Performance of Agro based Industries in India with Special Reference to Sugar Industry - An Assessment

G. Shivagami
Research Scholar & Professor, Department of Economics
Bangalore University, Bangalore, Karnataka, India

T. Rajendra Prasad
Professor, Department of Economics
Bangalore University, Bangalore, Karnataka, India

Abstract
The Indian sugar industry is a key driver of rural development, supporting India’s economic growth. The industry is inherently inclusive, supporting over 50 million farmers and their families, along with workers and entrepreneurs of almost 550 sugar mills, apart from a host of wholesalers and distributors spread across the country. The Indian sugar industry is cyclical as, on the one hand it serves the domestic market, the largest in the world. Sugar is a sector of significant importance to the national economy. It has done so by commercially utilizing the rural resources to meet the great domestic demand for sugar and by generating surplus energy to meet the increasing energy needs of India. In addition to this, the industry has become the mainstay of the alcohol industry. The sugar sector also has a significant standing in the global sugar space. The Indian domestic sugar market is one of the largest markets in the world in terms of volume. India is also the Second largest sugar-producing nation and remains a key growth driver for world Sugar growing above the Asian and world consumption growth average.

Keywords: Sugar, Khandhasari, Ethanol, Co-gen, Gur, Molasses, Spirit, Industry, Cane cultivation.

Introduction
The sugar industry in India plays a vital role in socio economic development in rural areas by mobilizing rural resources and generating higher income and employment opportunities. About 7.5 percent of the rural population covering about 45 million sugarcane farmers, their dependents, and a large number of agricultural laborers are involved in sugarcane cultivation, harvesting, and ancillary activities. About half a million skilled and semi-skilled workers, From the rural areas are also engaged in the sugar industry. In India, the sugar industry is the second largest agro-based industry, next only to textiles and contributes about Rs.1650 crore to the central exchequer as excise duty and taxes annually. Besides, the State Governments realize about Rs.600 crore annually through purchase taxes, cess, etc. The total value of sugarcane produced in the country is estimated at Rs.24000 crore per year. Sugar exported from India increased from 2000 tonnes [valued at Rs.0.91 crore] in the financial year 1990-91 to 1004317 tonnes [valued at Rs.2119.68 crore], in the financial year 2006-07 [upto July 2006],

The sugar industry in India finds itself entangled in a complex web of problems leading to declining profitability to the cane growers as well as the sugar industry. The reasons for the same are to be traced and suitably addressed to give a boost to this sector in the country.
Unlike many western or major sugarcane growing countries, sugarcane is the only source of sugar in our country, and therefore, any mismatch between demand and supply of sugar in the country assumes significance at the national level and influences the economics of sugarcane cultivation to a great extent. The initiatives by the State Governments in the form of fixing a remunerative sugarcane price and pressurizing sugar mills to make payment within a reasonable time encouraged farmers to put in more area under the sugarcane crop. This underlines the need to study the economics of sugarcane cultivation to understand the effectiveness of the price policy in determining the area under sugarcane crop. The initiatives of research institutions, particularly those directly involved with sugarcane crop, are required to be listed to study the growth in productivity of sugarcane crop. Further, the globalization of the Indian economy started in the early 90s is bound to direct the trade of agricultural commodities in the years to come.

Review of Literature

In this section, an attempt has been made to review past studies related to Sugar industries in India and Karnataka. The review of the following studies would help us to understand the growing trend of the Industry, problems encountered by the Industry Income, Employment, Export, Price level, crushing capacity, and sugar co-operatives of the working units in the Indian economy. The following are some of the important studies reviewed here are as follows;

Mahalingam (1980) has indicated that co-operative sugar factories are one of the important co-operative processing industries in India. It brings in a lot of benefits to the farmers who supply the cane to the factory on a remunerative price. He thinks that co-operative should make a positive contribution by supplying various inputs to farmers and recovering the same from the cane price in easy installment; thereby both could be benefited.

Ramesh (1980) stated that the sugar industry in India is the second-largest processing industry in the country next only to textiles. There are 320 factories producing annually 65.70 lakh tonnes of sugar. The aggregate assets of the industry are more than Rs.1300 crore. About 30 million cultivators are engaged in growing sugarcane and supplying the Same to sugar factories. The sugar industry distributes about Rs.800 crore annually towards sugarcane prices. It contributes more than Rs.300 crore annually to state and central exchequer. The factories are ideally suited for faster rural socio-economic development. The prosperity of the sugar industry is, therefore, closely linked with the development and prosperity of our vast population resident in the villages.

Shah and shah (1980) studied that the cost of production of sugar factory depends primarily on raw materials sugar recovery percentage and the duration of the crushing Season They suggested that, the cost of sugar production can be brought down by utilizing the processing unit for a maximum period, by proper checking of the machinery by reducing cost of extra fuel, lubricants, spare parts, consumption of chemicals and sugar content in final molasses. It must be ensured that the steam balance and machinery are maintained with proper plans and proper watch of boiling house stations.

Mane (1980) stated that the sugar co-operatives had blazed a trail inefficiency only to accelerate the economic improvement of the farmers. There is a raise in their level of income, saving investment, mostly in productive assets, possession of farm machinery, credit worthiness, and employment opportunities.

Ksar & Tilekar (1983) indicated that the sugar industry has a significant impact on the employment of seasonal migrants in Maharashtra. The share of sugar factory employment was to the extent of 65.36, 45.51 & 75 percent in the total employment of an average male, female and bullock pair of the household respectively. As regards the income, it is noted that the sugar industry, on an average contributes 57 percent of the gross income of the household. The seasonal employment provided by the sugar industry enabled the migrants to increase their income to enjoy a slightly better position as compared to the non-migrants under study. Hence, the policy has been endorsed for the installation of agro-processing industries based on local raw material opportunities for the economic development of weaker sections.
Nikam (2005) attempted to study the financial strength of four co-operative sugar factories situated in the Aurangabad district. The important ratio viz. current ratio and Acid test ratio were employed to locate the financial strength of these units (short terms) and two ratios viz. Debt equity ratio and net fixed assets to net worth ratio were used for assessing the long-term financial strength of the societies.

Narasziah (2006) analyzed cash management in Kovur Co-operative Sugar Factory Nellore in Andhra Pradesh. He analyzed cash and bank balances as percentage to the current assets, current ratio, liquid ratio, and cash flow coverage ratio. The study indicated low cash and bank balances when compared to current assets, which resulted in very low liquid assets. Inventory occupied a major portion in current assets, and the net cash flow coverage ratio of the factory was negative due to inconsistent and insufficient maintenance of liquidity.

Muralidharan (2008) made a comparative study of processing sugar cane into sugar, gur, and khandasari. He found that nearly 63.23 percent of processing costs farmed fixed items in sugar units, and this was mainly because of the inclusion of salaries and wages of permanent staff. In the case of khandasari unit, fixed costs constituted 17.29 percent, and variable cost 82.71 percent. While in the case of our unit, fixed costs accounted for 30.78 percent, and variable costs 69.22 percent. In the case of gur unit, labor cost was directly linked to the quantity of gur produced, indicating that an increase in the quantity of gur would reduce the per-unit cost. He found processing cane into gur was more profitable and compared to sugar and khandasari.

T.S. Devaral (2010) conducted an extensive study on the Agro-Based Industry in Karnataka. The study was emphasized on sugarcane production, sugarcane growers, and the major problem faced by the sugar industries in the study area.

With this background, the present paper has been brought out to examine the following objectives:

Objectives
• To examine the level of sugar cane production in India
• To study the number of companies engaged in sugar production.
• To assess the performance of sugar production in India.

Global Scenario on Sugar Production
Data on area, production, and productivity of sugarcane in the world as a whole as also in the major sugarcane producing countries during 2005 vis-a-vis 2004 are presented in Table 1.

| Country       | 2004                | 2005                | 2006                | 2007                | 2008                |
|---------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Area          | Production          | Productivity        | Area                | Production          | Productivity        |
| (ha.)         | (tonnes)            | (kg/ha.)            | (ha.)               | (tonnes)            | (kg/ha.)            |
| Australia     | 415000              | 36892000            | 888                 | 420000              | 38246000            | 91062               |
| Brazil        | 5571400             | 410983000           | 73767               | 5767180             | 420120992           | 72847               |
| China         | 1352500             | 135620585           | 100274              | 1414000             | 92130000            | 65156               |
| Colombia      | 440000              | 37100000            | 84318               | 431781              | 39849240            | 92290               |
| Cuba          | 700000              | 24000000            | 34286               | 400000              | 12500000            | 31250               |
| India         | 4100000             | 244800000           | 59707               | 3750000             | 232320000           | 61952               |
| Indonesia     | 360000              | 24600000            | 68333               | 350000              | 25500000            | 72857               |
| Mexico        | 639061              | 45126500            | 70614               | 639061              | 45126500            | 70614               |
| Pakistan      | 1074000             | 53419000            | 49738               | 966300              | 47244100            | 48892               |
| Philippines   | 380000              | 28000000            | 73684               | 380000              | 31000000            | 81579               |
| South Africa  | 305000              | 19094760            | 62606               | 312000              | 21725100            | 69632               |
| Thailand      | 1050000             | 111176100           | 10582               | 1066880             | 49572000            | 46464               |
It is observed from Table 1 that the area under sugarcane in the world marginally decreased from 20.27 million ha. In 2004 to 19.78 ha. In 2005. This led to a decrease in the production of sugarcane during the same period from 1323.65 million tonnes to 1293.22 million tonnes. However, during the same period, the yield per hectare of sugarcane marginally increased from 65.29 tonnes to 65.38 tonnes. During the same period, the area under sugarcane increased from 5.57 million ha. To 5.77 million ha in Brazil and from 1.35 million ha to 1.41 million ha in China. However, in the case of India, the area under sugarcane decreased from 4.1 million ha to 3.75 million ha. While the increase in the area under sugarcane in Brazil led to an increase in the production of sugarcane from 410.98 million tonnes to 420.12 million tonnes, the increase in the area under sugarcane in China led to a decrease in the production of sugarcane from 135.62 million tonnes to 92.13 million tonnes. Thus, the impact of the decrease in area under sugarcane on sugarcane production in India was quite high.

### Sugarcane Production in India

Table 2 indicates the figures of the area under sugarcane yield of sugarcane. Production of sugarcane. The number of factories, working capacity. Cane crushed, recovery. Sugar production, duration, and molasses production from 2004-2005 to 2017-18.

| Year    | Area under sugarcane (000 hectares) | Yield of cane (tonnes per hectare) | Production of sugarcane (000 tonnes) | No. of factories in operation | Average Total cane capacity crushed (tonnes) per 24 tonnes hrs | Recovery of sugar percent cane | Total sugar produced (000 tonnes) | Average Molasses production (days) | Average Molasses production (000 tonnes) |
|---------|-------------------------------------|------------------------------------|--------------------------------------|-------------------------------|---------------------------------------------------------------|-----------------------------|----------------------------------|-----------------------------------|-------------------------------------|
| 2004-05 | 3661                                | 64.8                               | 237088                               | 400                           | 3545                                                          | 124771                      | 10.17                            | 12691                            | 96                                  |
| 2005-06 | 4202                                | 66.9                               | 281172                               | 453                           | 3606                                                          | 188672                      | 10.22                            | 19267                            | 126                                 |
| 2006-07 | 5151                                | 69.0                               | 355520                               | 504                           | 3474                                                          | 279249                      | 10.17                            | 28361                            | 174                                 |
| 2007-08 | 5055                                | 68.9                               | 348188                               | 516                           | 3546                                                          | 249906                      | 10.55                            | 26356                            | 149                                 |
| 2008-09 | 4415                                | 64.5                               | 285029                               | 488                           | 3725                                                          | 144978                      | 10.03                            | 14538                            | .87                                 |
| 2009-10 | 4175                                | 70.0                               | 292302                               | 490                           | 3825                                                          | 185548                      | 10.20                            | 18912                            | 108                                 |
| 2010-11 | 4885                                | 70.1                               | 342382                               | 527                           | 3650                                                          | 239807                      | 10.17                            | 24394                            | 136                                 |
| 2011-12 | 5106                                | 69.3                               | 353768                               | 529                           | 3868                                                          | 256975                      | 10.25                            | 26342                            | 137                                 |
| 2012-13 | 5279                                | 67.1                               | 354400                               | 526                           | 4125                                                          | 250598                      | 10.03                            | 25140                            | 126                                 |
| 2013-14 | 534.1                               | 64.7                               | 345600                               | 509                           | 4088                                                          | 238464                      | 10.23                            | 24396                            | 125                                 |
| 2014-15 | 5307                                | 69.1                               | 366800                               | 538                           | 4101                                                          | 273046                      | 10.37                            | 28310                            | 135                                 |

Source: 1. Faoslat Citation 2005; 2. Website of FAO: www.fao.org
It is observed from table 3 Uttar Pradesh is the leading state in cultivating sugarcane crops in India. Maharashtra in another state given more importance to sugar cane cultivation Bihar, Gujarat, Haryana, Uttarkhand, Madhya Pradesh, and Chhattisgarh focus moderate level of cultivation. In the case of South India, It is Karnataka, and Tamilnadu Andhra Pradesh and Telangana have shown a considerable amount of cultivating sugar cane crops. It is also very clear that starts like Assam, Kerala, Pondicherry (UT) Rajasthan, and West Bengal are shown a dismal feature of sugarcane cultivation.

### Table 3: State-wise Sugarcane Cultivation in India (Thousand Hectares)

| States          | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam           | 29      | 27      | 30      | -       | -       | -       | -       | -       | -       | -       |
| A.P & Telangana | 196     | 158     | 192     | 204     | 190     | 195     | 210     | 190     | 186     | 177     |
| Bihar           | 112     | 116     | 248     | 170     | 252     | 298     | 302     | 280     | 296     | 300     |
| Gujarat         | 221     | 154     | 190     | 194     | 203     | 182     | 185     | 185     | 180     | 182     |
| Haryana         | 90      | 74      | 85      | 95      | 100     | 118     | 115     | 116     | 120     | 122     |
| Kerala          | 2       | 3       | 3       | -       | -       | -       | -       | -       | -       | -       |
| Maharashtra     | 768     | 756     | 965     | 1025    | 937     | 940     | 1060    | 1050    | 765     | 915     |
| M.P. & Chhattisgarh | 70   | 62      | 65      | 81      | 80      | 85      | 131     | 155     | 150     | 140     |
| Karnataka       | 281     | 337     | 423     | 432     | 427     | 476     | 499     | 510     | 410     | 415     |
| Orissa          | 11      | 8       | 13      | 40      | 40      | 42      | 30      | 30      | 43      | 35      |
| Punjab          | 81      | 60      | 70      | 95      | 95      | 96      | 98      | 100     | 105     | 105     |
| Pondicherry     | 2       | 2       | -       | -       | -       | -       | -       | -       | -       | -       |
| Rajasthan       | 6       | 6       | 5       | -       | -       | -       | -       | -       | -       | -       |
| Tamil Nadu      | 309     | 293     | 316     | 335     | 320     | 285     | 255     | 250     | 260     | 201     |
| Uttar Pradesh   | 2084    | 1977    | 2125    | 2252    | 2475    | 2513    | 2307    | 2302    | 2310    | 2330    |
| Uttarakhand     | 107     | 96      | 107     | 108     | 110     | 111     | 115     | 116     | 120     | 120     |
| West Bengal     | 18      | 14      | 15      | -       | -       | -       | -       | -       | -       | -       |
| Others          | 28      | 32      | 33      | 75      | 50      | -       | -       | -       | -       | -       |
| **Total**       | 4415    | 4175    | 4885    | 5106    | 5279    | 5341    | 5307    | 5284    | 4945    | 5042    |

Sources: From 2011-12 onwards data has been extracted from ISMA Satellite Mapping

### Table 4: State-Wise Production of Sugarcane in India (Thousand Tonnes)

| States          | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam           | -       | -       | 1075    | -       | -       | -       | -       | -       | -       | -       |
| A.P & Telangana | 15912   | 14300   | 14964   | 15912   | 14300   | 14000   | 13900   | 12400   | 9500    | 11500   |
| Bihar           | 8500    | 12600   | 12763   | 8500    | 12600   | 14900   | 14900   | 13900   | 14700   | 18500   |
| Gujarat         | 13386   | 14400   | 13760   | 13386   | 14400   | 13300   | 13200   | 13800   | 10800   | 13100   |
| Haryana         | 6745    | 7100    | 6042    | 6745    | 7100    | 8100    | 7900    | 7500    | 8600    | 10100   |
It is very clear from table 4 that sugar production in the Indian state revealed that Uttar Pradesh and Maharashtra play a significant role in the production of sugar cane followed by other states’ signs Bihar, Gujarat, Haryana, Madhya Pradesh, and Chhattisgarh and Orissa. Similarly, Karnataka performs a leading role in the production of sugar cane, which is followed by Tamil Nadu and Andhra Pradesh.

Table 5: State-Wise Yield of Sugarcane in India (Tonnes Per Hectare)

| States                  | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam                   | 37.9    | 39.1    | 36.2    | -       | -       | -       | -       | -       | -       | -       |
| A.P & Telangana         | 78.5    | 74.1    | 77.9    | 78.0    | 75.0    | 72.0    | 66.0    | 66.0    | 51.0    | 65.0    |
| Bihar                   | 44.3    | 43.4    | 51.4    | 50.0    | 50.0    | 50.0    | 50.0    | 50.0    | 50.0    | 62.0    |
| Gujarat                 | 70.2    | 80.5    | 72.4    | 69.0    | 71.0    | 71.0    | 71.0    | 75.0    | 60.0    | 72.0    |
| Haryana                 | 57.0    | 72.1    | 71.0    | 71.0    | 69.0    | 69.0    | 65.0    | 71.0    | 83.0    |
| Karnataka               | 83.0    | 90.3    | 93.7    | 90.2    | 87.0    | 88.0    | 94.0    | 78.0    | 60.0    | 94.5    |
| Kerala                  | 125.0   | 95.0    | 95.5    | -       | -       | -       | -       | -       | -       | -       |
| M.P. & Chhattisgarh      | 42.2    | 40.8    | 41.0    | 34.5    | 41.0    | 57.0    | 60.0    | 51.0    | 54.0    | 71.0    |
| Maharashtra             | 78.9    | 84.8    | 84.9    | 77.0    | 78.5    | 80.0    | 93.0    | 76.0    | 60.0    | 108.0   |
| Orissa                  | 59.8    | 61.2    | 68.9    | 51.0    | 51.0    | 50.0    | 50.0    | 50.0    | 38.0    | 40.0    |
| Punjab                  | 57.6    | 61.6    | 59.6    | 60.0    | 66.0    | 66.0    | 67.0    | 74.0    | 74.0    | 84.0    |
| Rajasthan               | 59.7    | 57.4    | 66.9    | -       | -       | -       | -       | -       | -       | -       |
| T.N. & Pondy.           | 99.7    | 101.4   | 108.4   | 1050    | 94.0    | 90.0    | 88.0    | 98.0    | 81.0    | 60.0    |
| Uttar Pradesh           | 52.3    | 59.2    | 56.7    | 56.0    | 57.0    | 53.0    | 55.0    | 53.0    | 62.0    | 77.0    |
| Uttarakhand             | 52.2    | 60.8    | 60.9    | 59.5    | 60.0    | 54.0    | 53.0    | 51.0    | 57.0    | 65.0    |
| Others                  | 22.7    | 33.8    | 34.5    | -       | -       | -       | -       | -       | -       | -       |
| All India               | 64.5    | 70.0    | 70.1    | 69.3    | 67.1    | 64.7    | 69.1    | 63.7    | 61.3    | 81.5    |

Sources: From 2011-12 onwards data has been extracted from ISMA Satellite Mapping
With regards to state wise yield of sugarcane in India presented is table 5 reveals that Maharashtra is the leading state, which has overcome the level of production of Uttar Pradesh. Fortunately, Karnataka and Punjab perform is second and third place. During 2011-12 onwards, no production has been carried out in the state of Assam, Kerala, and Rajasthan.

Performance of Sugar Industries in India

Table 6: State-Wise Number of Centrifugal Sugar Factories Working in India

| States         | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam          | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Andhra Pradesh | 35      | 35      | 37      | 37      | 36      | 24      | 22      | 19      | 18      | 18      |
| Bihar          | 9       | 9       | 10      | 11      | 11      | 11      | 11      | 11      | 11      | 11      |
| Goa            | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| Gujarat        | 18      | 18      | 19      | 19      | 18      | 18      | 20      | 21      | 20      | 17      |
| Haryana        | 15      | 14      | 14      | 14      | 14      | 14      | 14      | 14      | 14      | 14      |
| Kerala         | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Karnataka      | 50      | 54      | 59      | 58      | 60      | 62      | 65      | 64      | 64      | 66      |
| Madhya Pradesh | 9       | 11      | 13      | 13      | 12      | 14      | 16      | 17      | 17      | 18      |
| Maharashtra    | 147     | 143     | 167     | 170     | 172     | 157     | 183     | 180     | 152     | 187     |
| Orissa         | 5       | 4       | 5       | 5       | 5       | 3       | 3       | 3       | 2       |         |
| Punjab         | 16      | 15      | 16      | 17      | 16      | 16      | 16      | 16      | 16      | 16      |
| Puducherry     | 1       | 1       | 2       | 2       | 2       | 2       | 1       | 1       | m       |         |
| Rajasthan      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |         |
| Tamil Nadu     | 37      | 41      | 44      | 43      | 43      | 42      | 43      | 42      | 39      | 36      |
| East U. P.     | 44      | 42      | 42      | 42      | 40      | 38      | 38      | 38      | 38      | 38      |
| West U. P.     | 35      | 35      | 34      | 33      | 33      | 32      | 31      | 31      | 48      |         |
| Central U. P.  | 53      | 51      | 49      | 49      | 49      | 49      | 49      | 48      | 48      | 47      |
| West Bengal    | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| Uttar Pradesh  | 10      | 10      | 10      | 10      | 9       | 9       | 9       | 8       | 8       | 7       |
| Chhattisgarh   | 1       | 3       | 3       | 3       | 3       | 3       | 3       | 4       | 4       |         |
| Telangana      | 10      | 10      | 7       | 7       | 7       | 7       | 7       | 7       |         |         |
| All India      | 488     | 490     | 527     | 529     | 526     | 509     | 538     | 526     | 493     | 525     |

About the number of sugar factories in India for the period from 2008-09 to 2017-18 presented in table 6. The table 6 indicates that there are no sugar industries found in Assam, Kerala, where as in the state of Telangana, sugar factories are missing for the period from 2008-09 to 2012-13. Another noteworthy feature of the above table implies that there is only one sugar factory run in the state of Goa and Rajasthan the highest number of sugar factories are found in the state like Maharashtra (187), Uttar Pradesh (90), Karnataka (66) and Tamil Nadu (36). Rest of the state only a few sugar factories are working.
### Table 7: State-Wise Cane Crushed By Centrifugal Sugar Factories in India (Thousand Tonnes)

| States   | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam    | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| A. P.    | 5993    | 5546    | 10317   | 11588   | 10299   | 6942    | 6014    | 5894    | 4116    | 4885    |
| Bihar    | 2370    | 2723    | 4141    | 4761    | 5716    | 6591    | 5724    | 5147    | 5711    | 7479    |
| Goa      | 108     | 100     | 146     | 116     | 108     | 127     | 125     | 101     | 47      | 74      |
| Gujarat  | 9445    | 11295   | 12359   | 10493   | 10603   | 11147   | 11245   | 8368    | 10476   |
| Haryana  | 2528    | 2648    | 4346    | 5430    | 5245    | 5718    | 5794    | 5120    | 6454    | 8124    |
| Kerala   | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Kanyakumari | 16104 | 23977   | 33765   | 34753   | 33200   | 38140   | 44641   | 37714   | 21252   | 35427   |
| Maharashtra | 40022 | 61390   | 80223   | 77063   | 67646   | 93116   | 74383   | 37346   | 95360   |
| M.P.     | 581     | 853     | 1700    | 1639    | 1944    | 3277    | 3968    | 3465    | 3685    | 4636    |
| Nagaland | -       | 4       | -       | -       | -       | -       | -       | -       | -       | -       |
| Orissa   | 327     | 251     | 519     | 731     | 719     | 680     | 455     | 518     | 405     | 377     |
| Punjab   | 2603    | 2112    | 3433    | 4271    | 4796    | 4972    | 5695    | 6671    | 6760    | 6421    |
| Puducherry | 166   | 225     | 546     | 720     | 632     | 608     | 359     | 68      | 66      | -       |
| Rajasthan | 42      | 48      | 49      | 29      | 52      | 67      | 78      | 89      | 119     | 77      |
| Tamil Nadu | 16606 | 14328   | 20310   | 25455   | 21457   | 15760   | 14051   | 15586   | 11904   | 8240    |
| U.P.     | 45482   | 56734   | 64381   | 76855   | 81506   | 70117   | 74453   | 64479   | 82716   | 111190  |
| East U.P. | 14353  | 17124   | 21273   | 26624   | 27767   | 24182   | 24175   | 20462   | 24874   | 33437   |
| West U.P.| 15864   | 19507   | 19981   | 21521   | 23824   | 21348   | 22752   | 19526   | 26368   | 33222   |
| Central U.P. | 15265 | 20103   | 23127   | 28710   | 29915   | 24587   | 27526   | 24941   | 31474   | 44531   |
| West Bengal | 29     | 29      | 56      | 54      | 71      | 59      | 8       | 7       | 7       | -       |
| Uttar Pradesh | 2421  | 3175    | 3235    | 3641    | 3693    | 3222    | 3516    | 2837    | 3506    | 4091    |
| Chhattisgarh | 151   | 110     | 268     | 435     | 517     | 771     | 787     | 609     | 500     | 1080    |
| Telangana | 3152   | 3067    | 2558    | 1116    | 2483    | -       | -       | -       | -       | -       |
| All India | 144978 | 185548  | 239807  | 256975  | 250598  | 238464  | 273046  | 236492  | 194078  | 302427  |

Sources: From 2011-12 onwards data has been extracted from ISMA Satellite Mapping

With regards to state wise cane crushed by centrifugal sugar factories in India presented in table 7 indicates that the states like Assam, Nagaland, and Kerala have been ruled out in the sugar and sugar-related production activities. Table 7 further reveals that compared to 2016-17, almost all the states perform better in crushing of sugar cane activities during 2017-18. As usual, the agrarian state like Uttar Pradesh stood top among other states in the crushing of sugar cane, which is followed by Maharashtra and Karnataka. Another noteworthy feature of table 7 is the performance of crushing activities is Tamil Nadu is continually decreasing from 2012-13 expect 2015 and 2016.

### Table 8: State-Wise Average Recovery of Sugar Percent in India

| States          | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam           | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Andhra Pradesh  | 9.89    | 9.28    | 9.75    | 9.79    | 9.64    | 9.75    | 9.38    | 9.35    | 9.37    | 9.53    |
| Bihar           | 9.04    | 9.49    | 9.30    | 9.45    | 8.86    | 8.97    | 9.18    | 9.77    | 9.21    | 9.58    |
| Goa             | 8.72    | 8.17    | 8.66    | 9.02    | 8.89    | 9.49    | 9.19    | 9.60    | 8.38    | 7.92    |

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Table 8 reveals the information about the state-wise average recovery of sugar percent in India. The state like Assam, Kerala Dadar Nagar Haveli, is found to be nil during the year 2017-18. The performance of Tamil Nadu, Orissa, and Maharashtra showed a marginal decline in the percentage of performance. Where Andhra Pradesh, Bihar, Haryana, Uttarakhand have shown better performance, compared to the previous year 2016-17.

Table 9: The state-wise average duration of crushing season in India

| States          | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Assam           | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| A.P.            | 72      | 63      | 106     | 113     | 101     | 97      | 92      | 104     | 81      | 93      |
| Bihar           | 59      | 66      | 96      | 97      | 116     | 126     | 101     | 94      | 104     | 126     |
| Goa             | 78      | 73      | 108     | 90      | 81      | 94      | 98      | 78      | 43      | 60      |
| Gujarat         | 125     | 150     | 175     | 137     | 145     | 157     | 161     | 139     | 102     | 148     |
| Haryana         | 65      | 60      | 109     | 146     | 136     | 150     | 143     | 136     | 168     | 205     |
| Kerala          | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |
| Karnataka       | 96      | 126     | 169     | 152     | 134     | 138     | 151     | 120     | 77      | 116     |
| M.P.            | 44      | 55      | 79      | 73      | 89      | 133     | 130     | 92      | 96      | 109     |
| Maharashtra     | 89      | 143     | 164     | 147     | 125     | 125     | 149     | 116     | 67      | 137     |
| Dadar Nagar     | -       | 6       | -       | -       | -       | -       | -       | -       | -       | -       |
| Haveli          |         |         |         |         |         |         |         |         |         |         |

Sources: From 2011-12 onwards data has been extracted from ISMA Satellite Mapping
Table 9 reveals that the status of Haryana, Uttar Pradesh showed a real performance with regards to a number of days carried out of crushing activities. Even the state of Punjab, Bihar, Gujarat, and Maharashtra performed well for the crushing. Tamil Nadu has shown a declining trend and in the case of Karnataka and Telangana have done a remarkable job in the year 2017-18 compared to 2016-17.

**Major Findings**

The area under sugarcane cultivation in the world is marginally decreased to 20.27 million ha. In 2004 to 19.78 million ha. In 2005. This led to a decrease in sugar cane production.

Major sugarcane produced in Uttar Pradesh, Maharashtra, stood in second place. In Southern India both Karnataka and Tamil Nadu were the largest in sugarcane production.

It has been observed that Uttar Pradesh is the leading State in the production performance of sugar production. Similarly, in the Southern State, Karnataka performed a leading role in the production of sugar.

It has been observed that the States like Assam, Kerala, and Rajasthan sugarcane cultivation is almost negligible.

It is also observed that there are no sugar industries found in Assam and Kerala. In the case of Telangana, there were no sugar factories from 2009 to 2013.

It is further observed that the States like Assam, Nagaland, and Kerala has been ruled out in the sugar and sugar-related production activities.

It has been further observed that Karnataka and Telangana have done a remarkable job regarding crushing activities during 2017-18 compare to 2016-17.

**Conclusion**

Thus sugar industries in India play a pivotal role. The major contribution of significance crops comes from few states Viz., Uttar Pradesh, Maharashtra, Haryana, Gujarat, Karnataka, Andhra Pradesh, Tamil Nadu. It is at a very lower level, or almost the crop is missing in these state viz., Punjab, Assam, Orissa, West Bengal Rajasthan, and Pondicherry Besides, India is one of the longest sugar-producing countries next only to Brazil. It also undertakes the export of sugar to other countries. Further among the south Indian states, Karnataka is one of the south Indian states in sugar cane cultivating and sugar production. The details of the production performance in clearly presented in the next Chapter.

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**Author Details**

G. Shivagami, *Research Scholar & Professor, Department of Economics, Bangalore University, Bangalore, Karnataka, India.*

T. Rajendra Prasad, *Professor, Department of Economics, Bangalore University, Bangalore, Karnataka, India,*

*Email ID: trprasadhub@gmail.com.*