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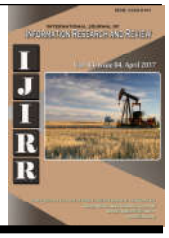

Research Article

GROWTH AND INSTABILITY OF SORGHUM IN VIDARBHA REGION

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ABSTRACT

Sorghum is the fifth most important cereal crop in the world. However in India it is third cereal crop after rice and wheat. It was one of the major cereal staple during 1950 but recently its area came down. The present study based on the last 30 year time series data on area,production and productivity to identify the trend. The compound growth rate and coefficient of variation here analysed for period I (1985-86 to 1999-2000), period II(2000-2001 to 2014-15) and overall 30 years (1985-2015) for the major five districts of Vidarbha region .The study indicate that compound growth rate for area, production and productivity for almost all the district where negative highest decline in the sorghum area is observed in Yavatmal district followed by Amravati and Buldhana district. i.e82.75, 78.96 and 77.84.percent per annum during the last 30 years i.e. overall production found to be statistically significant at 1 percent level of probability with the highest coefficient of variation is observed in wardha district followed by akola and chandrpur i.e. 75.34, 74.02 and 69.62 percent. The coefficient of variation for almost all the district were less in period I as compared to period II. The similar pattern also observed in production. On the other hand the growth rate of productivity for the Sorghum was positive for almost all the district and both the period . Highest compound growth rate for productivity during the overall period was observed in wardha followed by akola ,chandrapur i.e. 15 percent per annum with coefficient of variation range in between 28.44 to 41.30 percent. Thus it is concluded that Sorghum is declining during the study period. Considering the importance of Sorghum as a low input crop and the staple food it is recommended option for the farmer in operating in any environment where other crop not performing well. On the other hand sweet Sorghum was specially used for bioethanol production which is blended with petrol, In the developing and developed economies it is need to concentrate on the crop specially to cultivate under marginal and stress prone areas to attend the sustainability.

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INTRODUCTION

Jowar [sorghum bicolor (L), Moench)] belongs to family Graminae. Sorghum is considered to be originated in Ethiopia or East Central Africa.One of the main staple foods for the world`s poorest and most food-insecure people across the semi-arid tropics. It is the fifth most important cereal crops in the world, after wheat,maize,rice,barleywhereas;inindia sorghum is the third cereal crops after rice and wheat.Inindia ,it was one of the major cereal staple during 1950`s and occupied an area of more than 16 million ha. But recently it`s area has come down (48 percent) to 7.67 million ha. By 2009-10 5% of GCA). However, it is still contributes about 6.98 million tons (3.2%)to India`s total production and around 12.7% to the world`s sorghum production.

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Sorghum often a recommended option for farmers operating in harsh environment where other crops do poorly, as it is grown with limited rainfall (400 to 500mm) and often without application of any fertilizers or other inputs. However ,it is grown for a variety of uses in india as well as in the world.On the other hand,sweet sorghum was especially used for bio-ethanol production which is blended with petrol up to 5-10% in the developing and developed economies. Majority of the crop in India is cultivated under marginal and stress-prone areas of the semiarid tropics. The nutritional value of jowar grains contain about 74.1% starch, 11.2% protein,37% facts, 2.6% crude fibre,1.5%ash, 0.1%teninis, it is also used for the preparation of syrup and penicillian medicine.

MATERIALS AND METHODS

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

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 Jowar for each Jowar growing district were estimated to study the growth. It was estimated with the following exponential model.

$Y=a\ b'$
$CGR = (Antilog\ b-1) \times 100$

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) will be calculated by the formula-

$$\text{Coefficient of Variation (\%)} = \frac{\text{Standard deviation} \times 100}{\text{Mean}}$$

The simple Coefficient of Variation (C.V) often contains the trend component and thus over estimates the level of instability in time series data characterized by long term trends.

all districts in Vidharbha region registered negative growth including the region as a whole .The compound growth rates for area were negative indicating decline in area in Vidharbha region during this periods i.e. Period I and Period II. Hence there was very big need for policy maker to formulate development-oriented policy and researcher to design investigative research activity for promoting sustainable Jowar production system at the region for expansion of area under Jowar cultivation.

The growth rates were also worked out for overall period of 30 years where almost all were found to be significant at 1 % level in all districts of Vidharbha region both in area, production and productivity of Jowar. During this period compound rates for area and production were also found negative but less than 1 % in almost all the districts in the Vidharbha region and also statistically significant as compared to other periods.The higher growth rates were recorded in Akola district for production and productivity i.e. 87.45 and 97.98 % per annum respectively. Whereas region as a whole has registered the growth rates in this period for area, production and productivity as 65.56, 67, 46 and 80.39 % per annum respectively.

Table 1. District wise Compound growth rates for Vidharbha Region

Period		Buldhana	Akola	Amravati	Yavatmal	Wardha	Nagpur	Chandrapur	Vidharbha Region
I	A	-13.84	-13.35	-13.25	-8.26	-37.19	-32.83	-34.29	-17.69
	P	-13.80	-16.82	-10.82	-18.25	-46.67	-46.33	-33.01	-26.53
	Y	9.99	-10.41	5.42	-3.26	-6.52	-9.88	12.8	-1.86
II	A	-6.83	-3.33	-10.93	-5.38	-1.12	-13.90	-5.8	-6.76
	P	1.70	9.83	1.17	-5.58	1.43	-6.33	0.44	0.38
	Y	13.97	16.67	10.08	5.66	3.92	7.16	0.79	8.32
Overall	A	77.84	77.13	78.96	82.58	46.20	56.77	39.46	65.56
	P	85.35	87.45	79.87	83.16	42.24	54.86	39.27	67.46
	Y	34.76	97.98	90.66	87.85	81.62	83.86	86.04	80.39

Table 2. Districtwise instability of Sorghum in Vidharbha region

Sr.No	Division & District		Period I			Period II			Overall		
			A	P	Y	A	P	Y	A	P	Y
I)	Division:AMRAVATI	CV	15.75	31.52	35.31	48	45.61	31.14	50.32	59.99	36.05
1)	Buldhana	Mean	1867.93	3076.13	1824.13	741.46	1110.4	1402.3	1304.7	2093.3	1613.2
2)	Akola	CV	36.22	37.41	34.60	37.18	48.26	32.96	74.02	60.28	33.90
		Mean	2544.93	3005	1635.2	632.4	1205.5	1878	1588.66	2105.2	1756.6
3)	Amravati	CV	32.93	22.58	25.46	45.17	53.93	15.24	48.83	53.32	22.35
		Mean	1493	2244	1417.8	78.02	902.53	1240.7	1136.6	1573.2	1329.2
4)	Yavatmal	CV	13.65	29.20	24.17	38.33	50.11	25.34	43.30	59.24	29.97
		Mean	2043.8	2604.3	1371.2	937.26	940.5	973.13	1490.5	1772.4	1172.16
II)	Division: Nagpur	CV	19.76	28.72	28.04	89.13	101.19	28.87	75.34	84.39	32.45
1)	Wardha	Mean	833.53	937.06	1044.73	160.3	143.66	759.33	496.9	540.3	902.03
2)	Nagpur	CV	28.44	23.09	21.05	66.91	70.81	14.58	69.13	73.11	24.43
		Mean	952.5	1054	1132.6	257	225	833.7	604.7	639.5	983.2
3)	Chandrapur	CV	13.83	25.31	31.12	79.74	87.56	64.86	69.62	66.24	56.05
		Mean	341.12	307.9	953.5	75.86	96.46	1246.06	208.8	202.2	1099.8

RESULT AND DISCUSSION

Growth Performance in Jowar: The growth performance of Jowar pertaining to two periods and overall is discussed separately for each region as under :

Vidharbha Region

The district-wise compound growth rates of area, production and productivity of Jowar in Vidharbha region for two periods and overall were also worked out and presented in Table1. The results indicated that during the period I and period II, almost

Instabilty in Jowar

One should not be obvious of instability by taking the growth rate only. Because the growth rates will explain only the rate of growth over the period, whereas instability will judge whether the growth performance is stable or unstable for the period for the pertinent variable. To facilitate better understanding of the magnitude and pattern of changes in the level of production, cropped area and productivity of Jowar in the different Jowar growing region. Instability of production, area and productivity of Jowar has been worked out, The simple coefficient of variation (C.V) often contains the trend component and thus

overtimes the level of instability in the time series data characterized by long term trend.

Vidharbha Region

An attempt was made to study fluctuations in area, production and yield of Jowar across the major Jowar growing districts in Vidharbha region for two period and overall. The results are presented in Table 2 and discussed as under

Conclusion and Policy Implications

The results of this study lead to the conclusion that:

- The compound growth rates for area, production and productivity were negative for almost all the Sorghum growing districts in the study during the first period.But the picture changed and the growth rate was estimated positive during second period.
- The compound growth rate of area under crop that values are statistically significant at 1 percent level of probability, the coefficient of variation for area, production and productivity of first and second period was negative but other hand the growth rate of productivity for the sorghum was positive foe almost all the district of all period. It was proof the fact that the sorghum crop was traditional crop in the region as well as the state. Hence, there is a very big need to concentrate on this crop by policy maker and researchers.
- The production and productivity instability in Sorghum crop were observed in almost the entire district in the state. It may be because the crop largely depends on vagaries of nature and Sorghum production is subject to fluctuation from year to year and thus, causing heavy losses. farmer cannot bear risk due to scare resources and small holding. A crop failure means not only the loss of farmers income but also the loss of investment in the next crop season. This leads farmer to indebtedness. In order to maintain stability in production of Sorghum. Concerned efforts should be made in the state.

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