



Research Paper

# Performance of wheat crop in Maharashtra

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**ABSTRACT:** In a predominantly agriculture economy, the overall level of economic growth depends to greater extent, on the rate of growth in agriculture. The large increase in the production of foodgrain was realized after mid sixties commonly described as effect of "Green Revolution. Results in all time high foodgrain production record of 255 million tonnes in 2012-13 as against 50 million tonnes in 1950-51. Among the major cereals, wheat contributes 17 per cent to total cereal production. Maharashtra ranks 8<sup>th</sup> in wheat production in India with 1.31 million tones production which is only 1.39 per cent of Indias wheat production. For food security, production of serials is much important than the production of cash crops hence, there is a need to increase the production of serials. An attempt has been made in this study to find out the changes and trends in area production and productivity of wheat in Maharashtra. In all 53 years data has been collected for present study form the year 1960-63 to 2010-13. The area under wheat in Maharashtra had slightly declined from 8.98 lakh hectares to 8.43 lakh hectares, the production of wheat in the state had increased by 208.75 per cent during entire study period. The highest increase in the production was noticed in Western Maharashtra region (294.51%) followed by Marathwada (222.26%) and Vidarbha (127.42%), respectively. The productivity of wheat in the state had increased by 228 per cent during the period of 53 years. The highest increase in the productivity was noticed in Western Maharashtra (239.34%) followed by Marathwada (225.57%) and Vidarbha (217.23%), respectively. The area under wheat in the state decreased significantly at the rate of 0.36 per cent per annum while production and productivity increased significantly at the rate of 2.84 and 3.21 per cent per annum. It implied that the production of wheat in the state had been increased mainly due to increase in productivity. The productivity of wheat though has increased; the proportionate area under wheat did not increase in the State. The efforts need to be made to increase the area under wheat. This can be done by making available the irrigation water either from existing cropping pattern or by increasing its potential. Lack of knowledge, high cost of seed, non-availability of proper seed and fertilizers, fear of poor germination were the major constraints in adoption of wheat production technology.

**KEY WORDS :** Performance, Wheat crop

**Paper History :**

**Received :** 04.11.2014;

**Revised :** 29.01.2015;

**Accepted :** 16.02.2015

**HOW TO CITE THIS PAPER :** Joshi, G.G., Dorge, J.T. and Sanap, D.J. (2015). Performance of wheat crop in Maharashtra. *Internat. Res. J. Agric. Eco. & Stat.*, 6 (1) : 145-149.

## INTRODUCTION :

The new technology yielded results in the form of augmented agricultural production, with the increased area under irrigation, the intensity of cropping and the area coverage of high yielding variety of selected crops have steadily increased. As a result, the production of wheat in the country has increased significantly from 75.81 million MT in 2006-07 to an all time record high of 94.88 million MT in 2011-12. The productivity of wheat which was 2602 kg/hectare in 2004-05

has increased to 3140 kg/hectare in 2011-12. The major increase in the productivity of wheat has been observed in the states of Haryana, Punjab and Uttar Pradesh. Higher area coverage is reported from MP in recent years.

Among the major cereals, wheat contributes 17 per cent to total cereal production. Wheat has higher productivity than other cereals in the state except paddy. Wheat can play major role in increasing the foodgrain production of the state provided sufficient irrigation and adoption of new technology. Over a period of time, there has been a wide fluctuation in both acreages and production of wheat in different regions of

Maharashtra state. There exists a wide gap between the national and state average productivity of wheat. In view of the above, the present study was undertaken in order to understand the changes and trends in area, production and productivity of wheat and to study the constraints in production of wheat in Maharashtra.

## MATERIALS AND METHODS :

Data for present investigation has been collected from Agricultural Statistics at a glance from the year 1960-61 to 2012-13. The data were analyzed to obtain estimates of growth rates of area, production and productivity of wheat crop.

### **Estimation of growth rates in area, production and productivity of wheat :**

In the present study, the compound growth rates in area, production and productivity of wheat were estimated by using the following type of exponential model.

$$Y = ab^t$$

where,

Y = Area/ production/ productivity

a = Constant

b = Trend value

t = Time period in years

The significance of the estimated compound growth rates were tested with the help of student 't' test.

### **Constraints in wheat production :**

The constraints in wheat production were studied with the help of percentages.

## RESULTS AND DATA ANALYSIS :

The findings of the present study as well as relevant discussion have been presented under the following heads :

### **Trend in area, production and productivity of wheat in Maharashtra :**

Region wise information on decadal changes in area, production and productivity of wheat for Maharashtra State is presented in Table 1. Area under wheat in Maharashtra state declined from 8.98 lakh hectares to 8.43 lakh hectares during the period of 53 years since 1960. The highest area under wheat in the state was recorded (10.06 lakh hectares) during 1980-83 and this could mainly be attributed to considerable increase in acreage under wheat in Western Maharashtra. The share of Western Maharashtra in area under wheat of the state was 31.00 per cent during 1960-63 which was continuously increased to 49.07 per cent during 1990-93 and then declined upto 37.56 per cent during 2010-13. In other regions of the state, the decrease under area of wheat was noted during period under study.

The production of wheat in the state was 4.25 lakh tonnes in 1960-63, increased to 8.68 lakh tonnes in 1980-83 this is because of green revolution and high yielding varieties of wheat. But production of wheat decreased to 7.79 lakh tonnes in 1990-93 and again increased to 13.13 lakh tonnes in 2010-13. It was noted from the table that, Western Maharashtra was the major wheat producer in the state contributing between 23.00 per cent (1960-63) to 54.00 per cent (1990-91) of the state wheat production during different time periods. The least increase in wheat production (15.32%) was noted in Vidarbha region

**Table 1 : Changes in area, production and productivity of wheat in Maharashtra**

**(Triennium average)**

Sr. No.	Regions	Periods					
		1960-1963	1970-1973	1980-1983	1990-1993	2000-2003	2010-2013
<b>Area</b>							
1.	Western Maharashtra	2728	2918 (6.96)	4047 (48.35)	3592 (31.67)	3461 (26.87)	3167 (16.09)
2.	Marathwada	2675	2508 (-6.24)	2887 (7.93)	1925 (-28.04)	2495 (-6.73)	2694 (0.71)
3.	Vidarbha	3574	2907 (-18.66)	3127 (-12.51)	1801 (-49.61)	1677 (-53.08)	2568 (-28.14)
	Maharashtra	8976	8334 (-7.15)	10061 (12.09)	7319 (-18.46)	8633 (-3.82)	8430 (-6.08)
<b>Production</b>							
1.	Western Maharashtra	1404	1966 (40.03)	4105 (192.38)	4219 (200.50)	4887 (248.08)	5539 (294.51)
2.	Marathwada	1172	721 (-38.48)	2305 (96.67)	1799 (53.50)	3208 (173.72)	3777 (222.26)
3.	Vidarbha	1677	1267 (-24.45)	2265 (36.06)	1770 (5.55)	1934 (15.32)	3814 (127.42)
	Maharashtra	4253	3955 (-7.01)	8675 (103.97)	7789 (83.14)	10030 (135.83)	13131 (208.75)
<b>Productivity</b>							
1.	Western Maharashtra	516	658 (27.57)	1010 (95.74)	1176 (127.91)	1410 (173.26)	1751 (239.34)
2.	Marathwada	438	269 (-38.58)	796 (81.74)	929 (112.10)	1286 (193.61)	1426 (225.57)
3.	Vidarbha	470	435 (-7.45)	724 (54.04)	975 (107.45)	1153 (145.32)	1491 (217.23)
	Maharashtra	474	467 (-1.48)	861 (81.65)	1064 (124.47)	1313 (177.00)	1558 (228.69)

(Figures in the parentheses indicate per cent change over base year)

Note: Area '00' ha., production '00' tones., productivity kg/ha

during 2000-03 over the base period. The productivity of wheat was increased by 228.00 per cent *i.e.* from 474 kg/ha to 1558 kg/ha. From 1960-63 to 2010-13. The productivity of Western Maharashtra observed to be increased continuously and remained higher than the state average during all the decades.

Decadal absolute changes in area, production and productivity had shown that there were increases in all parameters during the entire period except for 1970-73. Therefore, for precise quantification of these changes (increase) the compound growth rates were worked out.

### Compound growth rates of area production and productivity of wheat in Maharashtra :

Periodwise and regionwise annual compound growth rates for area, production and productivity of wheat in Maharashtra is presented in Table 2. It was revealed from the table that, the growth rate of area under wheat declined significantly during pre-green revolution period (1.09 %) and for entire period (0.36 %). Amongst the different regions, significant decrease of 2.33 per cent, 2.67 per cent and 1.72 per cent were noted for Vidarbha region during respective periods. For entire period of 53 years, significant increase in area by 0.85 per cent per annum was observed only in Western Maharashtra. The production of wheat was increased at the rate of 2.84 per cent in the state during the entire period under study. The significant increase in production was noted in all the regions of the state during the entire period with highest increase in Western Maharashtra by 3.78 per cent per annum.

The significant increase in the production was noticed during period-II in Western Maharashtra (2.61%) and Marathwada region (2.28 %). The increase in the production of wheat in Western Maharashtra was due to increase in area

and productivity while for Marathwada and Vidarbha and State as whole was only due to increase in productivity. At the state level, the productivity of wheat significantly increased during entire period at the rate of 3.21 per cent and in post-green revolution period with 3.29 per cent and per annum. The significant increase in productivity with varied magnitudes was found for all regions of the state during post-green revolution and entire period. In pre-green revolution period, significant productivity increase was noted only in Western Maharashtra whereas no significant increase or decrease was observed for all regions during WTO period.

The critical examination of the periodwise growth rates in area, production and productivity provides additional insight regarding changing performance of wheat in the state. During the period I, the growth rate of area production and productivity of wheat turned-out to be negative except Western Maharashtra region. The magnitude of compound growth rates for area were turned-out to be negative and significant except Western Maharashtra region while magnitudes of production and productivity were turned-out to be positive and significant in all the regions of the state in period II. Period III indicated the growth rates of area; production and productivity for all regions in the state are non-significant. However, for Maharashtra state as a whole, area decreased @ 0.36 per cent per annum while production and productivity increased at the rate of 2.84 and 3.21 per cent per annum.

### Constraints in adoption of wheat production technology :

The constraints were grouped under the heads such as proper time of sowing, recommended seed rate, recommended time of sowing and corresponding recommended variety, method of sowing and fertilizer use. The information regarding

**Table 2 : Periodwise annual compound growth rates in area, production and productivity of wheat in Maharashtra state**

Sr. No.	Regions	Periods			
		I (Pre-green revolution)	II (Post-green revolution)	III (WTO)	Entire period
<b>Area</b>					
1.	Western Maharashtra	0.58	0.17	0.14	0.85***
2.	Marathwada	-1.30***	-1.94***	4.34*	-0.55**
3.	Vidarbha	-2.33***	-2.67***	-3.01	-1.72***
	Maharashtra	-1.09***	-1.28***	0.53	-0.36*
<b>Production</b>					
1.	Western Maharashtra	3.14**	2.61***	-0.83	3.78***
2.	Marathwada	-3.32	2.78*	6.41	2.98***
3.	Vidarbha	-4.21*	0.38	-3.19	1.24***
	Maharashtra	-1.12	1.96*	0.45	2.84***
<b>Productivity</b>					
1.	Western Maharashtra	2.55**	2.43***	-0.97	2.90***
2.	Marathwada	-2.05	4.81***	1.98	3.55***
3.	Vidarbha	-1.92	3.13***	-0.18	3.01***
	Maharashtra	-0.03	3.29***	-0.08	3.21***

\*, \*\* and \*\*\* indicate significance of values at P=0.05, P=0.01 and 0.1, respectively

constraints in adoption of improved wheat production technology presented in Table 3. is classified under size groupwise and for overall level. The constraints in adoption of improved wheat production technology were dealt with various determinants. Under the proper time of sowing aspect, among the different size groups, 40–50 per cent farmers carried out late sowing due to late harvesting of *Kharif* crops which delayed in tillage operations. At the overall level, 9.80 per cent farmers reported late sowing due to late rotation of canal water. With the same constraint of late sowing due to delayed rotation of irrigation water was somewhat negligible constraints meaning that proper canal water rotation were followed.

With the fear of moisture availability during later crop stage, early sowing was followed by very few farmers (6.86 %). Lack of awareness of seed rate was reported by 4.70 per cent farmers at the overall level. As regards the recommended seed rates, 45.71 per cent farmers reported high cost of seed is the major constraints on large size farm. Twenty two per cent framers from size group first were using the traditional method of seed rate making a total of 14.70 per cent at the overall level. More than 55 per cent farmers from the first size group were constrained with the fear of low germination. This constraint

was noticed by 35.29 per cent farmers at the overall level. Nearly 51 per cent farmers were not aware of recommended time of sowing with recommended variety at the overall level. The consideration of qualitative aspect of variety was faced by the wheat sample growers in the range of 16.67 to 28.57 per cent. Non-availability of proper variety seed was comparatively faced by less farmers in the first and second size group. However, this was reported by 17.14 per cent farmers from third size group.

The recommendation for method of sowing was not known by 33.33, 19.35 and 19.99 per cent farmers in the small, medium and large size groups. Either the labour were expensive or requirement was greater was reported by 37.25 per cent farmers at the overall level. This problem was relatively severe in the third size group. The adoption of traditional method of sowing was relatively more in the first size group (27.28 %). This constraint was faced by 6.45 and 14.28 per cent farmers from the second and third size groups. The fear of germination was the another constraint faced by 15.68 per cent farmers at the overall level in relation to the method of sowing.

As regards the recommendation of crucial input in wheat production *i.e.* fertilizer, 61, 32 and 14 per cent farmers from the

**Table 3 : Constraints in adoption of improved production technology of wheat**

Sr. No.	Production technology	Groups			Overall (n=102)
		I (n=36)	II (n=31)	III (n=35)	
<b>Proper time of sowing</b>					
1.	Late harvesting of <i>Kharif</i> crops and delay in preparation of tillage due to rain results in late sowing	14 (38.88)	15 (48.38)	18 (51.42)	47 (46.07)
2.	Late rotation of canal water results in late sowing	2 (5.55)	4 (12.90)	4 (11.42)	10 (9.80)
3.	Due to shortage of water during later stage early sowing is followed	1 (2.78)	3 (9.68)	3 (8.57)	7 (6.86)
<b>Recommended seed rate</b>					
1.	Lack of awareness	4 (11.11)	5 (16.13)	6 (17.14)	15 (14.70)
2.	High cost of seed	--	8 (25.80)	16 (45.71)	24 (23.52)
3.	Use traditional method	8 (22.22)	4 (12.90)	3 (8.57)	15 (14.70)
4.	Fear of poor germination of seed material	20 (55.55)	9 (29.03)	7 (20.00)	36 (35.29)
<b>Recommended time of sowing and corresponding recommended variety</b>					
1.	Lack of awareness	20 (55.55)	13 (41.93)	19 (54.28)	52 (50.98)
2.	Consideration of qualitative aspect of variety	6 (16.67)	6 (19.35)	10 (28.57)	22 (21.57)
3.	Non availability of proper variety seed	1 (2.78)	3 (9.68)	6 (17.14)	10 (9.80)
<b>Method of sowing</b>					
1.	Recommendation not known	12 (33.33)	6 (19.35)	7 (19.99)	25 (24.51)
2.	Expensive / more labour required	6 (16.67)	12 (38.70)	20 (57.14)	38 (37.25)
3.	Adopted traditional method	10 (27.28)	2 (6.45)	5 (14.28)	17 (16.67)
4.	Fear of poor germination	6 (16.67)	8 (25.80)	2 (5.71)	16 (15.68)
<b>Fertilizer</b>					
1.	Recommendation not known	22 (61.11)	10 (32.25)	5 (14.18)	37 (36.27)
2.	High cost of fertilizer	10 (27.78)	7 (22.58)	3 (8.57)	20 (19.61)
3.	Non availability in time	--	4 (12.90)	18 (51.42)	22 (21.27)
4.	Non availability as per choice	--	6 (19.35)	5 (14.28)	11 (10.78)
5.	No fertilizer at time of sowing due to fear of poor germination	4 (2.78)	4 (12.90)	4 (11.42)	12 (11.76)

Figures in parenthesis are percentage to total

corresponding size groups were unaware of the same. At the overall level, 19.61 per cent farmers reported the high cost of fertilizer and 21.57 farmers reported its non-availability in time as important constraints. Availability as per choice of fertilizers and its non-application due to poor germination were another minor constraints reported by some farmers.

For proper time of sowing technology 46.07 per cent farmers reported that late harvesting of *Kharif* crops delays preparation. Due to fear of poor germination, 35.29 per cent farmers used excess seed while 23.52 per cent farmers used less seed than recommendation because of high cost. More than 50.00 per cent did not know the recommended time of sowing and variety recommended for that time. While 21.57 per cent farmers opined that due to qualitative aspect they do not follow the recommendation. Regarding the method of sowing, 37.25 per cent farmers reported that drilling method of sowing is expensive while 16.67 per cent and 15.68 per cent farmers used traditional method of sowing and due to fear of poor germination, they adopt the broadcasting method. As regards the application of fertilizer, 36.27 per cent farmers reported that they do not know the recommendation while 21.27 per cent farmers reported non availability of fertilizer in time.

#### Conclusion :

The area under wheat in Maharashtra had slightly declined from 8.98 lakh hectares to 8.43 lakh hectares during the period of 53 years since 1960. In Vidarbha region the area under wheat had decreased by 28.14 per cent and negligible increase of 0.71 per cent in Marathwada region. In Western Maharashtra region, however, the area under wheat increased by 16.09 per cent over the base year 1960-63. The production of wheat in the state had increased by 208.75 per cent during 2012-13 over the base period 1960-63. The highest increase in the production was noticed in Western Maharashtra region (294.51%) followed by Marathwada (222.26 %) and Vidarbha (127.42 %), respectively. The productivity of wheat in the state had increased by 228 per cent during the period of 53 years. The highest increase in the productivity was noticed in Western Maharashtra (239.34 %) followed by Marathwada (225.57%) and Vidarbha (217.23 %), respectively.

The area under wheat in the state decreased significantly at the rate of 0.36 per cent per annum while production and productivity increased significantly at the rate of 2.84 and 3.21 per cent per annum. It implied that the production of wheat in the state had been increased mainly due to increase in productivity. Though there was marginal significant decrease in the acreage of wheat in the state.

At the overall level, regarding adoption of proper time of sowing technology, 46.07 per cent farmers reported that late

harvesting of *Kharif* crops delayed their field preparations. Due to fear of poor germination, 35.29 per cent farmers used excess seed while 23.52 per cent farmers used less seed than recommendation because of high cost. More than 50.00 per cent did not know the recommended time of sowing and variety recommended for that time. While 21.57 per cent farmers opined that due to qualitative aspect, they do not follow the recommendation. Regarding the method of sowing, 37.25 per cent farmers reported that drilling method of sowing was expensive while 16.67 per cent farmers used traditional method of sowing and 15.68 per cent farmers did not followed recommended method of sowing due to fear of poor germination. As regards the application of fertilizer, 36.27 per cent farmers reported that they do not know the recommendation while 21.27 per cent farmers reported non-availability of fertilizer in time.

Lack of knowledge, high cost of seed, non-availability of proper seed and fertilizers, fear of poor germination were the major constraints in adoption of wheat production technology.

#### Policy implication :

The productivity of wheat though has increased; the proportionate area under wheat did not increase in the State. The efforts need to be made to increase the area under wheat. This can be done by making available the irrigation water either from existing cropping pattern or by increasing its potential.

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