Growth Dynamics of Wheat in Westran Maharashtra Region

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Abstract— Wheat is the most important of food grain of India. It is the staple food of millions of people which is cultivated during Rabi season. In the present study the compound growth rates and instability were estimated with the help of district wise secondary time series data of thirty years collected from government sources. The results indicate that out of nine districts of Western Maharashtra the area under wheat cultivation of Ahmadnagar , Pune, Solapur and Satara districts were positive compound growth rate for the period-I (1985-86 to 1999-2000) i.e. 8.30 , 5.15 , 3.22 and 2.66 per cent per annum respectively as compared to period-I. However, the growth rates were higher side during the period-II (2000-01 to 2014-15) for Dhule, Nashik, Jalgaon, Sangli and Satara district i.e. 25.09, 8.34, 5.29, 2.86 and 2.43 per cent per annum respectively. It was found to be statistically significant. Whereas, for the overall period the compound growth rate of area and production were positive in all most all the district except Nashik district (area: -2.38 percent per annum) and Kolhapur (area : -3.77 per cent per annum). The average area under cultivation of wheat for last thirty year was highest in Ahmadnagar followed by Nashik , Pune, Solapur, jalgaon, Satara, Dhule, Sangli and Kolhapur district viz; 818030 , 644570, 580430, 477630, 360100, 333330, 253970,251730 and 105670 hectors. The coefficient of variation indicates the instability the lowest coefficient of variation for area under wheat cultivation was observed in Pune district (15.55 percent) for overall period. On the other hand highest coefficient of variation for area was observed in Kolhapur (43.69 per cent) district during the thirty year (1985-86 to 2014-15). The coefficient of variation of the production during the overall period was range in between 30.20 to 61.12 per cent. The area and productivity was indicating stability in wheat crop in all most all the district in Western Maharashtra region. It indicates that the wheat is cultivated traditionally in the region during rabi season. Hence, it is a scope to increase the area under cultivation, especially in Nashik and Kolhapur district by providing high yielding varieties and improve technology.

Keywords— Rabi season, Maharashtra, cereal crop, rice and wheat.

I. INTRODUCTION

Wheat (*Triticum aestivum*) is a cereal grain, originally from the South West Asia, but now cultivated worldwide. It is most important of food grain of India and it is the staple food of millions of people. Approximately one-sixth of the total arable land in the world is cultivated with wheat. Whereas paddy is mainly cultivated in Asia, wheat is grown in all the all the continents of the world. India is the second largest producer of wheat after China. It compare well with other important cereals in its nutritive value. It has good nutrition at profile with 12.1% protein, 1.8% lipids, 1.8% ash, 2.0% reducing sugar, 6.7 pentose, 59.2% starch good sources of mineral of vitamin and nicotinic acid.

In the world area around 225.62 Million ha. With a production of 685.6 million tonne. The normal world productivity is 3039 kg/ha.

Wheat is grown in India in an area of about 29647 million ha. with a production of 92458 million tonne. The normal national productivity is about 3119 kg/ha. India share out of world production is 13.15%.

In Maharashtra during 2012-13 area, production and productivity is 594000 'ha, 875000 tonnes and 1473 kg/ha respectively.

II. METHODOLOGY

In this study, for the analysis of growth and instability. The period was divided into breakup of 15 years and overall as shown below,

Period I : 1985-86 to 2000-01
Period II : 2001-02 to 2014-15
Overall : 1985-86 to 2014-15

The compound growth rate of area, production and yield for wheat for each wheat growing district of Western Maharashtra region were estimated to study the growth. It was estimated with the following exponential model.

$$Y = a\,b^t$$

$$CGR = [\text{Antilog (log } b) - 1] \times 100$$

The 't' test was applied to test of significance of 'b'

To measure the instability in area, production and productivity, and index of instability was used as measure of variability. The coefficient of variation (C.V) was calculated by the formula-

$$CV\ (\%) = \frac{Standard\ Deviation}{Mean} \times 100$$

III.   RESULT & DISCUSSION

The growth performance and instability of wheat pertaining to two periods and overall is discussed separately for each district as under

Compound growth rate

The district-wise compound growth rates of area , production and productivity of wheat in Western Maharashtra for two periods and overall were worked out and presented in Table1.which reveals that, out of nine districts of Western Maharashtra the area under wheat cultivation of Ahmadnagar , Pune, Solapur and Satara districts were positive compound growth rate for the period-I (1985-86 to 1999-2000) i.e. 8.30 , 5.15 , 3.22 and 2.66 per cent per annum respectively.

However, the growth rates were higher side during the period-II (2000-01 to 2014-15) for Dhule, Nashik, Jalgaon, Sangli and Satara district i.e. 25.09, 8.34, 5.29, 2.86 and 2.43 per cent per annum respectively as compared to period-I. It was found to be statistically significant.

Whereas, for the overall period the compound growth rate of area and production were positive in all most all the district except Nashik district (area: -2.38 percent per annum) and Kolhapur (area: -3.77 per cent per annum).

Table.1: District wise Compound growth rates for Western Maharashtra Region

Period		Nashik	Dhule	Jalgaon	Ahmadnagar	Pune	Solapur	Satara	Sangali	Kolhapur	Western Maharastra Region
I	A	-6.97**	-13.54**	-3.60	8.30**	5.15**	3.22	2.66	0.23	-16.31**	0.98
	P	2.51	-6.02	3.41	16.23**	4.68	8.91*	5.97	13.81**	-7.84*	2.64
	Y	9.97**	13.21*	8.77	6.21**	1.25	6.59**	5.02	6.73*	5.24	2.38
II	A	8.34**	25.09**	5.29	-6.14	2.37	-3.51	2.43	2.86	1.83	3.59
	P	14.94*	37.49**	10.53	-4.42	7.11*	-1.40	4.58	12.98*	6.96	4.40
	Y	6.08**	9.85**	5.00*	3.07	6.14*	2.18	1.80	9.57**	5.01**	1.43
Overall	A	-2.38	1.38	0.55	2.17	1.80*	2.23	3.47**	1.68	-3.77*	1.07
	P	3.93*	9.02**	6.53**	5.14*	6.54**	3.50	8.55**	9.92**	1.26	6.30
	Y	6.25**	8.80**	6.37**	3.51**	3.55**	1.15	4.52**	4.88**	5.41**	4.99

Note:- A-Area, P-Production, Y-Yield, 5 %, 1 % Level of Significance.

Instability of wheat

One should not obvious of instability by taking the growth rates only. Because the growth rates will explain only the rate of growth of over the period. Whereas, instability will judge, whether the growth performance is stable or unstable for the period for the pertinent variable.

As seen from the Table No. 2, The coefficient of variation indicates the instability the lowest coefficient of variation for area under wheat cultivation was observed in Pune district (15.55 percent) for overall period. On the other hand highest coefficient of variation for area was observed in Kolhapur (43.69 per cent) district during the thirty year (1985-86 to 2014-15). The coefficient of variation of the production during the overall period was range in between 30.20 to 61.12 per cent. The area and productivity was indicating stability in wheat crop in all most all the district in Western Maharashtra region.

The average area under cultivation of wheat for last thirty year was highest in Ahmadnagar followed by Nashik , Pune, Solapur, Jalgaon, Satara, Dhule, Sangli and Kolhapur district viz; 818030 , 644570, 580430, 477630, 360100, 333330, 253970,251730 and 105670 hectors respectively.

Table.2: District wise instability of wheat in Western Maharashtra region.

	Division & District		Period I			Period II			Overall		
			A	P	Y	A	P	Y	A	P	Y
1)	Nashik	CV	18.06	31.89	25.96	31.54	40.48	15.68	25.87	38.19	26.01
		Mean	702.93	777.07	1124.47	586.20	950.13	1576.13	644.57	863.60	1350.30
2)	Dhule	CV	32.70	29.28	28.73	41.29	53.35	23.46	37.13	58.83	34.37
		Mean	244.40	264.27	1096.73	263.53	491.33	1748.80	253.97	377.80	1422.77
3)	Jalgaon	CV	19.11	32.10	32.42	36.09	47.05	17.20	29.19	49.05	29.32

		Mean	347.07	499.93	1443.13	373.13	784.93	2055.53	360.10	642.43	1749.33
4)	**Ahmadnagar**	CV	19.71	31.52	17.26	43.41	49.38	18.30	38.05	49.01	20.50
		Mean	717.47	961.13	1293.00	918.60	1434.87	1587.40	818.03	1198.00	1440.20
5)	**Pune**	CV	15.81	19.89	16.73	14.88	23.70	19.28	15.55	31.47	22.59
		Mean	558.53	673.20	1246.87	602.33	1039.40	1624.13	580.43	856.30	1435.50
6)	**Solapur**	CV	14.79	26.05	17.86	35.00	49.75	22.86	31.31	46.26	20.27
		Mean	419.27	465.87	1121.00	536.00	651.93	1152.27	477.63	558.90	1136.63
7)	**Satara**	CV	12.34	30.25	25.10	13.90	23.17	11.62	18.08	38.79	22.75
		Mean	292.80	363.87	1309.27	373.87	656.47	1742.60	333.33	510.17	1525.93
8)	**Sangli**	CV	17.56	28.97	20.99	24.25	56.59	20.25	22.25	61.12	23.89
		Mean	235.47	291.13	1310.47	268.00	539.87	1679.07	251.73	415.50	1494.77
9)	**Kolhapur**	CV	50.92	27.44	23.74	23.46	31.81	12.07	43.69	30.20	23.67
		Mean	118.00	182.60	1583.40	93.33	207.13	2199.27	105.67	194.87	1891.33

Note:- A-Area, P-Production, Y-Yield, CV- Coefficient of variation.

IV.   CONCLUSION

The results of this study lead to the conclusion that, The compound growth rate of area and production were positive in all most all the district except Nashik and Kolhapur district. The highest compound growth rate for Satara district were estimated for overall period followed by Pune i.e. 3.47 and 1.80 respectively for area under cultivation of wheat. However, the growth rate for wheat production were highest in Sangali followed by Dhule and Satara i.e. 9.92, 9.02 and 8.55 respectively.

Hence, It is concluded that, wheat appears to the important rabi crop in the cropping pattern of Western Maharashtra region. Therefore, it is very big need to concentrate of this crop for policy maker and researcher.

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