

Performance of major cereals in Marathwada region

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ABSTRACT

The study was conducted in districts of Marathwada region to see the performance of major cereals in respect of area, production and productivity. Major cereal crops *viz.*, *Kharif* sorghum, pearl millet, wheat and *Rabi* sorghum and total cereals were selected for study. Time series data for the period from 1985-86 to 2004-05, regarding area, production and productivity were collected from *Epitoma of Agriculture*, published by Government of Maharashtra. The compound growth rate was worked out by fitting exponential trend equation and significance was tested with help of correlation coefficient by using 't' test. The results of study revealed that majority of districts showed decline in area under *Kharif* sorghum, *Rabi* sorghum and total cereals, whereas the area and production increased in case of pearl millet and wheat during the study period. Stagnation in productivity of *Kharif* sorghum was observed during the study period while productivity of pearl millet, wheat and total cereals raised in region and State.

INTRODUCTION

Importance of foodgrains in world economy is being recognized and there is urgent need to raise foodgrains production, in view of large gap between demand and supply of foodgrains. The foodgrains comprise cereals and pulses. Among cereals rice, wheat, maize and the coarse grains like sorghum, pearl millet, barley etc. are the major crops. Cereals form an important ingredient in the vegetarian diet and they are also rich source of energy, minerals and contain vitamins. The major cereals growing States in India are Tamil Nadu, West Bengal, Punjab, Uttar Pradesh, Maharashtra, and Madhya Pradesh. Karnataka, Rajasthan and Bihar, which together account for 70 per cent of area under total cereals crops.

Maharashtra is the largest producing State of coarse cereals with 19.35 per cent share of production to all India level. During 2006-07, the area, production and yield of cereals recorded up to 9.56 million ha., 10.47 millions tonnes and 1095 kg/ha, respectively. Nearly one third area of the State falls under rainshadow region, where rain is scanty and erratic. The productivity level in the State are much below the national average. In spite of huge investment in irrigation sector, the area under irrigation and production has practically remained at low level. Keeping in view the above importance the present study has been under taken to study the performance of major

foodgrains in respect of area, production and productivity.

METHODOLOGY

For study purpose, the major cereal crops *viz.*, sorghum, pearl millet, wheat and *Rabi* sorghum and total cereals were selected. All the eight districts of Marathwada region *viz.*, Aurangabad, Jalna, Latur, Osmanabad, Parbhani and Hingoli, Nanded and Beed were selected purposively. The time series data on area, production and productivity were collected from *Epitoma of Agriculture*, published by Government of Maharashtra for the period of 20 years *i.e.* from 1985-86 to 2004-05. For accessing performance of major cereals in respect of area, production and productivity, exponential trend equation was fitted and the compound growth rate was worked out:

$$\hat{N} = ab^t$$

where

\hat{N} = estimated area/production / productivity

a = constant

b = regression coefficient

t = time variable in year

After transforming into a linear form by taking logarithms.

$$\log y = \log a + t \log b$$

on writing $A = \log a$ $B = \log b$ and $Y = \log y$ this becomes

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$$Y = A + Bt$$

Annual per cent compound growth rate (CGR) was obtained by following formula:

$$\text{CGR} = (\text{anti log } b' - 1) * 100$$

The significance of linear and compound growth rate was tested with the help of correlation coefficient (r) by using 't' test:

$$t \geq \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

RESULTS AND DISCUSSION

Table 1 reveals that the area under *Kharif* sorghum was declined during the study period in all the districts, regions and State. The highest negative annual compound growth rate was recorded in Jalna (-6.57 per cent) followed by Aurangabad (-5.66 per cent) and Beed (-3.63 per cent). The decline in area under *Kharif* sorghum might be attributable to price consciousness of farmers and switching over to more remunerative crops.

In case of pearl millet annual compound growth rate was positive and significant in Osmanabad (4.91 per cent), Beed (1.37 per cent) and Jalna (1.32 per cent) districts implied that the area under pearl millet increased in these districts (Table 1). The highest negative annual compound growth was recorded in Nanded (-4.20 per cent) followed by Latur (-2.29 per cent) and Aurangabad district (-1.82 per cent). Pearl millet is one of the best dry land crops which can be grown on less rainfall. Osmanabad, Jalna and Beed districts receive less rainfall (< 750 mm) and are in scarcity zone. So, the climatic conditions in these districts are suitable for pearl millet which causes increase in area under pearl millet. While Aurangabad, Nanded

and Latur districts receive high rainfall (750 to 900 mm), so there is large scope to cultivate commercial crops, other than pearl millet. The present results are in the line with the findings of Doshi and Dange (1997), Shah (2003) and Swin and Bhakar (2006).

From Table 1, it is observed that the majority of districts showed increasing trend in area under wheat during study period except Jalna district. The significant annual positive compound growth rates varied between 1.97 per cent in Nanded district to 2.78 per cent in Latur district. The increase in area under wheat in majority of districts is due to shift in area from the coarse cereals and pulses to the wheat and availability of assured irrigation facility. The results are in conformity with those obtained by Bhatnagar and Nandal (1994) and Kumar *et al.* (2007).

Table 1 further depicts that the area under *Rabi* sorghum showed declining trend in Aurangabad (-2.05 per cent), Latur (-2.41 per cent) and Nanded district (-1.29 per cent) and also in the State (-0.79 per cent) while Osmanabad district recorded significant positive annual compound growth rate (2.47 per cent). The area of total cereal crops declined in majority of districts except Osmanabad. Significant negative annual growth rate was recorded in Aurangabad (-0.90 per cent), Latur (-1.31 per cent), Nanded (-1.89 per cent) and Parbhani district (-1.04 per cent) and also in Marathwada region (-0.48 per cent). The decline in area under total cereals attributed to significant decline in area under *Kharif* sorghum, *Rabi* sorghum and pearl millet and the area shifted from cereal crops to pulses and commercial crops. The present results are in the line with the findings of Ashturkar *et al.* (1992) and Shah (2003).

From Table 2 it is observed that the annual compound growth rate of production of *Kharif* sorghum was negative and significant only in Aurangabad (-3.52

Table 1 : District wise area trends of major cereals in Marathwada region (1985-86 to 2004-05)

District/ Crops	<i>Kharif</i> Sorghum		Pearl Millet		Wheat		<i>Rabi</i> Sorghum		Total Cereals	
	r	CGR	r	CGR	r	CGR	r	CGR	r	CGR
Aurangabad	-0.93**	-5.66	-0.77**	-1.82	0.21	0.89	0.57**	-2.05	-0.52*	-0.90
Jalna	-0.93**	-6.57	0.52*	1.32	-0.56**	-2.23	0.34	0.34	0.32	0.33
Beed	-0.94**	-3.63	0.64**	1.37	0.46*	2.01	0.08	0.14	-0.08	-0.09
Latur	-0.78**	-1.53	-0.77**	-2.29	0.63**	2.78	-0.63**	-2.41	-0.81**	-1.31
Osmanabad	-0.77**	-1.87	0.90**	4.91	0.47*	2.19	0.81**	2.47	0.78	1.39
Nanded	-0.95**	-2.47	-0.48*	-4.20	0.55*	1.97	0.57**	-1.29	-0.94**	-1.89
Parbhani & Hingoli	-0.67**	-2.23	-0.37	-0.79	0.16	0.77	-0.09	-0.14	-0.56**	-1.04
Marathwada Region	-0.91**	-2.66	0.12	0.17	0.32	1.06	0.01	-0.03	-0.51*	-0.48
Maharashtra	-0.95**	-3.37	-0.64**	-1.09	-0.03	-0.08	0.53*	-0.79	-0.22	-3.62

* and ** indicate significance of values at P=0.05 and 0.01, respectively

CGR – Compound Growth Rate

Table 2: District wise production trends of major cereals in Marathwada region (1985-86 to 2004-05)

District/ Crops	Kharif sorghum		Pearl millet		Wheat		Rabi sorghum		Total cereals	
	r	CGR	r	CGR	r	CGR	r	CGR	r	CGR
Aurangabad	-0.52**	-3.52	0.28	1.49	0.41	2.79	-0.06	-3.92	0.51*	2.51
Jalna	-0.62*	-4.85	0.62*	4.94	0.33	1.92	0.55*	2.52	0.64**	2.99
Beed	-0.06	-0.43	0.46**	3.31	0.42	2.98	0.03	0.20	0.18	9.16
Latur	0.18	1.18	0.19	1.27	0.41	2.68	-0.24	-1.70	0.17	0.98
Osmanabad	0.27	2.79	0.41	3.16	0.29	2.50	0.36	2.40	0.15	9.66
Nanded	0.08	0.59	-0.16	-1.86	0.79**	4.88	0.59**	2.39	0.03	1.83
Parbhani and Hingoli	0.01	0.72	0.38	2.06	0.37	3.88	0.09	0.37	0.09	0.43
Marathwada Region	0.04	0.25	0.47**	2.88	0.49*	2.87	0.20	1.21	0.26	1.95
Maharashtra	-0.41	-17.84	0.21	1.18	-0.05	-0.08	-0.04	-0.17	0.04	0.13

* and ** indicate significance of values at P=0.05 and 0.01, respectively

CGR – Compound Growth Rate

per cent) and Jalna district (-4.85 per cent). The rest of districts and region recorded non-significant growth rates indicating the stagnation in production of *Kharif* sorghum during the study period. Decline in production in Aurangabad and Jalna districts attributed to decline in area under *Kharif* sorghum.

Production of pearl millet showed significant positive annual compound growth rates in Jalna (4.94 per cent), Beed (3.31 per cent) and Marathwada region (2.88 per cent). This increase in production was due to increase in productivity in Jalna and Beed districts. Rest of districts recorded non-significant positive growth in production of pearl millet. Similar results were reported by Dosi and Dange (1997), Shah (2003) and Swin and Bhakar (2006).

The annual production growth rate of wheat (Table 2) was found positive and significant only in Nanded district (4.88 per cent) and in Marathwada region (2.87 per cent). The increase in production of wheat was attributed to rise in productivity in Nanded district. The rest of districts showed non-significant positive growth in production of wheat which implied the stagnation in production. Similar results were obtained by Bhatnagar and Nandal (1994) and Kumar *et al.* (2007).

Table 2 further shows that among the districts, significant positive annual compound growth rates of production of *Rabi* sorghum was recorded in Jalna (2.52 per cent) and Nanded (2.39 per cent) whereas rest of districts and region observed non-significant positive growth rates, except Aurangabad and Latur districts. The increase in production in Jalna and Nanded districts attributed to increase in productivity of *Rabi* sorghum. Similar results were observed by Doshi and Dange (1997). All the districts, region and state found positive growth in production of total cereals but significant positive growth registered in Aurangabad (2.51 per cent) and Jalna (2.99

per cent) districts. The growth in these districts attributed to significant growth in productivity to total cereals.

Table 3 reveals that, all the districts, region and state recorded non significant positive growth rates of *Kharif* sorghum which implied that there was stagnation of productivity of this crop. *Kharif* sorghum is a dry land crop and depends up on rainfall. Majority of districts in Marathwada region are the dry farming districts and receives inadequate rainfall which causes stagnation in productivity of *Kharif* sorghum. In case of pearl millet productivity, significant annual positive compound growth rates was recorded in Aurangabad (3.29 per cent), Jalna (3.19 per cent), Parbhani (2.65 per cent) districts and also in the State (2.61 per cent) while the rest of districts recorded non-significant positive growth in productivity of pearl millet. The increase in productivity of pearl millet attributed to improvement in production technology and also use of HYV's of crop. The results are in conformity with those obtained by Shah (2003) and Swin and Bhakar (2006).

The annual growth rates of productivity of wheat (Table 3) were significant and positive in Aurangabad (2.43 per cent), Jalna (3.96 per cent), Nanded (2.73 per cent), Parbhani district (2.09 per cent) and Marathwada region (2.47 per cent) and also in the State (2.06 per cent) while rest of the districts recorded non-significant positive growth. The significant growth in yield can be attributed to the introduction of new dwarf high yielding varieties with use of the associated complementary inputs, particularly fertilizers and irrigation. Similar results were also found by Kumar *et al.* (2007).

The productivity of *Rabi* sorghum recorded significant annual compound growth rate in Jalna (1.98 per cent) and Nanded district (3.28 per cent). The rest of districts recorded non-significant positive growth in

Table 3: Districtwise productivity trends of major cereals in Marathwada region (1985-86 to 2004-05).

District/ Crops	Kharif sorghum		Pearl millet		Wheat		Rabi sorghum		Total cereals	
	r	CGR	r	CGR	r	CGR	R	CGR	r	CGR
Aurangabad	0.37	1.62	0.61**	3.29	0.58**	2.43	0.24	1.19	0.73**	5.51
Jalna	0.28	1.74	0.59**	3.19	0.66**	3.96	0.53*	1.98	0.70**	2.82
Beed	0.21	1.24	0.42	2.49	0.26	1.19	0.07	0.32	0.22	1.05
Latur	0.40	2.45	0.34	2.26	0.11	0.55	-0.06	-0.25	0.36	2.04
Osmanabad	0.22	1.73	-0.16	-1.03	0.12	0.72	0.11	0.66	0.28	1.43
Nanded	0.38	2.08	0.14	0.94	0.64**	2.73	0.72**	3.28	0.52*	3.24
Parbhani and Hingoli	0.41	2.04	0.53*	2.65	0.46*	2.09	0.13	0.50	0.29	1.14
Marathwada Region	0.42	2.01	0.38	1.72	0.57**	2.47	0.39	1.59	0.67**	3.25
Maharashtra	0.32	1.13	0.56**	2.61	0.64**	2.06	-0.07	-0.28	0.43*	1.15

* and ** indicate significance of values at P=0.05 and 0.01, respectively

CGR – Compound Growth Rate

productivity of *Rabi* sorghum except Latur district which implied that the growth in productivity was not satisfactory during the study period. The present results are in the line with the findings of Pawar (2002). Such stagnation occurred because *Rabi* sorghum is mostly cultivated in rainfed area and its production depends largely on distribution of rainfall and the moisture precipitation available at the time of sowing.

The annual growth rate of productivity of total cereals (Table 3) was significant and positive in Aurangabad (5.51 per cent), Jalna (2.82 per cent) and Nanded district (3.24 per cent) and also in the region (3.25 per cent) and State (1.15 per cent) which implied that the productivity of total cereals increased during the study period. The significant growth in productivity may be obtained due to the use of HYV's, better agronomical practices, use of optimum doses of fertilizers. The results are in the line with the findings of Kalamkar (2003).

Conclusion:

– During the courses of investigation, it was observed that the area under *Kharif* sorghum declined significantly in all the districts of region where as the production was declined in Aurangabad and Jalna districts. The area and production of pearl millet increased significantly in Jalna, Beed and Osmanabad district along with region while productivity raised significantly in Aurangabad, Jalna Beed and Parbhani districts and in the State.

– Area under wheat increased in Beed, Latur, Osmanabad and Nanded district whereas production raised in Aurangabad, Beed, Nanded districts and in the region. The productivity of wheat raised significantly in all the districts except Beed, Latur and Osmanabad. Significant growth in area under *Rabi* sorgham recorded only in Osmanabad district while growth in production

and productivity of *Rabi* sorghum recorded in Jalna and Nanded districts.

– Area under total cereals declined significantly in Aurangabad, Latur, Nanded and Parbhani districts and in the region where as production of total cereals raised in Aurangabad and Jalna districts. The productivity of total cereals raised significantly in Aurangabad, Jalna, Nanded districts, in the region and State.

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