



EXPLORING THE GROWTH AND PATTERNS OF SUGARCANE AREA, PRODUCTION, AND PRODUCTIVITY IN KARNATAKA

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Abstract

This paper examined trends of area, production and productivity of sugarcane in Karnataka. The area under sugarcane in Karnataka has significantly increased during the study period. It is found that the area of sugarcane increased by 1.76 percent over thirty years in Karnataka, whereas production and productivity also increased by 2.31 percent and 0.54 percent respectively. It is observed that the area under sugarcane in Northern district is very high compare to Southern district during the study period in Karnataka. It is also observed that the production of Sugarcane in Northern districts is very high compare to Southern districts in Karnataka. The area, production and productivity of sugarcane experienced a significant increase in Karnataka during the study period from 1991-92 to 2020-21, with the data analyzed using methods such as compound annual growth rate (CAGR) and independent t-test.

Key Words : Sugarcane, trends, sugar, productivity, Karnataka

1. Introduction

Karnataka is one among the major sugarcane and sugar producing states in the country as sugarcane is being cultivated in large areas since many years for production of jaggery, khandsari and white sugar. It is also a major provider of livelihood to millions of agricultural families and their dependents particularly in rural areas. In Karnataka, the sugarcane is cultivated over an area of 4.80 lakh ha with production 36.76 million tonnes of sugarcane and productivity of 85.50 tonnes per hectare (Karnataka economic survey. 2020-21). Belgaum, Bagalkot, Mandya, Vijayapur and Bidar are the leading districts in terms of area under sugarcane. Karnataka has tremendous potential for increasing the cane cultivation and achieving higher yields, as the soil and climatic conditions are most favorable for planting the cane in different seasons.

The Sugar Industry in Karnataka has more than 50 sugar factories distributed well across the state. The major benefits of Karnataka sugar industry are many as it has generated many facilities in the state such as communication, employment and transport. The sugar industry in Karnataka contributes around ₹36 crore per year to the state exchequer as central excise duty. (Wali V.S. & et.al 2019)

The district of Mandya is situated entirely on the south Karnataka plateau, which is a part of the Deccan Plateau. Located in southern Karnataka, Mandya is surrounded by Ramanagara district to the east, Thumukur district and Hassan district to the north and northwest, Mysuru district and Chamarajanagar district to the south, respectively.

2. Review of literature

A considerable literature has examined the trends in growth rates in the area, production, and productivity of sugarcane in Indian agriculture. These studies have also outlined the factors that cause/influence these trends and variations.

Talawar basavaraj. & et al (2019) in his study has examined the trend analysis revealed that a high fluctuation was observed in the production of sugarcane in Vijayapura District and Karnataka state during 1991-92 to 2015-16.

Rai, C. K., & Arti, A. (2017) in their study analysed the trends in area, production, and productivity of sugarcane per hectare in Uttar Pradesh. The study showed that the area, production, and productivity of Sugarcane have significantly increased during the study period (1990-91 to 2014-15).

3. Methodology

The study is based on secondary data collected from the Ministry of Agriculture and Farmers Welfare, Government of India and indiastat.com. The data is analyzed by using the compound annual growth rate. Compound annual growth rate (CAGR) is worked out to study the changes in the area, production, and yield of sugarcane from 1991-92 to 2020-21 and also used independent t test.

4. Trends in Area, Production, and Productivity of Sugarcane in Karnataka

Sugarcane is one of the important commercial crops which is responsible for the overall socio-economic development of the farming community in Karnataka. In India, Karnataka is in the third place both in area under sugarcane cultivation and production of sugarcane after Uttar Pradesh and Maharashtra and fifth with respect to sugar recovery after Tamil Nadu, Maharashtra, Haryana and Punjab. Out of total production of sugarcane in the country 7.50 per cent is produced by Karnataka State. The annual average domestic consumption of sugar of the state is about 23 to 25 lakh million tonnes (Annual report of commissioner for cane development and director of sugar for the year 2019-20).

In this study sugarcane growing area in Karnataka has been classified into two regions, namely; Southern Karnataka and Northern Karnataka.

1. Southern Karnataka :

Bengaluru, Chamarajanagar, Chickaballapur, Chikmagalur, Chitradurga, Dakshina Kannada, Davanagere, Hassan, Kodagu, Kolar, Mandya, Mysuru, Ramanagaram, Shivamogga, Tumakuru and Udupi

2. Northern Karnataka :

Bagalkote, Belagavi, Ballari, Bidar, Dharwad, Gadag, Kalburgi, Haveri, Koppal, Raichur, Uttara Kannada, Vijayapura and Yadgiri

Karnataka is bestowed with favorable agro climatic conditions duly supplemented with suitable soils for sugarcane cultivation. In the state, there are a number of perennial rivers with dams, reservoirs, bore wells and open wells to supply water for sugarcane cultivation. Before reviewing the sugarcane production in Karnataka, following is the statistics for Karnataka major states of India. The total cultivated area (area harvested) and production of sugarcane in the published record of the Ministry of Agriculture and Farmers Welfare, Government of India 2020-21.

5. Area under sugarcane cultivation in Karnataka

Karnataka stands 3rd in Sugarcane production next to Uttar Pradesh and Maharashtra, 2nd with respect to sugar recovery after Maharashtra. Sugarcane is grown in 16 districts of the state. Belgaum, Bagalkot, Bijapur, Mandya, Mysore, Chamrajanagar and Bidar are the major sugarcane producing districts. Karnataka is bestowed with favourable agro-climatic conditions duly supplemented with suitable soils for sugarcane cultivation. There are number of rivers with dams, reservoirs, bore-wells and open-wells to supply water for sugarcane cultivation. The following sub sections provides information about sugarcane in Karnataka.

Table 1 : Area under sugarcane cultivation in Karnataka (1991-92 to 2020-21)

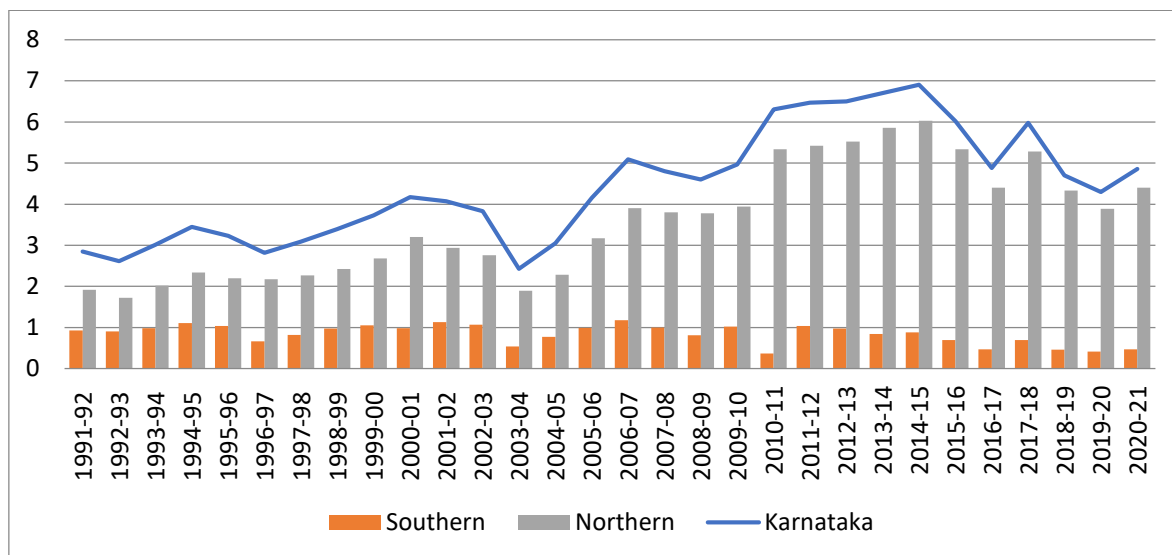
Year	Southern (In lakh hectares)	Northern (In lakh hectares)	Total (In lakh hectares)
1991-92	0.93	1.92	2.85
1992-93	0.90	1.72	2.61
1993-94	0.98	2.02	3.01
1994-95	1.11	2.34	3.45
1995-96	1.04	2.2	3.23
1996-97	0.66	2.17	2.82
1997-98	0.82	2.27	3.09
1998-99	0.97	2.42	3.39
1999-00	1.05	2.68	3.73
2000-01	0.98	3.2	4.17

2001-02	1.13	2.94	4.07
2002-03	1.07	2.76	3.83
2003-04	0.54	1.89	2.43
2004-05	0.77	2.28	3.05
2005-06	0.99	3.17	4.16
2006-07	1.18	3.9	5.09
2007-08	1.00	3.8	4.8
2008-09	0.81	3.78	4.6
2009-10	1.02	3.94	4.97
2010-11	0.37	5.34	6.31
2011-12	1.04	5.42	6.47
2012-13	0.97	5.52	6.5
2013-14	0.84	5.86	6.7
2014-15	0.88	6.03	6.91
2015-16	0.69	5.34	6.02
2016-17	0.47	4.4	4.88
2017-18	0.69	5.28	5.98
2018-19	0.46	4.3	4.7
2019-20	0.42	4.1	4.3
2020-21	0.47	4.86	4.4
CAGR	1.86%	-2.33%	2.90%

Source: Ministry of Agriculture and Farmers Welfare, Government of India

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Figure 1 : Area under sugarcane cultivation in Karnataka (1991-92 to 2020-21)



Source: Ministry of Agriculture and Farmers Welfare, Government of India

The figure 1 exhibits the area under Sugarcane in Karnataka. It shows the area under Sugarcane from 1991-92 to 2020-21. In 1991-92 the area under Sugarcane was 2.85 lakh hectares. Then it increased to 4.80 lakh hectares in 2014-15. Then it started to decrease from 2015-16 and finally reached to 4.4 lakh hectares in 2020-21.

The region wise area under Sugarcane in Karnataka has been reported in the figure 1. It is observed that the area under Sugarcane in Northern districts is very high compare to Southern districts during the study period due to large number of sugarfactories located in the region. In the year 1991-92 area under Sugarcane in Northern districts was 1.92 lakh hectares and Southern districts has only 0.93 lakh hectares during the same period. It is increased to 4.86 lakh hectares in Northern districts and decreased to 0.47 lakh hectares in Southern districts during 2020-21. The area under Sugarcane in Southern districts is only 10.68 percent of area under Sugarcane in Northern districts during 2020-21.

Table 2: Results of Independent Samples ‘t’ Test for Area Under Sugarcane between Northern and Southern Districts

	Region	N	Mean	Std. Deviation	Std. Error Mean
Area	Southern	30	.8413	.23591	.04307
	Northern	30	3.5737	1.36014	.24833

Mean Difference	Std. Error Difference	Degree of Freedom	t value	Significance
2.7324	0.20526	30.743	-10.841	.000***

Source: Values Computed by Researcher.

Note: *, ** and *** indicate significance level one, five and ten percent respectively

The table 2 shows the results of independent sample test for area under Sugarcane between Northern and Southern Districts in Karnataka. The average value of area under Sugarcane in Northern districts is 3.5737 million hectares whereas Southern districts has only 0.8413 million hectares. The calculated value of 't' is 10.841 and the 'p' value is 0.000, which indicate that there is significance difference in area under Sugarcane between Northern and Southern Districts and it is statistically significant at 1 percent level of significance.

Table 3 : Region Wise Sugarcane Production in Karnataka (1991-92 to 2020-21)

Year	Southern (In lakh tonnes)	Northern (In lakh tonnes)	Total (In lakh tonnes)
1991-92	99.63	141	240.63
1992-93	96.99	127.8	224.8
1993-94	104.48	161.55	266.03
1994-95	122.59	208.33	330.93
1995-96	109.8	165.78	275.58
1996-97	67.79	165.95	233.74
1997-98	89.18	200.81	289.99
1998-99	105.52	242.19	347.71
1999-00	115.13	260.54	375.67
2000-01	113.48	315.75	429.23
2001-02	117.34	212.83	330.17
2002-03	114.49	210.37	324.85
2003-04	57.32	102.83	160.15
2004-05	44.25	95.63	139.88
2005-06	46.76	149.72	196.48
2006-07	68.48	167.94	236.42
2007-08	65.94	194.34	260.28
2008-09	51.25	191.41	242.66
2009-10	58.3	246.13	304.43
2010-11	80.35	316.22	396.58

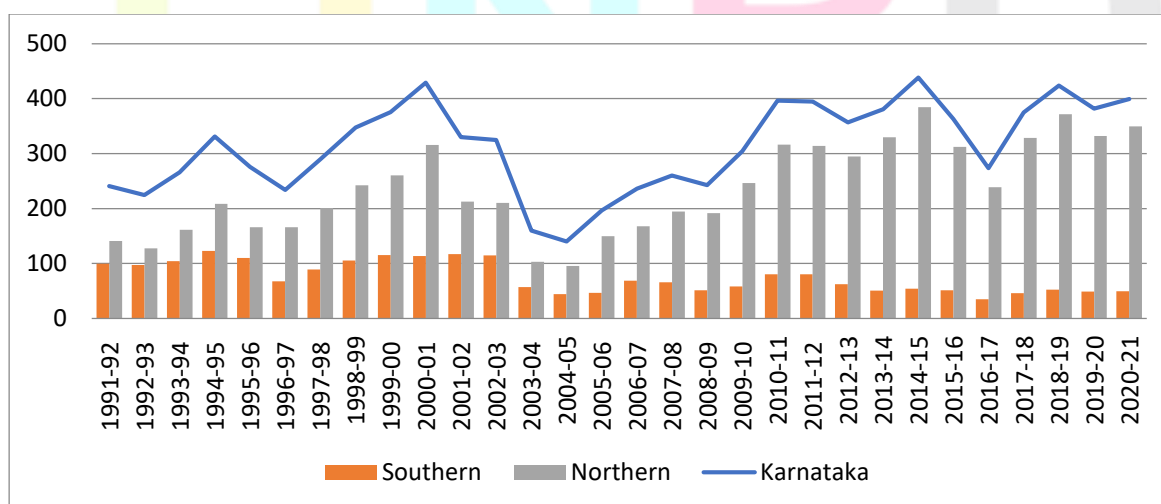
2011-12	80.6	314.11	394.7
2012-13	62.08	294.82	356.9
2013-14	50.88	329.54	380.42
2014-15	53.86	384.52	438.38
2015-16	51.04	312.1	363.14
2016-17	34.96	238.82	273.78
2017-18	45.78	328.83	374.61
2018-19	56.32	367.78	424.1
2019-20	46.42	334.78	381.8
2020-21	49.46	399.25	349.79
CAGR	1.76%	-2.39%	3.18%

Source: Ministry of Agriculture and Farmers Welfare, Government of India

The growth of production of Sugarcane in Karnataka is presented in table 3 for the period 1991-92 to 2020-21. It is found that the production of Sugarcane has shown a positive growth of 3.18 percent during the study period 2001-02 to 2020-21.

The Sugarcane production in Karnataka is reported in the figure 3.7 for the period from 1991-92 to 2020-21. Starting with the sugarcane production of 240.63 lakhtonnes during 1991-92 the production of sugarcane increased to 438.38 lakh tonnes during 2014-15 and it is 349.79 lakh tonnes in 2020-21. But it is reported that productionof Sugarcane has reduced during 2003-04, 2004-05, 2007-08, 2008-09, 2016-17, 2017-18 and 2020-21. Hence it can be concluded that the production of Sugarcane in Karnataka is highly fluctuating.

Figure 2 : Region wise Sugarcane Production in Karnataka (1991-92 to 2020-21)



Source: Ministry of Agriculture and Farmers Welfare, Government of India

The region wise production of Sugarcane in Karnataka has been reported the figure 2. It is observed that the production of Sugarcane in Northern districts is veryhigh compare to Southern districts during the study period due to large area under production in the region. In the year 1991-92 production of Sugarcane in Northern districts is 141 lakh tonnes and Southern districts has only 99.63 lakh tonnes duringthe same period. It is increased to 399.25 lakh tonnes in Northern districts, but in Southern districts it is decreased to 49.46lakh tonnes during 2020-21. The area under Sugarcane in Southern districts is only 10.68 percent of area under Sugarcane in Northern districts during 2020-21. The production of Sugarcane in Southern districts isonly 14.13 percent of production of Sugarcane in Northern districts during 2020-21.

Table 4 : Results of Independent Samples ‘t’ Test for Production of Sugarcanebetween Northern and Southern Districts

	Region	N	Mean	Std. Deviation	Std. Error Mean
Production	Southern	30	75.3050	27.67376	5.05251
	Northern	30	237.7810	83.32682	15.21333

Mean Difference	Std. Error Difference	Degree of Freedom	t value	Significance
162.476	13.16082	35.320	-10.136	.000***

Source: Values Computed by Researcher.

Note: *, ** and *** indicate significance level one, five and ten percent respectively

The table 4 shows the results of independent sample test for production of Sugarcane between Northern and Southern Districts in Karnataka. The average valueof production of Sugarcane in Northern districts is 237.7810 million hectares whereas Southern districts has only 75.3050 million hectares. The calculated value of ‘t’ is 10.136 andthe ‘p’ value is 0.000, which indicate that there is significance difference in production of Sugarcane between Northern and Southern Districts and it is statistically significant at 1 percent level of significance.

Table 5: Productivity per hectare of sugarcane in Karnataka (1991-92 to 2020-21)

Year	Southern (Tonnes per hectares)	Northern (Tonnes per hectares)	Total (Tonnes per hectares)
1991-92	106.81	73.42	84.34
1992-93	107.93	74.48	85.98
1993-94	106.23	79.89	88.51

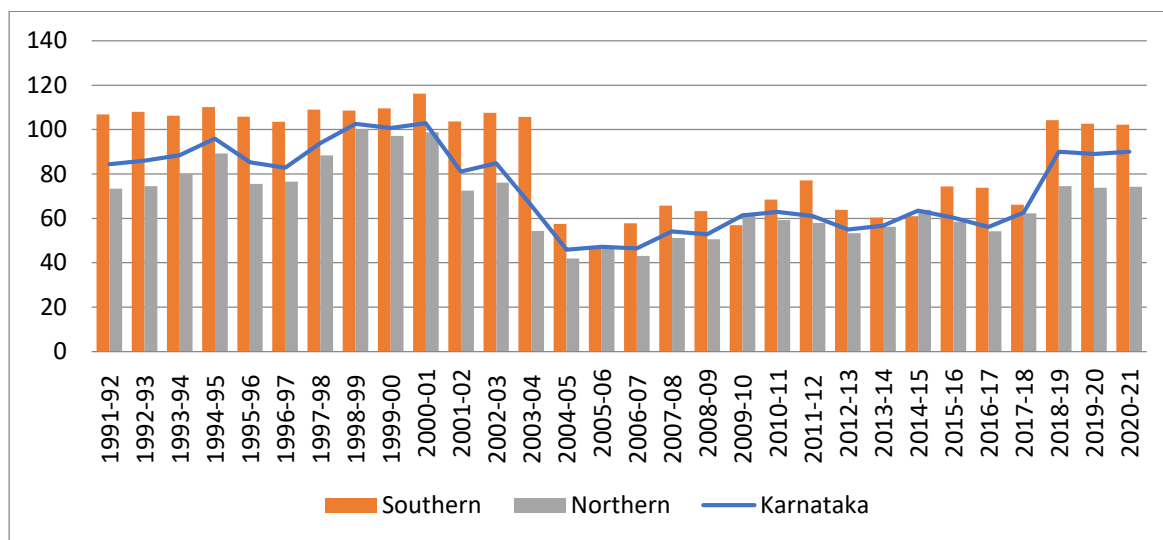
1994-95	110.14	89.18	95.94
1995-96	105.79	75.5	85.22
1996-97	103.48	76.62	82.86
1997-98	109.05	88.43	93.89
1998-99	108.59	100.25	102.64
1999-00	109.61	97.23	100.72
2000-01	116.25	98.82	102.9
2001-02	103.6	72.47	81.13
2002-03	107.49	76.16	84.88
2003-04	105.64	54.39	65.81
2004-05	57.46	41.99	45.9
2005-06	47.17	47.24	47.23
2006-07	57.84	43.02	46.47
2007-08	65.79	51.12	54.18
2008-09	63.24	50.57	52.81
2009-10	56.96	62.41	61.29
2010-11	79.1	59.27	62.89
2011-12	77.14	57.9	61.01
2012-13	63.83	53.38	54.94
2013-14	60.44	56.25	56.77
2014-15	60.96	63.82	63.45
2015-16	74.32	58.49	60.3
2016-17	73.75	54.24	56.13
2017-18	66.14	62.23	62.68
2018-19	104.23	80.21	90
2019-20	103.48	79.75	89
2020-21	102.24	90	74.24
CAGR	0.22%	-0.15%	0.04%

Source: Ministry of Agriculture and Farmers Welfare, Government of India

The figure 3.8 presents the trends in Sugarcane Productivity in Karnataka. The trends shows that Productivity is more or less stable during the study period. Further it is found that during 2003-04, 2012-13, 2016-17 and 2020-21 the Productivity of Sugarcane in Karnataka was slightly low.

The results from table 3.14 depicts the growth rate of Sugarcane Productivity in Northern and Southern districts of Karnataka. The Northern districts have positive growth rate of Sugarcane Productivity by 0.22 percent but in Southern districts the growth rate is negative (-0.15 percent).

Figure 3 : Region wise Sugarcane Productivity in Karnataka (1991-92 to 2020-21)



Source: Ministry of Agriculture and Farmers Welfare, Government of India

The region wise Sugarcane Productivity in Karnataka has been reported the figure 3. It is observed that the Sugarcane Productivity in Northern districts is high compare to Southern districts and also Karnataka during 1991-92. In the year 1991-92 Sugarcane Productivity in Northern districts was 73.42 tonnes per hectare and Southern districts has 106.81 tonnes per hectare during the same period. It is decreased to 102.24 tonnes in Northern districts and increased to 90 tonnes in Southern districts during 2020-21. From this analysis it is found that except in few years Productivity is high in southern districts compared to northern districts.

Table 6: Results of Independent Samples ‘t’ Test for Productivity of Sugarcane between Northern and Southern Districts

	Region	N	Mean	Std. Deviation	Std. Error Mean
Productivity	Southern	30	91.7290	32.57182	5.94677
	Northern	30	68.0437	16.24402	2.96574

Mean Difference	Std. Error Difference	Degree of Freedom	t value	Significance
23.6853	2.98103	42.585	3.564	.001***

Source: Values Computed by Researcher.

Note: *, ** and *** indicate significance level one, five and ten percent respectively

The table 6 shows the results of independent sample test for Productivity of Sugarcane between Northern and Southern Districts in Karnataka. The average value of Productivity of Sugarcane in Southern districts is 91.7290 million hectares whereas Northern districts has only 68.0437 million hectares. The calculated value of 't' is 3.564 and the 'p' value is 0.001, which indicate that there is significance difference in Productivity of Sugarcane between Northern and Southern Districts and it is statistically significant at 1 percent level of significance.

Conclusion

The present chapter examined trends of area, production and productivity of sugarcane in Karnataka. The area under Sugarcane in Karnataka has significantly increased during the study period. It is found that the area of sugarcane increased by 1.76 percent over thirty years (1991-92 to 2020-21) in Karnataka, whereas Production and Productivity also increased by 2.31 percent and 0.54 percent respectively. It is observed that the area under sugarcane in Northern district is very high compare to Southern district during the study period in Karnataka. It is also observed that the production of Sugarcane in Northern districts is very high compare to Southern districts in Karnataka. The growth of sugarcane productivity increased significantly increased in Karnataka

References

- Fazlur Rahman & Nida Bee (2020), Growth Rate of Area, Production, and Productivity of Sugarcane Crop in India, International Journal of Environmental & Agriculture Research (IJOEAR), 6(4)
- Rai, C. K., & Arti, A. (2017). Growth Rate of Area, Production, and Productivity of Sugarcane Crop in Uttar Pradesh. Research Journal of Agriculture Science, 8(2), 423-425.
- Kumar, S., & Singh, S. (2014). Trends in growth rates in the area, production, and productivity of sugarcane in Haryana. International Journal of Advanced Research in Management and Social Sciences, 3(4), 117-124.
- Talawar basavaraj., et al (2019). A comparative analysis of Growth and Trends in sugarcane cultivation of Vijayapura district. International journal of research, 8(4), 418- 428.
- Das Kumar Kishore (2016). Problems and prospects for sugarcane growers in India: an empirical study, International Education & Research Journal, 2(7).

- Kumar R., Hasan, S. S., Bajpai, P. K., & Singh, S. N. (2010). Economic analysis of sugarcane cultivation in different states of India. *The Association of Sugarcane Technologists of India*, 25(1&2), 97-101.
- Wali, V. S., Kadam, K. L., Wali, S., Mohapatra, U., & Mishra, R. K. (2019). Economics of sugarcane cultivation in Bagalkot district of Karnataka. *The Pharma Innovation*, 8(2), 261-265.

