19**	1.09
1990-91 to 1999-2000	10.22***	10.04***	0.09
2000-01 to 2007-2008	17.90***	30.63***	10.87
1970-71 to 2007-2008	6.32***	9.47***	2.00***

\*\*\*, \*\* and\*, significant at 1,5and 10 percent level of significance

### iii) Ragi

Ragi or finger millet is one of the nutritious cereals, rich in calcium and other minerals. The ragi production declined at an annual rate of 0.42 per cent in India and 2.13 per cent in Tamil Nadu due to decline in area under cultivation of ragi. Productivity of ragi registered significant positive growth with an increase of 1.39 per cent in India and 1.14 per cent in Tamil Nadu in the period 1970-71 to 2007-2008.

**Table 4. Trends in ragi production** (in per cent)

Time Period	Area	Production	Productivity
India			
1970-71 to 1979-1980	1.26***	4.27***	2.99*
1980-81 to 1989-1990	-1.18	-0.07	1.09
1990-91 to 1999-2000	-2.85	-0.80	2.10**
2000-01 to 2007-2008	-3.71	-2.61	1.16
1970-71 to 2007-2008	-1.78	-0.42	1.39***
Tamil Nadu			
1970-71 to 1979-1980	-0.43	3*	3.42***
1980-81 to 1989-1990	-2.20	1.49	4.08***
1990-91 to 1999-2000	-4.68	-4.46	0.25
2000-01 to 2007-2008	-4.32	-6.14	-1.94
1970-71 to 2007-2008	-3.23	-2.13	1.14***

\*\*\*, \*\* and\*, significant at 1,5and 10 percent level of significance

### iv) Jowar

Jowar or sorghum is a popular cereal among the low income people in dryland areas. Like other cereals, sorghum is predominantly starchy and rich in iron and Phosphorus. Sorghum is predominantly cultivated with limited input under conditions of sparse rainfall and low soil fertility. It is also used for cattle feed, bio fuel, for making baked products like breads, cakes, cookies etc. The pattern of growth in the area, production and productivity of jowar is furnished in Table. 5. The area under jowar declined consistently in the last few decades both in India

and Tamil Nadu. The total production of jowar has declined 0.79 per cent in India and 2.52 per cent in Tamil Nadu. The productivity increased by 1.33 per cent per annum since 1970-71 in India but the increase in productivity was marginal in Tamil Nadu.

**Table 5. Trends in jowar production** (in per cent)

Time Period	Area	Production	Productivity
India			
1970-71 to 1979-1980	-0.34	5.67***	6.05***
1980-81 to 1989-1990	-1.00	0.28	1.29
1990-91 to 1999-2000	-3.54	-3.07	0.48
2000-01 to 2007-2008	-3.10	0.31	3.70**
1970-71 to 2007-2008	-2.08	-0.79	1.33***
Tamil Nadu			
1970-71 to 1979-1980	0.63	4.31***	3.64***
1980-81 to 1989-1990	-0.98	4.84**	5.85***
1990-91 to 1999-2000	-4.93	-5.61	-0.73
2000-01 to 2007-2008	-1.83	-0.10	0.42
1970-71 to 2007-2008	-2.78	-2.52	0.24

\*\*\*, \*\* and\*, significant at 1,5and 10 percent level of significance

### Cost of Production and Minimum Support Price

Cost of production was for various crops were published by the Commission for Agricultural Costs and Prices (CACP). In the CACP methodology, Cost A1 includes value of human, bullock and machine labour, seeds, insecticides and pesticides, manure, fertilizers, depreciation of implements & machinery, irrigation charges, land revenue, interest on working capital and miscellaneous expenses. Cost A<sub>2</sub> includes cost A1+ rent paid for leased in-land.

**Table 6. Cost of Production and Minimum Support Price (2008-09)**

<b>Cumbu</b>	
Gross income in Rs per ha	24922
Cost of cultivation in Rs per ha (cost A2)	13697
Net income Rs per ha	11225
Cost of Production in Rs per quintal	420
Minimum Support Price(MSP) in Rs per quintal	840
MSP minus Cost of Production	420
<b>Maize</b>	
Gross income in Rs per ha	31808
Cost of cultivation in Rs per ha (cost C2)	22059
Net income in Rs per ha	9749
Cost of Production in Rs per quintal	630
Minimum Support Price(MSP) in Rs per quintal	840
MSP minus Cost of Production	210
<b>Jowar</b>	
Gross income in Rs per ha	13403
Cost of cultivation in Rs per ha (cost A2)	12553
Net income in Rs per ha	850
Cost of Production in Rs per quintal	679
Minimum Support Price(MSP) in Rs per quintal	840
MSP minus Cost of Production	161
<b>Ragi*</b>	
Gross income in Rs per ha	17789
Cost of cultivation in Rs per ha (cost A2)	10478
Net income in Rs per ha	7311
Cost of Production in Rs per quintal	281
Minimum Support Price(MSP) in Rs per quintal	540
MSP minus Cost of Production	259

\*Data on ragi relates to 2006-07; Data source: CACP, Ministry of Agriculture, GOI and [agricoop.nic.in/price.htm](http://agricoop.nic.in/price.htm)

Assurance of a remunerative and stable price environment is considered very important for increasing agricultural production and productivity since the market place for agricultural produce tends to be inherently unstable, which often inflict undue losses on the growers, even when they adopt the best available technology package and produce efficiently. Towards this end, minimum support prices (MSP) for major agricultural products are fixed by the government, each year, after taking into account the recommendations of the Commission for Agricultural Costs and Prices.

Cost of production and MSP of cereals are given in Table. 6. In cumbu cost of production per quintal was Rs. 420 while the MSP was Rs. 840. In Maize the difference between cost of production and maize was only Rs. 210 per quintal. In the case of Jowar and ragi the difference between cost of production and MSP was Rs 161 and Rs. 540 per quintal respectively.

### Conclusion

The results of the analysis revealed that in India the area under *bajra* declined in the period from 1970-71 to 2007-2008. But the production of bajra

registered significant positive growth in the same period due to growth in productivity. There is significant positive growth in the area, production and productivity of maize both in Tamil Nadu and India unlike in other coarse cereals. The ragi production declined in India and in Tamil Nadu due to decline in area under cultivation of ragi. Productivity of ragi registered significant positive growth in India and in Tamil Nadu in the period of study. The area under *jowar* declined consistently in the last few decades both in India and Tamil Nadu. The difference between MSP and cost of production was the highest in ragi followed by cumbu, maize and Jowar.

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