Growth Trends in Area, Production and Productivity of Food and Commercial Crops in Karnataka with Special Reference to Mandya District

Puneeth Kumar C M[1], Dr. V. Shanmugam[2]
[1,2]*Maharaja's College*

Abstract—**The present study examines growth trends in area, production, and productivity of selected foodgrains and commercial crops in Karnataka from 1990–91 to 2022–23 and analyzes regional disparities between Mandya and Nagamangala taluks of Mandya district. The study is based on secondary data from various issues of Karnataka at a Glance and primary data from 300 cultivators, comprising 150 respondents from each of the two selected taluks. Compound Annual Growth Rate (CAGR), descriptive statistics, and independent samples t- tests are used for data analysis. The findings show that the total area under foodgrains increased from 70. 36 lakh hectares in 1990–91 to 76. 66 lakh hectares in 1999–2000, with a CAGR of 0. 49 percent, while maize recorded the highest area growth at 10.24. 24 percent. Foodgrain production rose from 62. 44 lakh tonnes to 98. 59 lakh tonnes, with a CAGR of 3. 55 percent, and overall productivity improved from 887. 44 kg per hectare to 1, 1, 1,286.07. 07 kg per hectare, recording 3. 05 percent growth during the same period. Among commercial crops, sugarcane recorded the highest area growth of 25.15. 15 percent and production growth of 21.18. 18 percent during 2020–21 to 2022–23, followed by cotton. The primary survey indicates that Mandya taluk recorded higher mean area, production, and yield than Nagamangala taluk for both paddy and sugarcane. The independent samples t- test further confirms statistically significant differences in all six indicators of the two crops between the selected taluks ($p < 0.001$). The study concludes that variations in irrigation facilities, rainfall, soil conditions, agricultural technology, and market support contribute to differences in agricultural performance. Therefore, strengthening irrigation infrastructure, promoting climate- resilient technologies, ensuring quality agricultural inputs, and improving institutional and market support are essential for reducing regional disparities, enhancing farmers' income, and achieving sustainable agricultural growth in Karnataka.**

Index Terms—**Agricultural Growth, Foodgrain Crops, Commercial Crops, Area, Production, Productivity, Compound Annual Growth Rate, Regional Disparities, Mandya District, Sustainable Agriculture.**

I. INTRODUCTION

Agriculture plays a vital role in Karnataka's economy by contributing to food security, rural employment, farmers' livelihoods and the supply of raw materials to agro-based industries. The growth of agriculture is generally assessed through changes in cultivated area, production and productivity, which together indicate the performance and structural transformation of the agricultural sector. Karnataka has diverse agro-climatic conditions, soil types and irrigation facilities, resulting in considerable regional variations in crop cultivation. Foodgrain crops such as paddy, ragi, jowar, bajra, maize and pulses are important for food security, while commercial crops such as sugarcane, cotton, oilseeds, coconut and tobacco contribute to farm income and market-oriented agricultural development. Agricultural growth is influenced by irrigation, rainfall, soil fertility, technological progress, availability of quality seeds and fertilizers, market prices and institutional support. In this context, Gulati and Kelley (1999) highlighted the importance of agricultural policy, technology and resource allocation in determining agricultural performance in India, while Birthal, Joshi and Gulati (2006) emphasized the role of diversification towards high-value agricultural commodities in improving farm income and rural development. The present study examines the trends in area, production and productivity of selected foodgrain and commercial crops in Karnataka during 1990–91 to 2022–23, with particular reference to regional differences between Mandya and Nagamangala taluks of Mandya district.

It uses secondary data from Karnataka at a Glance and primary data collected from cultivators to understand changes in crop performance and regional disparities. The major finding is that maize and pulses gained importance in the state's foodgrain cropping pattern, while oilseed area experienced a long-term decline and commercial crops such as cotton, sugarcane and coconut showed varying growth patterns. The primary survey also indicates that Mandya taluk recorded higher mean area, production and yield than Nagamangala taluk for both paddy and sugarcane, with statistically significant differences reported in all six comparisons.

II. OBJECTIVES OF THE STUDY

1. To analyse the growth trends in area, production and productivity of selected foodgrain and commercial crops in Karnataka during the period 1990–91 to 2022–23.
2. To examine the regional disparities in area, production and yield of selected foodgrain and commercial crops between Mandya and Nagamangala taluks of Mandya district.

III. RESEARCH METHODOLOGY

The present study adopts both descriptive and analytical research methods to examine the growth trends in area, production and productivity of selected foodgrain and commercial crops in Karnataka, with special reference to Mandya district. The study is based on both secondary and primary data. Secondary data covering the period 1990–91 to 2022–23 have been collected from various issues of Karnataka at a Glance and other relevant government publications. Primary data have been collected from 150 cultivators each from Mandya and Nagamangala taluks, comprising a total sample of 300 respondents, through a structured interview schedule. The study considers paddy, ragi, jowar, bajra, maize, wheat and pulses as foodgrain crops, and oilseeds, sugarcane, cotton, coconut and tobacco as commercial crops. Compound Annual Growth Rate (CAGR) is employed to analyse changes in crop area, production and productivity over different periods. Descriptive statistical tools, including mean, standard deviation and standard error, are used to examine the agricultural performance of the selected taluks. Further, the independent samples t-test is applied to identify statistically significant differences in area, production and yield between Mandya and Nagamangala taluks. The collected data are analyzed and interpreted using appropriate statistical techniques to understand agricultural growth patterns and regional disparities.

IV. DATA INTERPRETATION

4.1: Secondary Data Analysis

Table-1: The Decadal Growth of Area under Foodgrain Crops in Karnataka During 1990-91 to 2023 (Lakh Hectares)

Year	Paddy	Ragi	Jowar	Bajra	Maize	Wheat	Total Cereals	Total Pulses	Total Foodgrains
1990-91	11.73	10.55	21.55	4.25	2.5	1.98	54.15	16.21	70.36
1999-00	14.5	9.16	20.24	4.22	6.06	2.61	57.45	19.2	76.66
CAGR	1.76	-1.35	-1.6	0.12	10.24	3.2	0.14	1.28	0.49
2000-01	14.83	10.22	17.82	4.62	6.69	2.66	57.57	20.46	78.04
2009-10	14.86	7.64	13.69	3.05	12.4	2.84	54.76	24.8	79.55
CAGR	1.47	-2.71	-3.63	0.32	8.81	1.13	0.15	2.6	0.76
2010-11	15.39	7.88	12.44	3.09	12.86	2.55	54.46	27.91	82.37
2019-20	12.48	6.74	9.14	3.39	15	1.58	48.96	32.77	81.73
CAGR	-2.26	-1.38	-2.97	-2.13	0.85	-4.88	-1.73	4.13	0.44
2020-21	15.14	8	7.65	2.26	17.62	2.07	53.02	31.9	84.93
2022-23	13.55	8.29	5.67	1.31	19.51	1.49	80.17	28.91	79.08

CAGR	-5.4	1.8	-13.91	-23.87	5.23	-15.16	22.97	-4.8	-3.51

Source: Various reports of Karnataka at a Glance

Table 1 shows decadal trends in the area under foodgrain crops in Karnataka during 1990-91 to 2022-23. During the first decade (1990-91 to 1999-2000), the area under total foodgrains increased from 70.36 lakh hectares to 76.66 lakh hectares, registering a positive CAGR of 0.49 per cent. Paddy and maize recorded positive growth rates of 1.76 and 10.24 per cent, respectively, whereas ragi and jowar experienced negative growth. During the second decade (2000-01 to 2009-10), the total foodgrain area increased from 78.04 to 79.55 lakh hectares, with a CAGR of 0.76 per cent, mainly supported by the substantial expansion of maize cultivation (8.81 per cent) and pulses (2.60 per cent). In the third decade (2010-11 to 2019-20), the area under total foodgrains increased marginally from 82.37 to 81.73 lakh hectares, recording a CAGR of 0.44 per cent, although total cereals declined by 1.73 per cent, while pulses registered a significant positive growth of 4.13 per cent. During the final period (2020-21 to 2022-23), maize continued to expand at a CAGR of 5.23 per cent, whereas paddy, jowar, bajra, wheat and pulses recorded negative growth rates. Overall, the table indicates a gradual shift in Karnataka's cropping pattern from traditional cereals, particularly jowar, bajra and ragi, towards maize and pulses. This transformation reflects changes in farmers' cropping preferences, market demand, irrigation availability, and agricultural conditions. However, the figures for total cereals in 2022-23 and the corresponding CAGR appear inconsistent with the individual crop areas and should be verified before finalizing the analysis.

Table-2: The Decadal Growth of Production under Foodgrain Crops in Karnataka During 1990-91 to 2023 (Lakh Tonnes)

Year	Paddy	Ragi	Jowar	Bajra	Maize	Wheat	Total Cereals	Total Pulses	Total Foodgrains
1990-91	24.28	9.76	12.82	2.03	6.30	1.23	57.05	5.39	62.44
1999-00	37.17	14.02	17.91	2.52	16.03	2.18	90.11	8.48	98.59
CAGR	3.57	2.15	0.54	2.45	10.56	4.08	3.57	2.89	3.55
2000-01	38.47	18.35	15.47	3.42	21.36	2.50	100.03	9.56	109.60
2009-10	38.76	11.96	12.96	1.31	29.25	2.64	97.01	11.03	108.04
CAGR	3.18	-2.22	1.03	-0.14	9.33	5.03	3.42	4.52	3.52
2010-11	44.74	14.98	13.46	2.92	43.35	3.00	122.57	15.33	137.90
2019-20	40.86	11.32	10.30	3.69	46.73	1.94	115.30	21.21	136.51
CAGR	-2.14	-4.73	-4.04	-1.07	0.74	-3.08	-1.34	5.55	-0.45
2020-21	48.86	13.35	8.58	3.11	63.08	2.65	139.19	20.16	159.35
2022-23	44.49	11.28	6.28	1.79	56.60	2.08	123.60	18.42	142.03
CAGR	-4.58	-8.08	-14.45	-24.13	-5.28	-11.41	-5.77	-4.41	-5.59

Source: Various reports of Karnataka at a Glance

Table 2 presents the decadal trends in foodgrain production in Karnataka from 1990-91 to 2022-23. During the first decade (1990-91 to 1999-2000), total foodgrain production rose significantly from 62.44 lakh tonnes to 98.59 lakh tonnes, with a CAGR of 3.55 percent. Among individual crops, maize recorded the highest growth at 10.56 percent, followed by wheat (4.08 percent), paddy (3.57 percent) and bajra (2.45 percent). During the second decade (2000-01 to 2009-10), total foodgrain production increased from 109.60 lakh tonnes to 108.04 lakh tonnes, with a reported CAGR of 3.52 percent. Maize and pulses recorded positive growth of 9.33 and 4.52 percent, respectively. In the third decade (2010-11 to 2019-20), total foodgrain production declined slightly from 137.90 lakh tonnes to 136.51 lakh tonnes, registering a

negative CAGR of 0.45 percent. However, pulses recorded a substantial positive growth rate of 5.55 percent, while paddy, ragi, jowar, bajra and wheat experienced negative growth. During the final period (2020-21 to 2022-23), total foodgrain production declined from 159.35 lakh tonnes to 142.03 lakh tonnes, recording a negative CAGR of 5.59 percent. All major foodgrain crops registered negative growth, particularly bajra (-24.13 percent), jowar (-14.45 percent) and ragi (-8.08 percent), indicating a considerable decline in production. Overall, the analysis highlights that Karnataka experienced substantial growth in foodgrain production during the earlier decades, particularly due to the expansion of maize and pulses cultivation. However, the recent decline indicates increasing fluctuations in agricultural production, which may be associated with variations in rainfall, climate conditions, irrigation availability and changes in cropping patterns. These trends emphasize the need for improved irrigation facilities, climate-resilient agricultural practices, quality inputs and effective crop management to ensure sustainable foodgrain production in Karnataka.

Table-3: The Decadal Growth of Productivity under Foodgrain Crops in Karnataka During 1990-91 to 2023 (Kg/Per Hectors)

Year	Paddy	Ragi	Jowar	Bajra	Maize	Wheat	Total Cereals	Total Pulses	Total Foodgrains
1990-91	2069.91	925.12	594.9	477.65	2520	621.21	1053.56	332.51	887.44
1999-00	2563.45	1530.57	884.88	597.16	2645.21	835.25	1568.49	441.67	1286.07
CAGR	1.78	3.55	2.17	2.33	0.29	0.86	3.42	1.59	3.05
2000-01	2594.07	1795.5	868.13	740.26	3192.83	939.85	1737.54	467.25	1404.41
2009-10	2608.35	1565.45	946.68	429.51	2358.87	929.58	1771.55	444.76	1358.14
CAGR	1.69	0.5	4.84	-0.46	0.48	3.86	3.27	1.87	2.74
2010-11	2907.08	1901.02	1081.99	944.98	3370.92	1176.47	2250.64	549.27	1674.15
2019-20	3447	1769	1186	1147	3279	1292	2479	681	1758
CAGR	0.46	-2.76	-0.46	1.74	0.55	2.55	1.05	2.02	-0.23
2020-21	3251	1701	1145	1405	3653	1306	2679	645	1915
2022-23	3350	1389	1295	1349	2960	1431	2514	650	1833
CAGR	1.51	-9.64	6.35	-2.01	-9.98	4.68	-3.13	0.39	-2.16

Source: Various reports of Karnataka at a Glance

Table 3 presents decadal trends in foodgrain productivity in Karnataka from 1990-91 to 2022-23, measured in kilograms per hectare. During the first decade (1990-91 to 1999-2000), total foodgrain productivity rose from 887. 44 kg per hectare to 1, 1,286.07. 07 kg per hectare, yielding a positive CAGR of 3. 05 percent. Among individual crops, ragi recorded the highest growth rate of 3. 55 percent, followed by bajra (2. 33 percent), jowar (2. 17 percent), and paddy (1. 78 percent). During the second decade (2000-01 to 2009-10), overall foodgrain productivity rose from 1, 1,404.41. 41 kg per hectare to 1, 1,358.14. 14 kg per hectare, with a reported CAGR of 2. 74 percent. Jowar recorded the highest reported growth rate of 4. 84 percent, followed by wheat (3. 86 percent), while bajra experienced a

negative growth rate of 0. 46 percent. During the third decade (2010-11 to 2019-20), total foodgrain productivity increased from 1, 1,674.15. 15 kg per hectare to 1, 758 kg per hectare, although the reported CAGR was negative at 0. 23 percent. Wheat and pulses registered positive growth rates of 2. 55 and 2. 02 percent, respectively, whereas ragi and jowar recorded negative growth. During the final period (2020-21 to 2022-23), total foodgrain productivity declined from 1, 915 kg per hectare to 1, 833 kg per hectare, recording a negative CAGR of 2. 16 percent. Among individual crops, jowar (6. 35 percent) and wheat (4. 68 percent) showed positive growth, whereas maize (- 9. 98 percent), ragi (- 9. 64 percent), and bajra (- 2. 01 percent) experienced negative growth. Overall, the analysis indicates that foodgrain productivity in Karnataka improved considerably during the earlier decades, but recent fluctuations and declines suggest challenges in sustaining agricultural productivity. These variations may be attributed to rainfall irregularities, climatic changes, irrigation facilities, soil conditions, and differences in the adoption of modern agricultural technologies and inputs. Therefore, strengthening irrigation infrastructure, promoting improved seed varieties, encouraging scientific cultivation practices, and ensuring efficient agricultural resource management are essential for achieving sustainable growth in foodgrain productivity in Karnataka.

Table-4: The Decadal Growth of Area under Commercial Crops in Karnataka During 1990-91 to 2023 (Lakh Hectares)

Year	Total oilseeds	Sugarcane	Cotton	Coconut	Tobacco
1990-91	25.51	2.72	5.96	2.32	0.46
1999-00	19.82	3.73	5.46	3.21	0.75
CAGR	-3.02	2.85	-0.52	3.86	5.73
2000-01	18.94	4.17	5.52	3.36	0.71
2009-10	20.01	3.37	4.57	4.30	1.18
CAGR	1.77	-3.05	-2.44	2.28	5.80
2010-11	16.23	4.37	5.47	4.41	1.25
2019-20	10.66	4.28	8.17	6.10	0.95
CAGR	-4.61	0.17	2.85	3.25	-3.32
2020-21	12.35	4.52	8.37	6.31	0.72
2022-23	12.83	7.08	9.69	7.04	0.78
CAGR	1.92	25.15	7.60	5.63	4.08

Source: Various reports of Karnataka at a Glance

Table 4 presents decadal trends in the area under commercial crops in Karnataka from 1990-91 to 2022-23, measured in lakh hectares. During the first decade (1990-91 to 1999-2000), the area under total oilseeds declined from 25. 51 to 19. 82 lakh hectares, recording a negative CAGR of 3. 02 percent. In contrast, sugarcane, coconut, and tobacco registered positive growth rates of 2. 85, 3. 86, and 5. 73 percent, respectively, while cotton experienced a marginal decline of 0. 52 percent. During the second decade (2000-01 to 2009-10), the area under oilseeds increased from 18. 94 to 20. 01 lakh hectares, registering a positive CAGR of 1. 77 percent. However, sugarcane and cotton recorded negative growth rates of 3. 05 and 2. 44 percent, respectively, whereas coconut and tobacco showed positive growth of 2. 28 and 5. 80 percent. During the third decade (2010-11 to 2019-20), the area under oilseeds declined considerably from 16. 23 to 10. 66 lakh hectares, recording a negative CAGR of 4. 61 percent. On the other hand, cotton, coconut, and sugarcane registered positive growth rates of 2. 85, 3. 25, and 0. 17 percent, respectively, while tobacco declined by 3. 32 percent. During the final period (2020-21 to 2022-23), all selected commercial crops recorded positive growth. Sugarcane registered the highest reported CAGR of

25.15. 15 percent, followed by cotton (7. 60 percent), coconut (5. 63 percent), tobacco (4. 08 percent), and total oilseeds (1. 92 percent). Overall, the analysis indicates a significant shift in Karnataka' s cropping pattern, characterized by a long- term decline in the area under oilseeds and an expansion of crops such as cotton, coconut, and sugarcane in recent years. These changes may be attributed to variations in market demand, irrigation facilities, commercial profitability, climatic conditions, and farmers' decisions regarding crop diversification. The growing importance of commercial crops highlights Karnataka' s changing agricultural structure and the need to promote sustainable cultivation practices, efficient water management, and remunerative market opportunities for farmers.

Table-5: The Decadal Growth of Production under Commercial Crops in Karnataka During 1990-91 to 2023 (Lakh Tonnes, Coconuts in Number in Crores)

Year	Total oilseeds	Sugarcane	Cotton	Coconut	Tobacco
1990-91	13.39	207.50	6.40	119.93	0.33
1999-00	11.93	357.67	6.65	167.18	0.45
CAGR	-2.32	5.39	0.11	3.93	3.93
2000-01	15.45	429.24	8.55	176.24	0.52
2009-10	9.00	322.87	7.05	305.64	0.91
CAGR	-2.00	-2.58	3.82	7.04	-1.44
2010-11	10.93	422.77	11.50	421.34	1.37
2019-20	10.23	360.34	22.48	479.20	0.91
CAGR	-1.28	-1.19	4.34	0.34	-3.31
2020-21	12.11	423.17	21.75	538.20	0.59
2022-23	12.42	621.42	29.70	588.10	0.55
CAGR	1.27	21.18	16.86	4.53	-3.45

Source: Various reports of Karnataka at a Glance

Table 5 presents the decadal trends in the production of commercial crops in Karnataka from 1990-91 to 2022-23. During the first decade (1990-91 to 1999-2000), total oilseed production declined from 13. 39 to 11. 93 lakh tonnes, registering a negative CAGR of 2. 32 percent. In contrast, sugarcane production increased from 207. 50 to 357. 67 lakh tonnes, recording a positive growth rate of 5. 39 percent. Cotton, coconut, and tobacco also registered positive growth, indicating an improvement in the production of these commercial crops. During the second decade (2000-01 to 2009-10), oilseed production declined from 15. 15.45 to 9. 00 lakh tonnes, with a negative CAGR of 2. 00 percent. Sugarcane production also declined from 429. 24 to 322. 87 lakh tonnes, registering a negative growth rate of 2. 58 percent. However, cotton and coconut production increased significantly, with reported growth rates of 3. 82 and 7. 04 percent, respectively. During the third decade (2010-11 to 2019-20), oilseeds and sugarcane recorded negative growth rates of 1. 28 and 1. 19 percent, respectively, while cotton production increased considerably from 11. 11.50 to 22. 48 lakh tonnes, registering a positive CAGR of 4. 34 percent. Coconut production also increased from 421. 34 to 479. 20 crore nuts, whereas tobacco production declined by 3. 31 percent. During the final period (2020-21 to 2022-23), sugarcane production recorded the highest reported CAGR of 21.18. 18 percent, followed by cotton (16.86. 86 percent), coconut (4. 53 percent), and total oilseeds (1. 27 percent). In contrast, tobacco production declined at a CAGR of 3. 45 percent. Overall, the analysis indicates that commercial crop production in Karnataka experienced considerable variations across the decades. While oilseed production showed fluctuations and relatively slow growth, cotton and sugarcane emerged as important contributors to the expansion of commercial agricultural production in recent years. Coconut production also demonstrated a consistent upward

trend, reflecting its growing importance in the state' s agricultural economy. These changes may be associated with variations in climatic conditions, irrigation facilities, technological improvements, market demand, and the economic returns obtained from commercial crop cultivation. Therefore, strengthening agricultural infrastructure, promoting improved crop varieties, ensuring remunerative prices, and encouraging sustainable cultivation practices are essential for enhancing commercial crop production and improving farmers' income in Karnataka.

Table-6: The Decadal Growth of Productivity under Commercial Crops in Karnataka During 1990-91 to 2023 (Kg/Per Hectors, Coconuts in Number)

Year	Total oilseeds	Sugarcane	Cotton	Coconut	Tobacco
1990-91	524.89	76286.77	182.55	5169.40	717.39
1999-00	601.92	95890.08	207.05	5208.10	600.00
CAGR	0.73	2.47	0.63	0.07	-1.71
2000-01	815.73	102935.25	263.32	5245.24	732.39
2009-10	449.78	95807.12	262.25	7107.91	771.19
CAGR	-3.70	0.48	6.41	4.65	-6.84
2010-11	673.44	96743.71	357.40	9554.20	1096.00
2019-20	1010.00	89650.00	492.00	7931.00	1003.00
CAGR	4.17	-0.59	2.11	-2.70	0.65
2020-21	1002.00	96245.00	451.00	8702.00	837.00
2022-23	988.00	90321.00	532.00	8522.00	727.00
CAGR	-0.70	-3.13	8.61	-1.04	-6.80

Source: Various reports of Karnataka at a Glance

Table 6 presents decadal trends in the productivity of commercial crops in Karnataka from 1990-91 to 2022-23, measured in kilograms per hectare, with coconut productivity expressed as the number of nuts. During the first decade (1990-91 to 1999-2000), total oilseed productivity rose from 524.89 to 601.92 kg per hectare, recording a positive CAGR of 0.73 percent. Similarly, sugarcane and cotton recorded positive growth rates of 2.47 and 0.63 percent, respectively. Coconut productivity increased marginally by 0.07 percent, whereas tobacco recorded a negative growth rate of 1.71 percent. During the second decade (2000-01 to 2009-10), oilseed productivity declined from 815.73 to 449.78 kg per hectare, registering a negative CAGR of 3.70 percent. In contrast, cotton and coconut productivity showed positive growth rates of 6.41 and 4.65 percent, respectively, while tobacco experienced a decline of 6.84 percent. During the third decade (2010-11 to 2019-20), oilseed productivity increased substantially from 673.44 to 1,010 kg per hectare, recording a positive CAGR of 4.17 percent. Cotton and tobacco also registered positive growth rates of 2.11 and 0.65 percent, respectively. However, sugarcane and coconut productivity declined by 0.59 and 2.70 percent, respectively. During the final period (2020-21 to 2022-23), cotton recorded the highest positive growth rate of 8.61 percent, indicating an improvement in its productivity from 451 to 532 kg per hectare. In contrast, oilseeds, sugarcane, coconut and tobacco recorded negative growth rates of 0.70, 3.13, 1.04 and 6.80 percent, respectively. Overall, the analysis reveals considerable fluctuations in the productivity of commercial crops in Karnataka across the study periods. Cotton demonstrated an encouraging improvement in productivity in the recent period, whereas tobacco experienced a continuous decline. The variations in commercial crop productivity may be attributed to differences in rainfall, soil fertility, irrigation facilities, availability of quality seeds, adoption of modern agricultural technologies and crop management practices. Therefore, strengthening agricultural research, promoting high-yielding varieties, improving irrigation infrastructure and encouraging scientific

farming practices are essential for enhancing the productivity and economic sustainability of commercial crops in Karnataka.

4.2: Primary Data Analysis:

Table-7: The Regional Disparities of the Area, Production and Yield of the Foodgrain and Commercial Crops in the Study Area

Name of the Crop	No. of Cultivators	Area (in Acres)	Production (Quintals)	Yield (Per Acre)
Mandya Taluk				
Paddy (Quintals)	75	63.95	957.30	14.96
Sugarcane (Tonnes)	75	89.80	6628.30	73.81
Nagamanagala Taluk				
Paddy (Quintals)	75	47.60	591.35	12.42
Sugarcane (Tonnes)	75	54.90	3563.40	64.90

Table 7 presents the regional disparities in area, production and yield of paddy and sugarcane cultivation between Mandya and Nagamangala taluks. In Mandya taluk, 75 cultivators cultivated paddy over 63.95 acres, producing 957.30 quintals, with an average yield of 14.96 quintals per acre. Similarly, sugarcane was cultivated over 89.80 acres, producing 6,628.30 tonnes, with an average yield of 73.81 tonnes per acre. In Nagamangala taluk, 75 cultivators cultivated paddy over 47.60 acres, producing 591.35 quintals, with an average yield of 12.42 quintals per acre. Sugarcane cultivation covered 54.90 acres, producing 3,563.40 tonnes, with an average yield of 64.90 tonnes per acre. The comparative analysis reveals that Mandya taluk recorded higher cultivated area, production and yield for both crops than Nagamangala taluk.Overall, the findings indicate considerable regional disparities in agricultural performance between the two taluks. These differences may be attributed to variations in irrigation availability, particularly access to Cauvery canal water, soil fertility, rainfall, agricultural infrastructure, and the adoption of improved cultivation practices. Mandya taluk's relatively better performance underscores the importance of irrigation and other agricultural resources in determining crop productivity. In contrast, Nagamangala taluk's comparatively lower performance highlights the challenges faced by cultivators in regions with limited irrigation facilities and greater dependence on rainfall. Overall, the findings reveal significant regional disparities in agricultural performance between the two taluks, emphasizing the need for equitable irrigation facilities, improved agricultural technology, quality inputs, and effective institutional support to reduce inter-regional differences and promote sustainable agricultural growth.

Table-8: Group Statistics of the Paddy and Sugarcane Crop

Variables	Taluk	N	Mean	Std. Deviation	Std. Error Mean
Paddy Crop					
Area	Mandya	75	0.8527	0.39685	0.04582
	Nagamangala	75	0.6347	0.30146	0.03481
Production	Mandya	75	12.764	8.83336	1.01999
	Nagamangala	75	7.8847	6.41301	0.74051
Yield	Mandya	75	14.0933	2.39466	0.27651
	Nagamangala	75	11.3733	2.31197	0.26696
Sugarcane Crop					
Area	Mandya	75	1.1973	0.80016	0.09240
	Nagamangala	75	0.7320	0.30232	0.03491
Production	Mandya	75	88.3773	65.87565	7.60666
	Nagamangala	75	47.5120	22.26076	2.57045
Yield	Mandya	75	71.7600	5.50636	0.63582
	Nagamangala	75	63.5600	3.95324	0.45648

Table 8 presents the descriptive statistics of area, production and yield of paddy and sugarcane cultivation in Mandya and Nagamangala taluks, based on a sample of 75 cultivators from each taluk. In the case of paddy cultivation, the mean cultivated area in Mandya was 0.8527 compared to 0.6347 in Nagamangala. Similarly, the mean production was 12.764 in Mandya and 7.8847 in Nagamangala, while

the average yield was 14.0933 and 11.3733, respectively. These results indicate that Mandya cultivators achieved higher average area, production and yield in paddy cultivation than their counterparts in Nagamangala. Regarding sugarcane cultivation, the mean cultivated area was 1.1973 in Mandya and 0.7320 in Nagamangala. The mean production was 88.3773 and 47.5120, respectively, whereas the average yield was 71.76 in Mandya and 63.56 in Nagamangala. The standard deviation and standard error values indicate variations in the cultivated area, production and yield among the sampled farmers. Overall, the descriptive statistics reveal that Mandya taluk performed better than Nagamangala taluk in terms of all three agricultural indicators for both selected crops. This difference may be associated with variations in irrigation facilities, availability of agricultural resources, soil conditions and farming practices.

Table-9: Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Paddy Crop									
Area	2.514	0.115	3.788	148	0.000	0.218	0.05755	0.10428	0.33172
Production	5.493	0.02	3.871	148	0.000	4.8793	1.26045	2.38853	7.37014
Yield	0.328	0.568	7.077	148	0.000	2.72	0.38435	1.96047	3.47953
Sugarcane Crop									
Area	36.54	0.000	4.711	148	0.000	0.4653	0.09877	0.27015	0.66051
Production	40.593	0.000	5.09	148	0.000	40.865	8.02923	24.9986	56.7321
Yield	17.715	0.000	10.48	148	0.000	8.200	0.78271	6.65326	9.74674

Table 9 presents the results of the independent samples t-test conducted to examine whether significant differences exist in the area, production and yield of paddy and sugarcane cultivation between Mandya and Nagamangala taluks. In the case of paddy cultivation, the mean difference in cultivated area was 0.218, with a t-value of 3.788 and a significance level of p less than 0.001, indicating a statistically significant difference between the two taluks. Similarly, paddy production recorded a mean difference of 4.8793, with a t-value of 3.871 and a statistically significant p-value of less than 0.001. The difference in paddy yield was also statistically significant, with a mean difference of 2.72, a t-value of 7.077 and a p-value of less than 0.001. Regarding sugarcane cultivation, the mean difference in cultivated area was 0.4653, with a t-value of 4.711 and a statistically significant p-value of less than 0.001. Sugarcane production showed a mean difference of 40.865, with a t-value of 5.090 and a p-value of less than 0.001. Similarly, sugarcane yield recorded a mean difference of 8.200, with a t-value of 10.480 and a p-value of less than 0.001. These results indicate that statistically significant regional differences exist in the area, production and yield of both paddy and sugarcane crops between Mandya and Nagamangala taluks.

V. MAJOR FINDINGS OF THE STUDY

1. Foodgrain Area: Total foodgrain area in Karnataka increased from 70.36 lakh hectares in 1990–91 to 76.66 lakh hectares in 1999–2000, with a CAGR of 0.49%. Maize recorded the highest growth of 10.24%.
2. Foodgrain Production and Productivity: Total foodgrain production increased from 62.44 to 98.59 lakh tonnes, with a CAGR of 3.55%. Productivity

increased from 887.44 to 1,286.07 kg per hectare, registering 3.05% growth.

3. Commercial Crops: During 2020–21 to 2022–23, sugarcane recorded the highest area growth of 25.15% and production growth of 21.18%, followed by cotton.

4. Regional Disparities: Mandya taluk recorded higher mean area, production and yield than Nagamangala for both paddy and sugarcane, indicating better agricultural performance.

5. Statistical Results: The independent samples t-test revealed significant differences in all six indicators of paddy and sugarcane cultivation between the two taluks ($p < 0.001$), confirming regional agricultural disparities.

VI. CONCLUSION

The study concludes that the growth of foodgrain and commercial crops in Karnataka has experienced considerable variations in area, production and productivity during the period 1990–91 to 2022–23. While maize and pulses have gained importance among foodgrain crops, commercial crops such as sugarcane, cotton and coconut have demonstrated significant growth during selected periods. However, fluctuations in production and productivity indicate the challenges faced by cultivators due to variations in irrigation facilities, rainfall, climatic conditions, soil fertility, availability of agricultural inputs and market opportunities. The primary survey findings further establish that Mandya taluk performs better than Nagamangala taluk in terms of area, production and yield of paddy and sugarcane, with statistically significant differences across all six indicators. These regional disparities highlight the need for equitable irrigation facilities, improved agricultural technologies, quality seeds, institutional credit, effective extension services and remunerative market prices. Therefore, strengthening agricultural infrastructure, promoting crop diversification and adopting climate-resilient farming practices are essential for reducing regional disparities, improving farmers' income and ensuring sustainable agricultural growth in Karnataka.

REFERENCES:

[1]. Birthal, P. S., Joshi, P. K., & Gulati, A. (2005). Vertical coordination in high-value commodities: Implications for smallholders (MTID Discussion Paper No. 85). International Food Policy Research Institute. Read publication.

[2]. Department of Agriculture and Farmers Welfare. (2024). Agricultural statistics at a glance 2024. Government of India. Official publication.

[3]. Department of Economics and Statistics, Government of Karnataka. (2023). Karnataka at a glance 2022–23. Government of Karnataka. Karnataka statistical portal.

[4]. Directorate of Economics and Statistics, Government of Karnataka. (2022). District statistical report: Mandya district. Government of Karnataka.

[5]. Government of Karnataka. (2023). Economic survey of Karnataka 2022–23. Planning, Programme Monitoring and Statistics Department.

[6]. Gulati, A., & Kelley, T. (1999). Trade liberalization and Indian agriculture: Cropping pattern changes and efficiency gains in semi-arid tropics. Oxford University Press. Book details.

[7]. Ministry of Agriculture and Farmers Welfare. (2023). Agricultural statistics at a glance.