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An Economic Analysis of Area, Production and Yield of Sugarcane in India

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Abstract

In India, sugarcane is the key raw material for the production of sugar. Sugarcane is grown in the tropical and sub tropical region of the India. Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu and Gujarat are the major sugarcane producing states in the tropical regions of India. Subtropical regions include Uttar Pradesh, Bihar, Punjab, Haryana and Madhya Pradesh. Sugarcane is the chief raw material for sugar industry and accounts for about 70 % of the total cost of production of sugar. The purpose of this paper is to examine and better understand the dynamics of area production and productivity of sugarcane in India. The paper is based on secondary data and made use of semi log regression model to test the significance of growth rate of selected variables. Paper concludes that both area and production of sugarcane fluctuate considerably from year to year. This is due to variations in climatic conditions, the vulnerability of areas cultivated under rain fed conditions, fluctuations in prices of sugar, gur and Khandsari and the changes in returns from competing crops. Despite this instability, both area and production of sugarcane have increased considerably during the post independence period. However the stagnation in sugarcane yield is a matter of grave concern.

Keywords: Area, Production, Yield, Sugarcane

Background

The sugar is extracted from two different raw materials sugarcane and beet; both produce identical refined sugar. Beet is grown in temperate climate and accounts for around one third of world sugar production. Sugarcane is grown in semi-tropical region and accounts for around two-third of world sugar production.

In India, sugarcane is the key raw material for the production of sugar. Sugarcane is grown in the tropical and sub tropical region of the India. Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu and Gujarat are the major sugarcane producing states in the tropical regions of India. Subtropical regions include Uttar Pradesh, Bihar, Punjab, Haryana and Madhya Pradesh Sugarcane yields are substantially higher in the tropical states as compared to the subtropical states. In India, subtropical regions account for around 67% of the cane area and 62% of the sugarcane production. Though the tropical regions account for 33% of the total area in India, it contributes 38% of the production, owing to high productivity. In this background it would be beneficial to examine and better understand the interstate differences in the area, production and yield of sugarcane in India.

Review of Literature

Gopal Lallanji (1964)¹, designed an intensive study to explain the origin of sugarcane cultivation and the art of sugar making by utilizing ancient documents like Atharvaveda, Charaka Samhita and Sushruta Samhita and the subsequent sutras. The study claims that Aryans were acquainted with sugarcane; they were not very much acquainted with the production of sugar from its juice. On the basis of Buddhist literature, the study assigned the beginning of sugar manufacturing to somewhere about the eighth century B.C.

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¹ Gopal Lallan Ji (1964), Sugarmaking in Ancient India, Journal of Economics Social, History of the Orient, 1964, Vol. VII, No. 13, pp. 55-72.

Pruthy S. (1995)² conducted a study to explain the historical development of sugar industry in India from ancient to modern India till 1992. The study covered various important aspects of the sugar industry in India like the reasons behind intensification of sugar manufacturing by Britishers, existence of regional differences in the installed capacity of sugar mills, role of government in protection and control of sugar sector in India.

Mohan Narendra (2013)³, tried to present glimpses of recent advances which have taken place in sugar industry in India during the last decade. The study is based on secondary data. The study found that a number of efforts have been undertaken by sugar industry for its revival in the competitive market. Efforts related to enhancement of efficiency, better utilization of by products, and production of sulphur less white sugar, pollution control and water conservation etc. have been marked as recent advancements in the sugar industry, by the study

Objectives of the Study

The main objective of the study is to examine and better understand the dynamics of area, production and yield of sugarcane in India.

Data and Methodology of Research

The study is based on secondary data pertaining to a long term covering a period of 1950-51 to 2013-14. The paper made use of secondary sources of information such as journals, magazines, newspapers and internet. Present study is descriptive as well as exploratory in nature. Statistical tools like compound annual growth rate, coefficient of variation, averages, charts, graphs and tables have been utilized to draw meaningful inferences. Statistical inferences have been drawn with the help of semi log linear regression model.

Empirical Study

Sugarcane is the chief raw material for sugar industry and accounts for about 70 % of the total cost of production of sugar. Sugarcane accounted for 6.0 percent of the total value of agriculture output and occupied about 2.5 percent of India's gross cropped area in 2013-14 (CACP 2015-16). Besides, it is also the major source of income of cane growers. Both area and production of sugarcane fluctuate considerably from year to year.

² Pruthi S. (1995), *The History Of Sugar Industry In India*, Reliance publishing house, New Delhi. ISBN 8185972966

³ Mohan Narendra (2013), Recent advancements in sugar industry- an overview, Cooperative sugar, Jan. 2013, Vol. 44, No. 5.

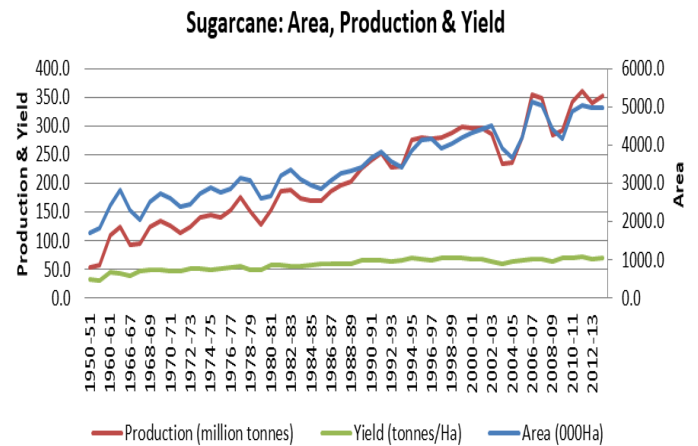


Chart 1: Sugarcane: Area, Production and yield

Note: Researcher's illustration, Data Source: Cooperative Sugar (various issues), NFCSFL

It is evident from the Chart 1 that during the last 65 years of post independence period, the sugar industry in India has experienced a long journey in the form of growth in the area, production and yield of the sugarcane. The area under sugarcane cultivation has increased from 1176 thousand hectare in 1950-51 to 4993 thousand hectare in 2013-14. During this period area has grown with a CAGR of 1.61 %. The study further wants to know this growth rate was significant or not? Hence the hypothesis framed in this respect is as follow:

H0: There is no significant growth in area of sugarcane in terms of compound annual growth rate.

H1: There is significant growth in area of sugarcane in terms of compound annual growth rate.

With calculated value of $p = 0.000$ and $t = 22.777$ at 5% level of significance, the result of hypothesis testing using Semi Log Linear Regression Model reveals that the null hypothesis cannot be accepted in this case and there is significant growth in area of sugarcane in terms of compound annual growth rate.

With the increase in the area the production has also increased from the 54.82 million tonnes in 1950-51 to 352.14 million tonnes in 2013-14 with 2.74 % CAGR. To test the significance of growth in production of sugarcane null and alternate hypotheses have been framed:

H0: H0: There is no significant growth in production of sugarcane in terms of compound annual growth rate.

H1: There is significant growth in production of sugarcane in terms of compound annual growth rate.

With p value = 0.000, $t = 23.98$ at 5 % level of significance, The result of Semi Log Linear Regression Model reveals that the null hypothesis cannot be accepted in this case and there is significant growth in production of sugarcane in terms of compound annual growth rate.

Among the three indicators used to assess the condition of sugarcane, the yield of sugarcane is the most important factor from the point of view of long term viability and profitability of sugarcane farming. The yield of sugarcane per hectare has increased remarkably from the level of 32.1 tonnes per hectare in 1950-51 to the level of 70.5 tonnes per hectare in 2013-14 registering 1.1% CAGR.

To test the significance of growth in yield of sugarcane null and alternate hypothesis have been framed:

H0: H0: There is no significant growth in yield of sugarcane in terms of compound annual growth rate.

H1: There is significant growth in yield of sugarcane in terms of compound annual growth rate.

With p value=.000, t = 15.652 at 5% level of significance, the result of Semi Log Linear Regression Model reveals that the null hypothesis cannot be accepted in this case and during the study period the yield has recorded significant growth in terms of CAGR

Conclusion

It can easily be concluded from the above discussion that the growth path of sugarcane production has been accompanied with the cyclicality. Besides natural factors like climatic variations, water availability and pest attacks which affect this cyclicality, the sugar sector is impacted by induced cyclicality also. The high sugar and sugarcane prices in the current year lead to increase in sugarcane and sugar production in the next year at the cost of other crops. As a consequence the price of sugar decreases in the domestic market. The resulting low prices for sugar impact the ability of mills to pay the farmers, thus leading to creation of cane price arrears. High arrears lead to a significant fall in cane cultivation in the next year, leading to high sugar prices and increased attractiveness of cane. Despite this instability, area, production and yield of sugarcane have increased considerably during the post-independence period. After examining the long term trend of area, production and yield of sugarcane and testing the significance of growth rates these variables attain, the study can conclude that the growth in the level of sugarcane production could be largely attributed to the growth in area and yield.

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