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THE TREND IN AREA, PRODUCTION, AND PRODUCTIVITY OF FOODGRAINS IN SANGLI DISTRICT FROM 2006-07 TO 2018-19

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ABSTRACT

This study analyzes the trends in the area, production, and productivity of foodgrains in Sangli district from 2006-07 to 2018-19. The present study has evaluated the trends in area under major foodgrain crops, growth in the production of foodgrain, and productivity of essential foodgrains in the Sangli district during the period 2006-007 to 2018-19. The statistical tools, such as Compound Growth Rate (CGR) and Simple Growth Rate (SGR), are used to assess trends in the foodgrains production. A comparative analysis of several crops facilitates the identification of patterns and potential factors influencing growth or reduction in output and yield. The results demonstrate an overall reduction in the farmed area of food grains, with rice, wheat, and jowar exhibiting variations in both production and productivity. The area dedicated to wheat production has diminished at a compound growth rate of -2.12%, whilst jowar productivity has experienced a notable decline of -6.91%. In contrast, the production of rice has fluctuated, showing notable increases in some years and notable decreases in others. There are sustainability concerns because foodgrain productivity has shown an average declining trend of -2.156 percent. These patterns have been greatly impacted by governmental regulations, technological advancements, irrigation system modifications, and climatic factors, according to the research. Despite reported yield increases, the study indicates that foodgrain production has been negatively impacted by factors like declining soil fertility, erratic monsoons, and a decline in agricultural investments. To sustain agricultural development in the area, policymakers must push for modern farming methods, give farmers financial and technical support, and give priority to managing water resources.

Key Words: Foodgrain Production, Agricultural Productivity, Sangli District

1. Introduction

Food grain production in India has grown more steadily after the green revolution. Providing adequate food to the rising population and becoming self-reliant in foodgrain production were the government priorities during the 1970s and 1980s decade. The Maharashtra government has also taken several steps to boost agriculture production right from the late former chief minister Vasantrao Naik. He was the pioneer of the green revolution of the Maharashtra. There is a need for sustainable agriculture practices and land reforms to improve the socio-economic conditions of the farmers and to meet the food needs of the rising population.

Sangli district is located in western Maharashtra, it is well-known for its diverse range of agricultural activities. The district is rich with dark black soil, however, most of the tehsils of the district are often suffering from drought conditions. Almost 65 percent part of the

district falls under drought-hit conditions. In recent times farmers of the district have started cultivation of vegetables, floriculture, and horticulture crops at large scale with minimum available water sources. The government flagship program "Jalyukth Shivar" has brought significant positive changes in the irrigation potential. The ground water level has also grown and farmers are gradually practicing modern irrigation systems like drip and sprinklers. Sugar cane is the dominant cash crop in the Sangli district. However, in addition to sugar cane, food grains such as rice, wheat, and jowar are also grown at large agricultural scale in the district. However, the present trends are alarming in the context of area, production, and productivity of foodgrains in the Sangli district. The Krishna River and its tributaries provide irrigation to the region, although large areas of the district are still dependent on monsoons for irrigation. Against this backdrop, the present study has examined the trends in areas under foodgrain, production of foodgrains, and productivity of foodgrains in Sangli district. Overall, foodgrain productivity has revealed a downward trend of -2.56%, raising concerns regarding sustainability.

2. Review of Literature

Several studies have analyzed foodgrain production trends across India and Maharashtra. Sharma (2013) has examined the trends in area, production, and productivity of foodgrains in the northeastern states of India. His study highlighted regional disparities in foodgrain productivity and suggested location-specific agricultural policies. Kumari, Mehta, and Bhatia (2015) have conducted a trend and decomposition analysis of foodgrain production in India. They identified key drivers of agricultural growth and constraints that are affecting on productivity of foodgrains. Ahmad et al. (2015) have compared the trends of area, production, and productivity of major foodgrains in India and Maharashtra. Their study found that climatic conditions, government policies, and access to advanced agricultural technology are significantly affecting agricultural production. Gadgil, Abrol, and Rao (1999) in their joint study analyzed the growth and fluctuation of Indian foodgrain production. They have emphasized the role of monsoons and government policy interventions in stabilizing and increasing agricultural productivity. Kumar and Mittal (2003) have discussed productivity and supply issues related to food grains in India. They proposed strategies for achieving food security through enhanced supply chain efficiency.

Despite huge research on foodgrain production in India, there is a lack of region-specific studies with special reference to the Sangli district. Previous research studies have mainly emphasized national or state-level trends, with a limited focus on district-level variations.

3. Objectives of the Study

The major objectives of the present study are

1. To analyze the trend in the cultivated area of foodgrains in Sangli district.
2. To examine the changes in foodgrain production over the study period.
3. To evaluate the productivity variations of major foodgrains in the district.

4. Discussion

Rice

The area under rice cultivation in Sangli district has fluctuated from year to year. The area was recorded at 186 hundred ha in 2006-07 and decreased to 175 hundred ha in 2018-19,

indicating a slight decline during the period under study. The highest area under rice cultivation (202, hundred ha) was recorded in the 2016-17 period. The mean area under rice cultivation during the period of the study was 181.69 hectares, with a standard deviation (SD) of 9.91 indicating a moderate spread of land allocated to rice cultivation. The coefficient of variation (CV) of 5.45 percent indicates the relative stability of the growing area.

Rice production has shown extreme fluctuations, starting at 104 hundred tonnes in 2006-07 and rising to 337, hundred tonnes in 2018-19. The highest production was observed in the 2016-17 period (589 hundred tonnes) and the lowest in the 2008-09 period (284 hundred tonnes). The average production of rice amounted to 370.38 hundred tonnes with an SD of 109.74 hundred tonnes, indicating a significant variability. CV of 29.63 percent suggests a higher volatility of production. The CGR of rice production was 10.29 percent, showing a positive trend despite the fluctuations.

Table 1 Growth of Area, Production, and Productivity of Rice in Sangli District during 2006-07 to 2018-19

(Area in Hundred Hectares Production in Hundred Tons, Yield in Kg / Hectare)

Year	Area	SGR	Production	SGR	Productivity	SGR
2006-07	186	0	104	0	2172	0
2007-08	177	-4.84	472	353.85	2665	22.7
2008-09	185	4.52	284	-39.83	1535	-42.4
2009-10	156	-15.68	395	39.08	2532	64.95
2010-11	177	13.46	442	11.9	2497	-1.38
2011-12	181	2.26	392	-11.31	2182	-12.62
2012-13	181	0	289	-26.28	1597	-26.81
2013-14	187	3.31	436	50.87	2332	46.02
2014-15	187	0	387	-11.24	2070	-11.23
2015-16	187	0	351	-9.3	1875	-9.42
2016-17	202	8.02	589	67.81	2667	42.24
2017-18	181	-10.4	337	-42.78	1864	-30.11
2018-19	175	-3.31	337	0	1928	3.43
Mean	**181.69**	**-**	**370.38**	**-**	**2147.38**	**-**
SD	**9.91**	**-**	**109.74**	**-**	**364.85**	**-**
CGR	**-0.51%**	**-**	**10.29%**	**-**	**-0.99%**	**-**
CV	**5.45**	**-**	**29.63**	**-**	**16.99**	**-**

Source: www. Mahakrushi.com

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Figure 1 Trend in Area under Rice Cultivation in Sangli District

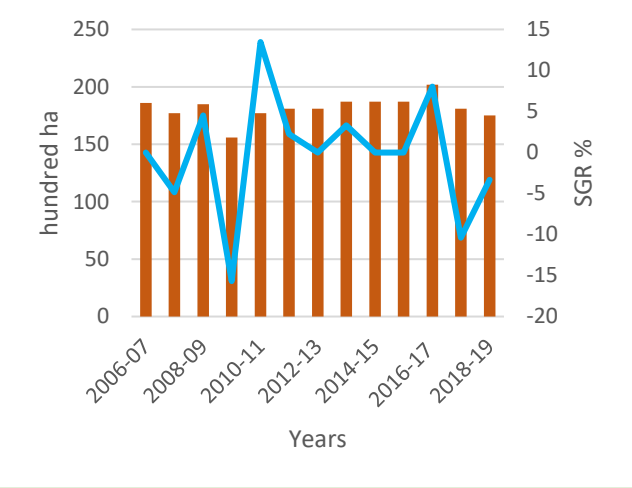


Figure 2 Trend in Production of Rice in Sangli District

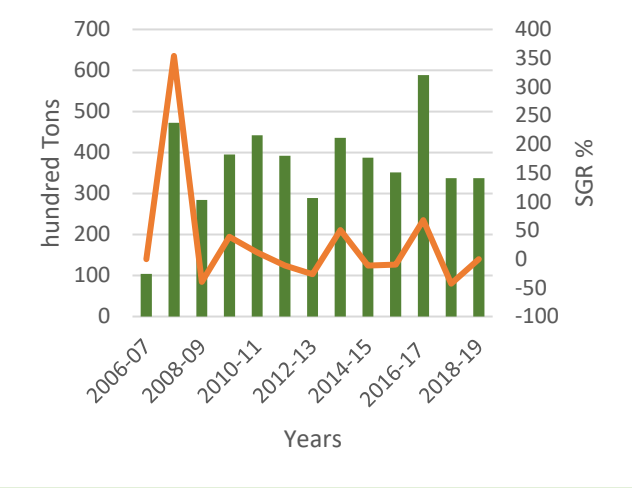
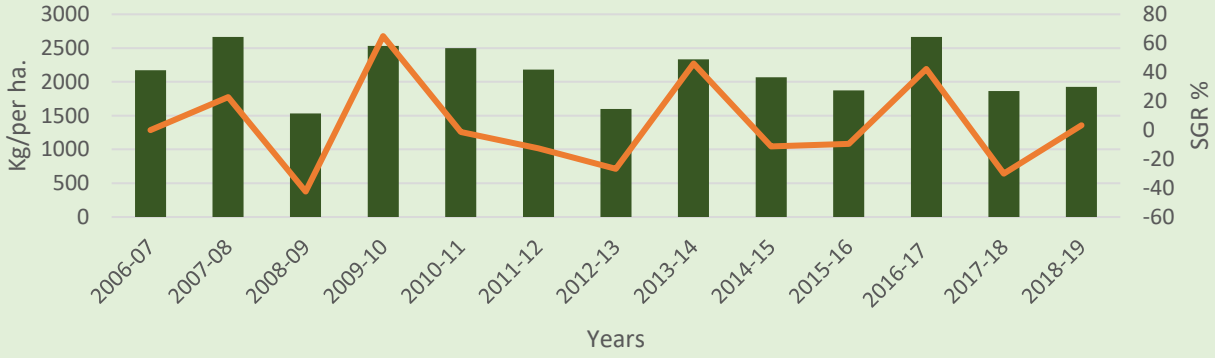


Figure 3 Trend in Productivity of Rice in Sangli District



Productivity also followed a mixed trend, starting at 2172 kg per hectare in 2006-07 and reaching 1928 kg per hectare in 2018-19. The highest yield was registered in the 2016-17 period (2667 kg per hectare) while the lowest yield was recorded in the 2012-13 period (1597 kg per hectare). Mean productivity was 2147.38 kg per hectare during the study period, with an SD of 364.85 kg per hectare, which showed a significant variability. The CGR of productivity was -0.99, indicating a slight decrease in the growth of the return over time.

Wheat

The area under wheat has shown a downward trend, from 260 hundred hectares in 2006-07 to 201 hundred hectares in 2018-19. The highest area recorded in 2016-17 was 393, hundred hectares, and the lowest was 126, hundred hectares in 2009-10. The mean area during the study period was 257.46 hundred hectares, with an SD of 62.92 hundred hectares and a CV of 24.44 percent, indicating a moderate variation in the use of the wheat-growing area. The CGR for the wheat sector decreased by -2.12 percent.

Wheat production followed a similar pattern, starting at 447 hundred tonnes in 2006-07 and ending at 365 hundred tonnes in the year 2018-19. The highest production was registered in the 2016-17 period (729 hundred tonnes) and the lowest production in the 2009-10 period (203 hundred tonnes). The average production amounted to 444.31 hundred tonnes with an SD of 127.26 and a CV of 28.64 percent, indicating a relatively stable trend in

production. The CGR of wheat production was -1.67 percent, indicating a long-term decline in the production of the staple grain.

However, productivity showed a slightly positive trend, starting at 1700 kg per hectare in 2006-07 and increasing to 1815 kg per hectare in 2018-19. The highest yield was recorded in the 2014-15 period (1958 kg per hectare) and the lowest yield in the 2008-09 period (1270 kg per hectare). The average productivity was 1691.85 kg per hectare, with an SD of 163.21 kg per hectare and a CV of 9.65 percent, indicating a relative stability of wheat yields.

Table 2 Growth of Area, Production, and Productivity of Wheat in Sangli District during 2006-07 to 2018-19

(Area in Hundred Hectares Production in Hundred Tons, Yield in Kg / Hectare)

Year	Area	SGR	Production	SGR	Productivity	SGR
2006-07	260	0	447	0	1700	0
2007-08	289	11.15	500	11.86	1730	1.76
2008-09	222	-23.18	285	-43	1270	-26.59
2009-10	126	-43.24	203	-28.77	1608	26.61
2010-11	294	133.3	502	147.3	1708	6.22
2011-12	226	-23.13	417	-16.93	1604	-6.09
2012-13	296	30.97	474	13.67	1601	-0.19
2013-14	298	0.68	477	0.63	1601	0
2014-15	296	-0.67	584	22.43	1958	22.3
2015-16	246	-16.89	453	-22.43	1841	-5.98
2016-17	393	59.76	729	60.93	1856	0.81
2017-18	200	-49.11	340	-53.36	1702	-8.3
2018-19	201	0.5	365	7.35	1815	6.64
Mean	**257.46**	**-**	**444.31**	**-**	**1691.85**	**-**
SD	**62.92**	**-**	**127.26**	**-**	**163.21**	**-**
CGR	**-2.12%**	**-**	**-1.67%**	**-**	**0.55%**	**-**
CV	**24.44**	**-**	**28.64**	**-**	**9.65**	**-**

Source: www. Mahakrushi.com

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Figure 4 Trend in Area under Wheat Cultivation in Sangli District

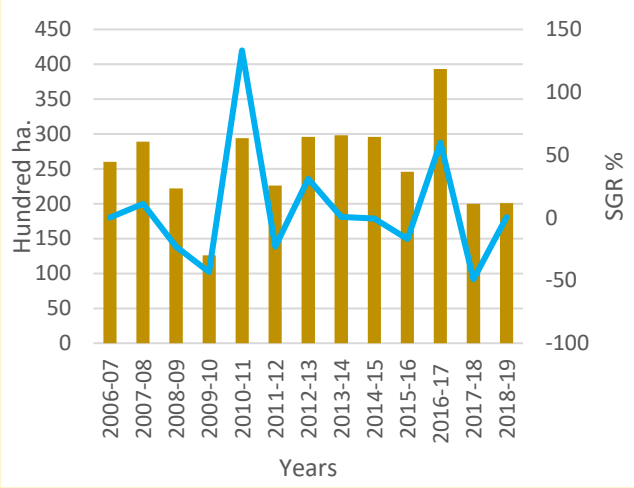


Figure 5 Trend in Production of Wheat in Sangli District

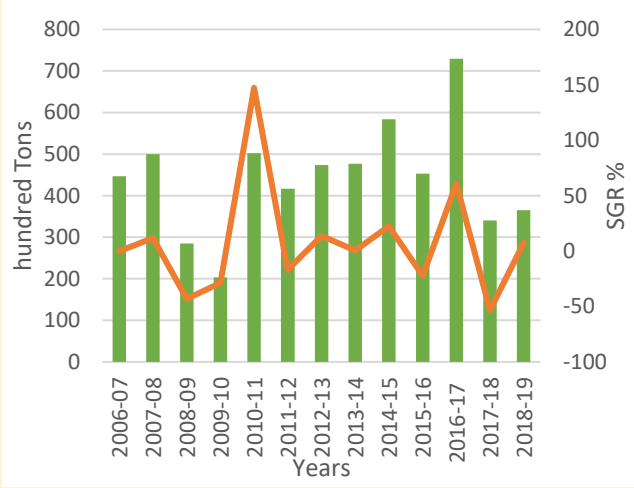
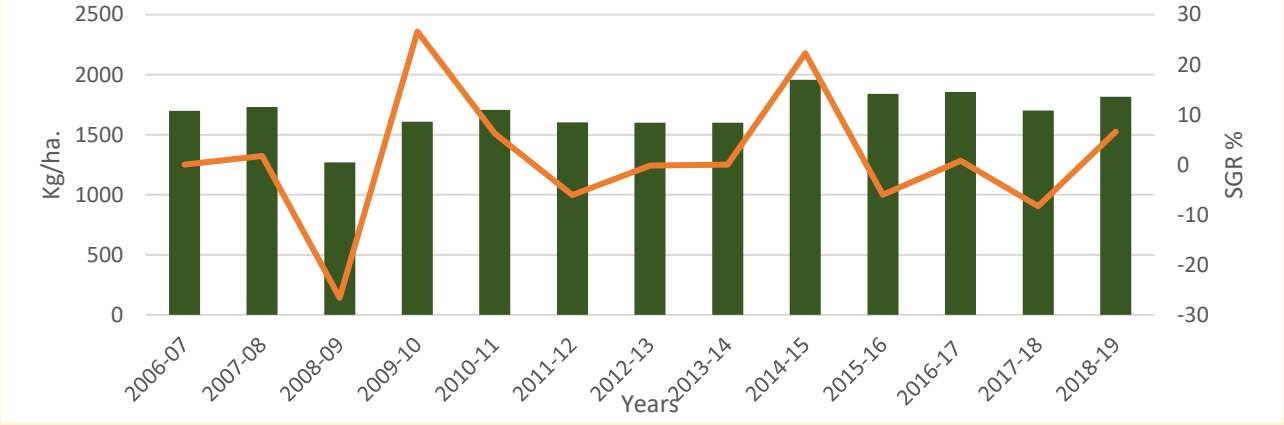


Figure 6 Trend in Productivity of Wheat in Sangli District



Productivity CGR was 0.55 percent, indicating marginal growth during the study period.

Jowar

Table 3 Growth of Area, Production, and Productivity of Jowar in Sangli District during 2006-07 to 2018-19

(Area in Hundred Hectares Production in Hundred Tons, Yield in Kg / Hectare)

Year	Area	SGR	Production	SGR	Productivity	SGR
2006-07	2870	0	251	0	876	0
2007-08	2281	-20.52	527	109.96	470	-46.3
2008-09	2718	19.16	105	-80.07	460	-2.1
2009-10	2033	-25.2	492	368.57	242	-47.4
2010-11	2330	14.61	286	-41.87	1076	344.6
2011-12	2276	-2.32	1532	435.66	673	-37.5
2012-13	2585	13.58	1677	9.4647	662	-1.6
2013-14	2426	-6.15	1766	5.3071	741	11.9

2014-15	2132	-12.12	1290	-26.95	610	-17.7
2015-16	2568	20.45	1889	46.43	725	18.9
2016-17	2678	4.28	2117	12.07	858	18.3
2017-18	2372	41.36	861	-59.32	353	-58.9
2018-19	2422	2.11	705	-18.11	371	5.1
Mean	**2437.77**	**-**	**1038.31**	**-**	**624.38**	**-**
SD	**229.73**	**-**	**673.17**	**-**	**229.46**	**-**
CGR	**-1.40%**	**-**	**8.99%**	**-**	**-6.91%**	**-**
CV	**9.42**	**-**	**64.83**	**-**	**36.75**	**-**

Source: www. Mahakrushi.com

Figure 7 Trend in Area under Jowar Cultivation in Sangli District

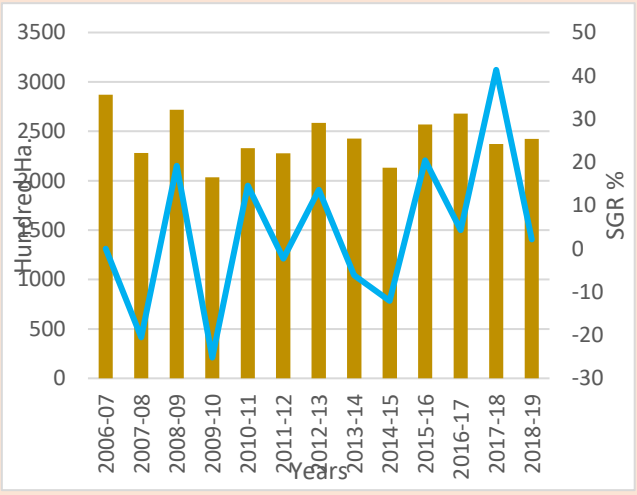


Figure 8 Trend in Production of Jowar in Sangli District

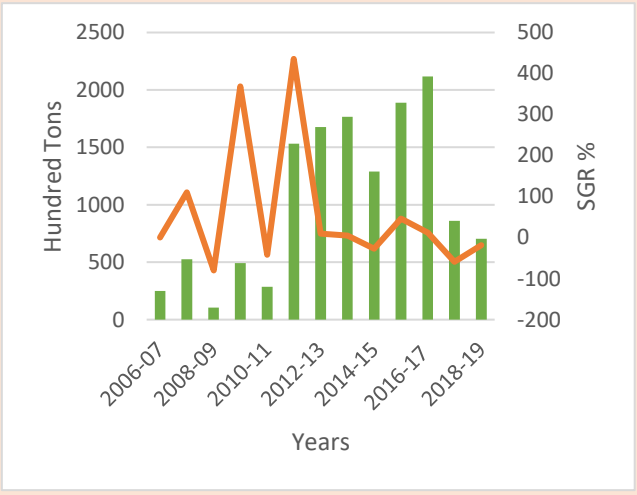
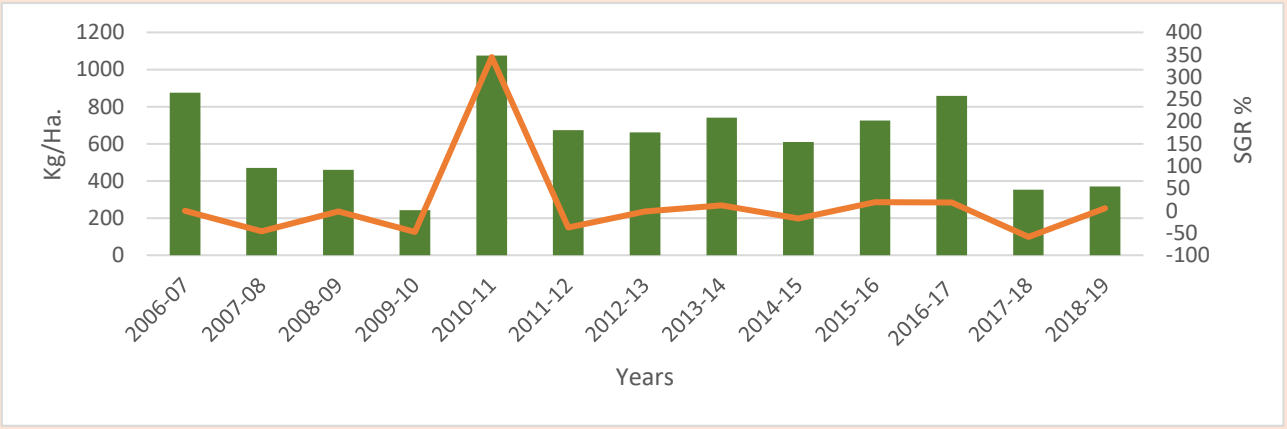


Figure 9 Trend in Productivity of Jowar in Sangli District



The area under jowar cultivation showed a decreasing trend, falling from 2,870 hundred hectares in 2006-07 to 2422 hundred hectares in 2018-19. The lowest recorded area was 2033 hundred hectares in the 2009-10 period. The mean area throughout the study was 2437.77 hundred hectares, with a SD of 229.73 hundred hectares, and a CVs of 9.42 percent. The CGR for the Jowar region was -1.40, reflecting the gradual decrease in the allocation of land to Jowar.

Jowar production showed a high variability, ranging from 251 hundred tonnes in 2006-07 to 705 hundred tonnes in 2018-19. The highest production was recorded in the 2016-17 period (2117 hundred tonnes) while the lowest was recorded in the 2008-09 period (105 hundred tonnes). The average production of jowar amounted to 1038.31 hundred tonnes with an SD of 673.17 hundred tonnes and a CV of 64.83 percent, indicating a considerable volatility of the production level. The CGR of output was 8.99 percent.

The productivity of jowar followed an erratic trend, starting at 876 kg per hectare in 2006-07 and ending at 371 kg per hectare in 2018-19, which represents a drastic decrease. The highest recorded productivity was in the 2010-11 period (1076 kg per hectare), while the lowest was in the 2017-18 period (353 kg per hectare). Average productivity was 624.38 kg per hectare, with an SD of 229.46 kg per hectare and a CV of 36.75 percent, indicating high variability. The CGR for jowar productivity showed a steep negative increase of -6.91 percent, which underlined the significant decrease in yield during the period of the study.

Foodgrains

The total area under foodgrains crops in Sangli district decreased from 5497 hundred hectares in 2006-07 to 3829 hundred hectares in 2018-19. The highest recorded area in 2006-07 was 5497 hundred hectares. The average area was 4495.08 hundred hectares, with an SD of 787.44 hundred hectares and a CVs of 17.52 percent. The CGR for the total area under foodgrain crops amounted to -2.97 percent.

Table 4 Growth of Area, Production, and Productivity of Foodgrains in Sangli District during 2006-07 to 2018-19

(Area in Hundred Hectares Production in Hundred Tons, Yield in Kg / Hectare)

Year	Area	SGR	Production	SGR	Productivity	SGR
2006-07	5497	0	4501	0	819	0
2007-08	4484	-18.43	3278	-27.17	731	-10.74
2008-09	4321	-3.64	2196	-33.01	508	-30.51
2009-10	2949	-31.75	1549	-29.46	525	3.35
2010-11	5217	76.91	5185	234.73	994	89.33
2011-12	4496	-13.82	3612	-30.34	803	-19.22
2012-13	5120	13.88	3682	1.94	719	-10.46
2013-14	5074	-0.9	4583	24.47	903	25.59
2014-15	3142	-38.08	3000	-34.55	879	-2.66
2015-16	4811	53.12	4237	41.23	881	0.23
2016-17	5414	12.53	6049	42.77	1117	26.79
2017-18	4082	-20.2	2967	-50.95	727	-34.91
2018-19	3829	-6.2	2297	-22.58	600	-17.47
Mean	**4495.08**	**-**	**3625.85**	**-**	**785.08**	**-**
SD	**787.44**	**-**	**1222.60**	**-**	**170.19**	**-**
CGR	**-2.97%**	**-**	**-5.45%**	**-**	**-2.56%**	**-**
CV	**17.52**	**-**	**33.72**	**-**	**21.68**	**-**

Source: www. Mahakrushi.com

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Figure 10 Trend in Area under Foodgrains Cultivation in Sangli District

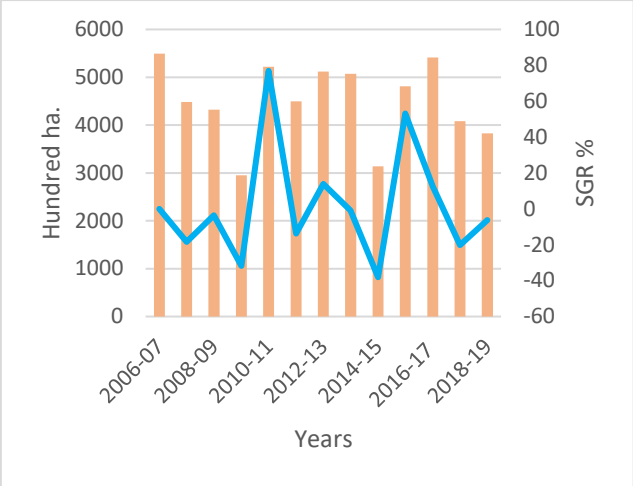


Figure 11 Trend in Production of Foodgrains in Sangli District

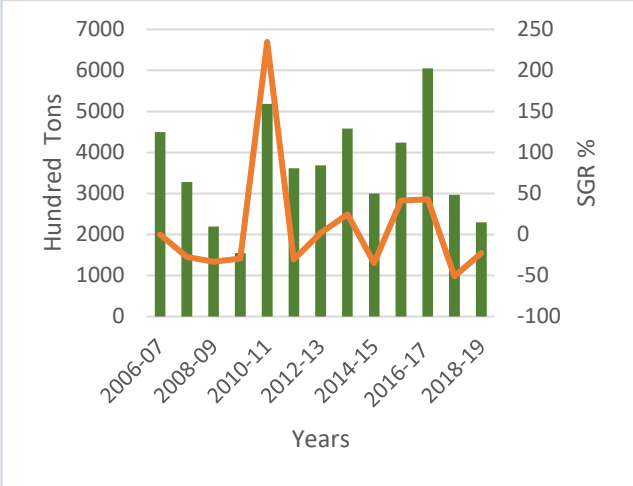
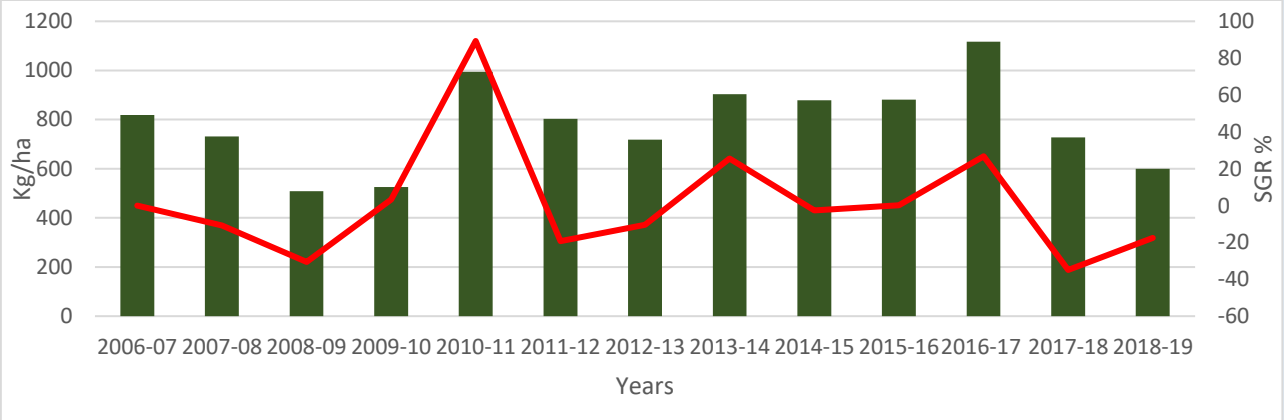


Figure 12 Trend in Productivity of Foodgrains in Sangli District



The production of foodgrains followed a fluctuating trend, from 4501 hundred tonnes in 2006-07 to 2297 hundred tonnes in 2018-19. The highest production was made in the 2016-17 period (6049 hundred tonnes). The average production amounted to 3625.85 hundred tonnes with an SD of 1222.60 hundred tonnes and a CVs of 33.72 percent. The CGR of the output was -5.45 percent, indicating a decreasing trend.

The productivity of foodgrain crops decreased from 819 kg per hectare in 2006-07 to 600 kg per hectare in 2018-19. The highest recorded productivity was 1117 kg per hectare in the 2016-17 period. Average productivity was 785.08 kg per hectare, SD was 170.19 kg per hectare, and CV 21.68. percent The CGR of productivity was -2.56 percent, indicating that the growth of the return has been decreasing over time.

Overall, the study shows a downward trend in the area, production, and productivity of foodgrain crops in Sangli, with jowar showing the steepest decrease. This underlines the need for improved irrigation equipment, sustainable farming practices, and political support to increase productivity and safeguard food security.

5. Conclusions

The results of this study show a mixed development of the area, production, and productivity of foodgrain crops in the Sangli district between 2006 and 2018-19. Although

the area under food grain cultivation showed a general decrease, production and productivity fluctuated significantly. Rice production showed extreme variability, with a notable increase in some years followed by a sharp decline in others. Wheat growing showed a decreasing trend in both area and production, while jowar showed a significant decrease in productivity over time. These trends underline the difficulties facing farmers in maintaining stable agricultural production.

The main observation is that, despite some technological progress, declining soil fertility, erratic monsoons, and rainfall dependency have harmed productivity in some regions. Irregular fluctuations in grain production indicate that sustainable farming practices and improved irrigation infrastructure are necessary to stabilize yields. In addition, input costs, access to quality seeds, and financial support mechanisms play a key role in determining the willingness of farmers to continue growing food grains.

Policymakers need to focus on strengthening irrigation facilities, promoting climate-resilient crops, and ensuring access to affordable inputs for farming. Extension services should further educate farmers on modern agricultural techniques, soil protection practices, and the benefits of crop diversification. Government intervention through subsidies, crop insurance, and price support mechanisms can also help to reduce risks and support foodgrain production.

Overall, addressing the challenges facing foodgrain farmers in Sangli requires a combination of infrastructure improvements, political support, and farmer-led initiatives. A comprehensive approach integrating technology, financial assistance, and sustainable agricultural practices will be crucial to ensure long-term growth in the region's agriculture and food security.

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