

Spatial Analysis of Sugarcane Production in India - Using GIS Technique

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Abstract:

In the present study, spatial compound growth rates were estimated to know the growth pattern and instability in the area, production, and productivity of sugarcane in major sugarcane growing states of India. India ranks second in sugar production in the world due to favorable geographical conditions and social conditions for sugarcane production in India. For the said research, the manner in which the total production of the states in India has been studied. Secondary data are relied upon for this study. In India, Uttar Pradesh ranks first in sugarcane production and Maharashtra state ranks second, the most important reason is the alluvial land in Uttar Pradesh and the availability of water, similarly in the state of Maharashtra, and sugarcane production is high in these two states due to the black soil and the availability of water and social trends.

Key words: Spatial Analysis, Sugarcane Production, GIS Technique, Resources

Introduction:

The production of any crop depends on the inputs available in it, while the agricultural efficiency also depends on the production, the more we give the inputs, the more output we get. Agricultural efficiency mainly depends on various factors such as land type, water availability, supply of fertilizers, capital, labor, technology, the higher the agricultural efficiency, the higher the output from agriculture, in short, agricultural output depends on agricultural efficiency. Although India ranks second in sugarcane production in the world, India has a good socio-economic and geo-technological position in sugarcane production and sugarcane sector. Sugarcane (*Saccharum officinarum* L.) is one of the important cash crops of India. There is less risk in sugarcane cultivation, and it provides assured returns to the farmers even in adverse

conditions (Raju and Kumar, 219). Cultivation of sugarcane was comprehensive to all or any tropical and subtropical regions. Sugarcane can be a leading resource for sugar manufacture and other associated groups of industries. Sugarcane has taken an essential responsibility for food security, nutrition, and socio financial improvement of the farming community (Rahman and Bee, 2019). Sugarcane is a flexible crop being a premier source of food, fiber, fodder, fuel, and chemicals such as ethanol (Yadav et al. 2006). Sugarcane is an annual crop and requires 10-15 and even 18 months to mature. In India, sugarcane is grown in tropical states, namely Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, and Tamil Nadu subtropical states such as Bihar, Haryana, Punjab, and Uttar Pradesh (Bhim Singh et.al, 2021).

Aims and Objective:

The main objective of this research is to study sugarcane production in India. Then the objectives are taken in the following types.

1. GIS method now shows the Spatial Analysis of Sugarcane Production in India.
2. To study sugarcane production in major states of India.

Materials and Methods:

The statistic data related to the area, production, and yield of sugarcane for 3 years (2018-19 to 2020-21) were used for the present study. The sugarcane production data taken in various website. The top 13 states in total sugarcane production in India have been ranked by taking their percentage. And the total sugarcane production in the state has been averaged and mapped using GIS method. While making the map, 04 groups have been divided into first low production, medium production and high production and no production. At the same time, bar graphs have been used to show the differences in the state. In short, various maps and various figures have been drawn with the help of cartography techniques.

Results:

India is the second-highest producer of sugarcane in the world after Brazil. The largest producer of sugarcane in India is Uttar Pradesh, which produced over 177 million tonnes of sugarcane in 2021. Sugarcane is a multipurpose crop, used in making sugar, jaggery, khansari, molasses, and even paper. In India, approximately 60% of the population is involved in agriculture and among the many crops cultivated in the nation, sugarcane is one of the most important Kharif crops. The

climate of the country supports the plantation of sugarcane throughout the year. Find the top 10 sugarcane producing states in India below.

The largest sugarcane producing state in India is Uttar Pradesh. The state has an area of 2.27 million hectares that produces sugarcane. The average annual production of sugarcane in Uttar Pradesh is 135.64 million tonnes. Here are some more facts about the sugarcane producing states in India. Uttar Pradesh, Karnataka, and Maharashtra together contribute to 80% of the total sugarcane production in India. Maharashtra produces 61.32 million tonnes of sugarcane on average per year.

1. Uttar Pradesh

Uttar Pradesh is the largest cultivator of sugarcane in India. With more than 177 million tonnes produced in 2021, UP tops the list of sugarcane producers. The main reason behind this is the perennial water supply provided by the river Ganga. Meerut, Bareilly, Saharanpur, and Bulandshahr are the major districts producing sugarcane in UP.

2. Maharashtra

Maharashtra ranks second in the list of largest sugarcane producing state in India. For 2021-22, the area reserved for sugarcane plantation was increased to 12.32 lakh hectares. Consequentially, the per hectare production of sugarcane is expected to be 97 tonnes. Pune, Satara, Solapur, Ahmednagar, and Aurangabad are the major producers.

3. Karnataka

Karnataka is the third-largest producer of sugarcane in India. The climatic condition here favors the production of top-quality sugarcane. It recorded production of over 38 MT in 2019-20. Districts such as Shimoga, Mysore, Belgaum, and Chitradurga are the largest producers, thanks to the irrigation projects in the Cauvery River.

4. Tamil Nadu

Tamil Nadu occupies the fourth position in list of major producer of sugarcane in India. The state produces an average of 18.5 MT of sugarcane annually. However, it tops the list in terms of productivity per hectare. It produces an average of 99 tonnes/ha.

5. Bihar

Bihar is one of the top producers of sugarcane and jaggery, thanks to its fertile plains. The major contributors are Patna, Darbhanga, Gaya, and Champaran districts.

5. Gujarat

Despite being an industrial area, Gujarat contributes more than 3% of the total sugarcane produced in the country. The bulk contribution comes from its southern districts like Valsad, Navsari, Surat, and Bharuch.

6. Haryana

Haryana is one of the largest contributors to India's central pool of food grains. Apart from sugarcane, Haryana also produces large quantities of rice, jawar, bajra, and maize. It produces more than 8MT of sugarcane in 1.3 lac hectares of land.

7. Andhra Pradesh

The black alluvial soil of Andhra Pradesh is perfect for sugarcane cultivation. The districts around Krishna and Godavari benefit from these rivers and can produce sugarcane in bulk quantities.

8. Punjab

Punjab occupies the ninth position on this list. On average, it produces 7 MT of sugarcane in 0.92 lac hectares of land. The high productivity is due to the inbuilt agricultural culture in the state.

10. Uttarakhand

The hilly state of Uttarakhand ranks 10th on the list, with an average annual production of 6.38 MT. Dehradun, Haridwar, and Udham Singh Nagar are major contributors to this high number.

Table no 01: largest sugarcane-producing states in India in 2021

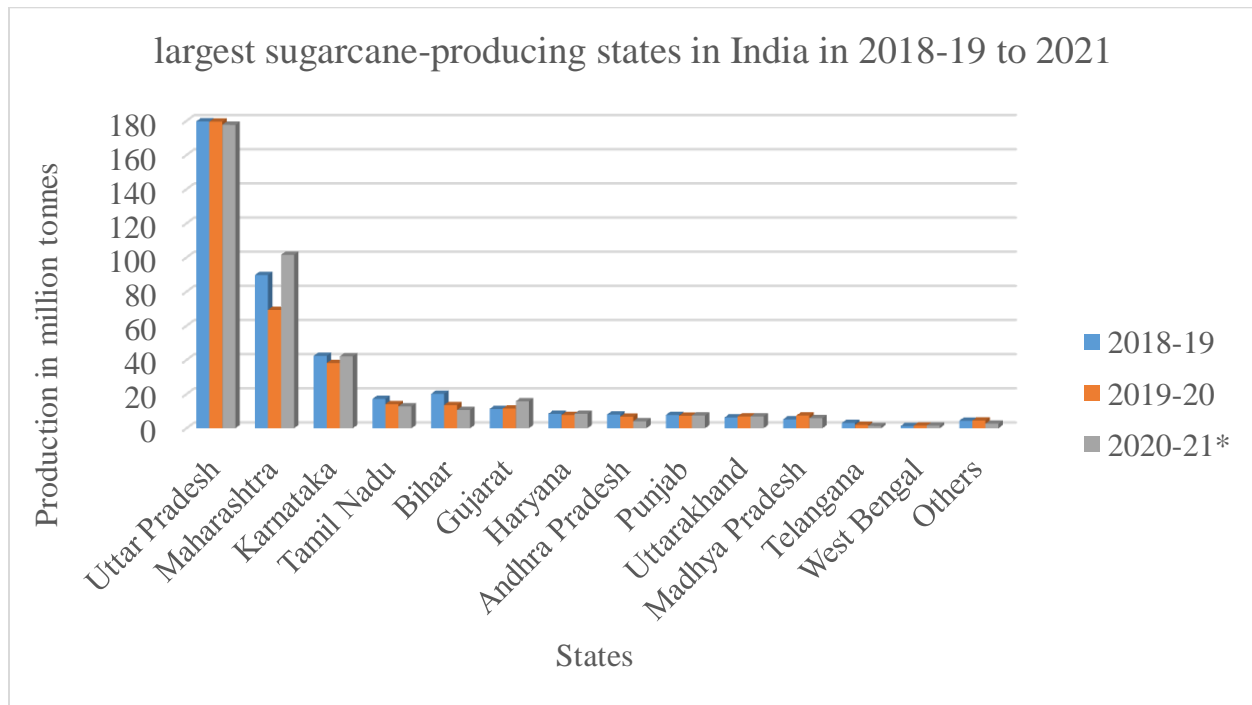
S.No	States / UT	2018-19	2019-20	2020-21*	Average (2018-19 to 2020-21)	% to total	Rank
1	Uttar Pradesh	179.71	179.54	177.67	164.37	45.40	1st
2	Maharashtra	89.77	69.31	101.59	73.60	20.33	2nd
3	Karnataka	42.41	38.18	42.09	35.39	9.77	3rd
4	Tamil Nadu	17.14	14.12	12.80	18.58	5.13	4th
5	Bihar	20.12	13.58	10.71	14.64	4.04	5th
6	Gujarat	11.33	11.57	15.85	11.61	3.21	6th
7	Haryana	8.51	7.73	8.53	8.16	2.25	7th
8	Andhra Pradesh	8.09	6.72	4.12	7.96	2.20	8th
9	Punjab	7.77	7.30	7.49	7.37	2.04	9th
10	Uttarakhand	6.33	6.94	6.96	6.38	1.76	10th
11	Madhya Pradesh	5.28	7.43	5.88	5.63	1.56	11th
12	Telangana	3.18	2.01	1.36	2.45	0.68	12th
13	West Bengal	1.34	1.53	1.56	1.52	0.42	13th
14	Others	4.45	4.53	2.64	4.41	1.22	
	All India	405.42	370.50	399.25	362.07	100.00	

Source: <https://byjusexamprep.com/current-affairs/largest-sugarcane-producing-state-in-india>

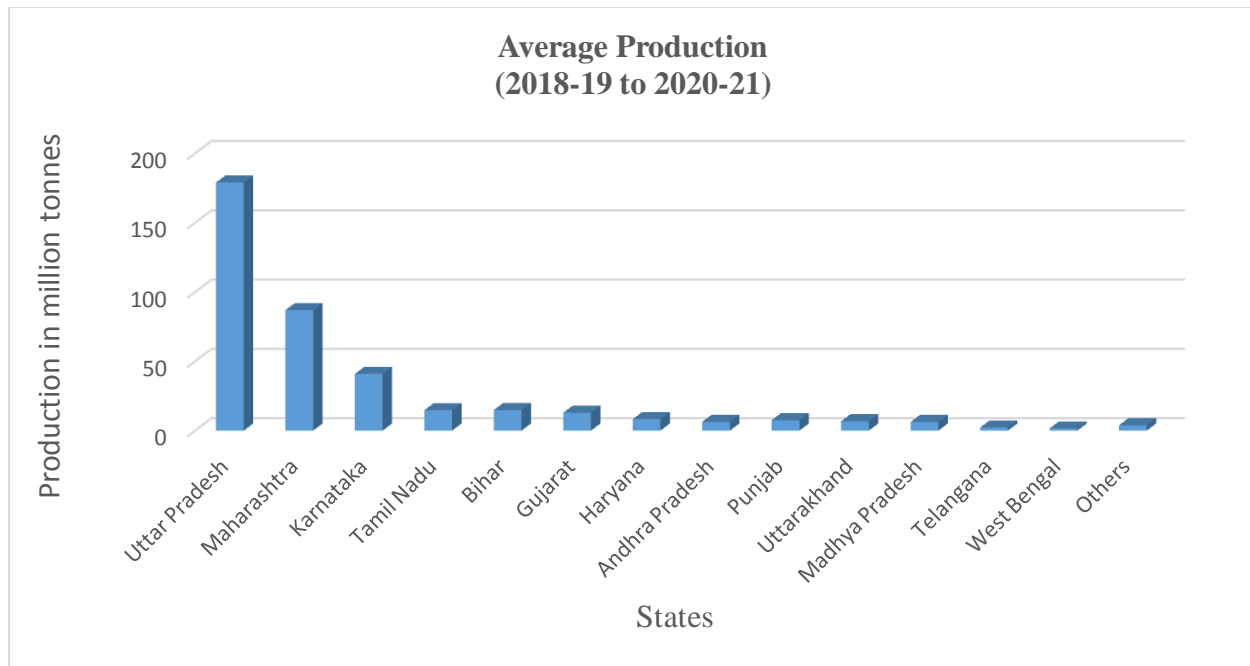
Uttar Pradesh accounts for 45.40 percent of India's total production, followed by Maharashtra state, which accounts for 20.33 percent of total production in the state of Maharashtra. Maharashtra ranks second in India, West Bengal has the lowest production share i.e. 0.42 percent, but these two states together i.e. Uttar Pradesh and Maharashtra account for more than half of India's production. However, the third position is Karnataka, Tamil Nadu, Bihar, Gujarat, Haryana, Andhra Pradesh, Punjab, Uttarakhand, Madhya Pradesh, Telangana, and twelve states respectively. Sugarcane production is more important in Uttar Pradesh because of alluvial land and water availability in these areas because sugarcane production requires more water for the sugarcane area followed by Maharashtra state also because of black soil and availability of water due to which these two states rank highest in India in sugarcane production. Productivity of any

crop depends on agricultural efficiency. The more inputs we give to the crop, the more output we get in the form of products. Uttar Pradesh and Maharashtra state are ranked first and second respectively than other states in India in terms of sugarcane production and efficiency of these states than other states and due to high efficiency the production of these states is also high due to geographical social and technological factors of these regions.

Graph no 01: largest sugarcane-producing states in India in 2018-19 to 2021



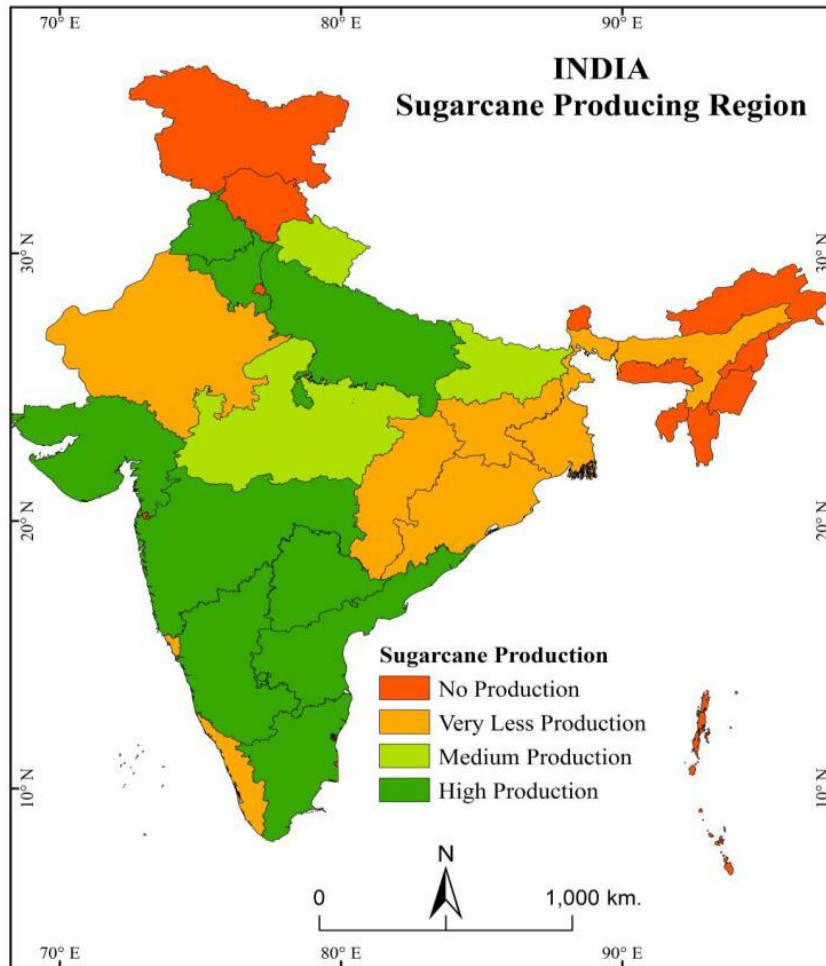
Graph no 02: Average sugarcane Production (2018-19 to 2020-21)



In India, Sugarcane is growing in tropical climatically condition. South region of our country is found high area under sugarcane. Which are Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra, Telangana and Gujarat states etc. In the north region there are Uttar Pradesh, Punjab and Haryana produce sugarcane on large scale.

Madhya Pradesh, Bihar and Uttaranchal states are found medium area under sugarcane cultivation. Because these states had a less area is suitable for irrigation. Kerala, Rajasthan, Goa, Jharkhand, Chhattisgarh, West Bengal and Assam states are very less production of sugarcane. The geographical condition of Assam is not favorable for sugarcane cultivation. Besides these states some states are not possible to take sugarcane production because of their geographical factors. Which are Jammu Kashmir, Himachal Pradesh, Arunachal Pradesh, Nagaland, Manipur, Tripura, Sikkim, and Mizoram etc. These states are locate in Himalaya mountain ranges, therefore they are not able for sugarcane cultivation.

Map no 01: Sugarcane Producing Region in India



Conclusion:

Productivity of any crop depends on agricultural efficiency. The more inputs we give to the crop, the more output we get in the form of products. Uttar Pradesh and Maharashtra state are ranked first and second respectively than other states in India in terms of sugarcane production and efficiency of these states than other states and due to high efficiency the production of these states is also high due to geographical social and technological factors of these regions.

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