



SUGARCANE BASED INDUSTRIES AND SUGARCANE (*SACCHARUM SPP.*) IN WEST BENGAL: PRESENT & FUTURE

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Abstract

Sugar industry is the second largest agro based industry after textile in India and sugarcane provide raw materials to the industry and jaggery (gur) units, which is also a traditional cottage industry in west Bengal since long back. The performance of the only sugar mill (Khaitan India Ltd located at Plassey, Nadia) in the state is consistently poor for last few years with low cane crushing ability (0.69 lakh tone during 2017-18) and recovery (5.1% during 2017-18) leading to poor paying capacity to farmers. In contrary to that it has an area of 17 thousand hectares with average yield of 76.1 tonne per hectare and total production of 12.94 lakh tonnes during 2017-18. A sugarcane research unit was established at State Agricultural Research Institute, Tollygunj in 1950. In the same year, another sugarcane research facility was established at Burdwan. The Tollygunj unit was shifted to the District Seed Farm, Burdwan in 1956 to provide farm facilities. Then both units were transferred to Bethuadahari, Nadia in 1965 to establish the present Sugarcane Research Station. Convergence of its research with industry may change the sugar factory into “Bio-refinery” or “Agri Business Complex” and able to produce sugar of improved quality as per the consumer preferences and also able to produce bio ethanol for blending up to 10% with automobile fuel. This industry and jaggery units spread over the state plays an important role for sustaining the livelihoods of thousands of sugarcane growers of rural areas. Sugarcane juice vending is popularizing day by day and an alternative sustainable livelihood option may be created, if convergent with research by developing new varieties resistant to red rot and suitable for various purposes for different agro climatic zones of this state.

Key words: Sugarcane Based Industries, Convergence, Research, Livelihood and West Bengal.

Introduction

The second largest agro based industry after textile is sugar industry which provides livelihood to around 6 million sugarcane growers and 10 lakh workers employed in sugar mills & jaggery units in India. Bagassess, molassess and press mud are the main by-products, which have diversified use in other industries. Jaggery (Gur) preparation from sugarcane juice is a cottage industry in rural areas in india as well as in West Bengal. Bio-ethanol is also produced in sugar industry for which blending upto 10% with automobile fuel. There is only one sugarmills (Khaitan India Ltd located at Plassey, Nadia) in the state having very poor cane crushing ability (0.69 lakh tonne) and recovery (5.1%) leading to poor paying capacity to farmers. In spite of that sugarcane has an area of 17 thousand hectares with average yield of 76.1 tonne per hectare and total production of 12.94 lakh tonnes during 2017-18 (Sugar India, Year Book, 2018). It is grown almost all the districts except hill area but the major sugarcane growing districts are Murshidabad, Nadia, Birbhum, North 24 Parganas, Paschim Medinipur, Malda, Dakshin Dinajpur & Uttar Dinajpur. Districts with high spread sugarcane area and total production are very powerful in reducing poverty in rural population of India (Rajesh Kumar, SS Hasan and AD, Pathak, 2016). It can also be eaten as is or consumed in the form of juice. Demands of sugarcane juice can easily be seen by the huge crowd rounding the roadside vendors, waiting a glass of it. In addition to the industrial use of sugarcane, installation of organic sugarcane juice bars/outlets/stalls within the Bus Stands, Hospital campuses, Market places, educational institutes, different government offices, Kishan Mandies, Parks, Tourist Spots, Religious places, etc and

organic jaggery (gur) making units can also drastically change the scenario and having huge opportunities of employment generation as well as increase the income of the sugarcane growers in West Bengal (Mahata, 2019).

Brief History of Sugarcane in West Bengal

First mentions of sugarcane can be traced back to our ancient scriptures such as Atharva Veda, Rig Veda and Manus Law book dating back to 1000-3000 BC. Buddhist literature also mentioned sugarcane and gur. But it is not known since when sugarcane was under cultivation in the Indo-Gangetic plain. Wild sugarcane germplasms collected by Sugarcane Breeding Institute, Coimbatore from West Bengal (Kandasami *et al.*, 1983; Sreenivasan *et al.*, 2001a and 2001b; Amalraj and Manjunatha, 2011). Table 1 is an indication of the natural biodiversity of wild sugarcane species in the state. According to Panini the word gur is connected with Gour region (East Bengal) (Prakash, 2005). In the seventh century AD the capital of Gour country is called Gour or Karnasubarna(modern Rangamati, about 7 miles to the south of Murshidabad). The name Gour is supposed to be derived from the word Gur possible because it was famous in ancient time for its production of gur. At present Murshidabad, Malda and Nadia accounts for about 65% of sugarcane area in this state.

In West Bengal, a sugarcane research unit was established at State Agricultural Research Institute, Tollygunj in 1950. In the same year, another sugarcane research facility was established at Burdwan. The Tollygunj unit was shifted to the District Seed Farm, Burdwan in 1956 to provide farm facilities. Then both units were transferred to Bethuadahari,

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Nadia in 1965 to establish the present Sugarcane Research Station. During, 1947, Co 213 occupied about 80% area of Bengal and other local thick cane varieties were Dacca-Ganderi, Vendamukhi, Samsara and Puri (Rao, 1947).

Objective of Study: The present study was taken up for the following objectives keeping in mind-

1. To Study the present status of sugarcane cultivation and sugarcane based industries in West Bengal.
2. To analyse the problems faced by this industries and way to overcome.
3. To study the future prospect of this industries.
4. To study the impact of convergence between research and associate industries.
5. To study the employment potential for this industries.

Materials and Methods

This study is based on secondary data which have been collected from various reports published by the ICAR-Sugarcane Breeding Institute, Coimbatore, Tamil Nadu, ICAR-Indian Institute of Sugarcane Research, Lucknow, Uttar Pradesh, Indian Sugar Mills Association, National Federation of Co-operative Sugar Factories Ltd., Sugar India Year Book 2018, Sugarcane Research Station, Bethuadahari, Department of Agriculture, Govt. of West Bengal, different journals and magazines, etc.

Results and Discussions

Present Status of Sugarcane based industries in West Bengal

The performance of the only one operational sugar mill, Khaitan(India) Ltd. at Plassey, Nadia in West Bengal have consistently poor cane crushing and recovery record as compared to national average, for last few years resulting less production of sugar and thus their paying capacity to the farmers is very poor and uncertain (Table 2). The crushing season (days) of this sugar mill was also negligible as compared to other state during 2015-16 and 2016-17 crop season (Table 3).

Present status of Sugarcane cultivation in West Bengal

Sugarcane is grown almost all the districts except hill area. The major growing districts are Murshidabad, Nadia, Birbhum, North 24 Parganas, Paschim Medinipur, Malda, Dakshin Dinajpur & Uttar Dinajpur. It has an area of 17 thousand hectares with average yield of 76.1 tonne per hectare and total production of 12.94 lakh tonnes during 2017-18 (Table 2) The area under sugarcane was decreased by 4000 hectare but yield increase by 2.3 t/ha in 2017-18 as compared to 2016-17 crop season though both area and yield increased in national level.

The soil and climatic condition of West Bengal is highly favourable for higher yield of sugarcane as well as sugar production. The demand for sugar, gur, molasses and sugarcane juice for consumption is much higher than its production. Therefore, there is huge scope for extension of profitable sugarcane cultivation both for conventional as well as organically in this state.

Facilities and achievements of Sugarcane Research in West Bengal

A sugarcane research unit was established at State

Agricultural Research Institute, Tollygunj in 1950. In the same year, another sugarcane research facility was established at Burdwan. The Tollygunj unit was shifted to the District Seed Farm, Burdwan in 1956 to provide farm facilities. Then both units were transferred to Bethuadahari, Nadia in 1965 to establish the present Sugarcane Research Station. This research station is a regular centre of All India Coordinated Research Project on Sugarcane under North Central & North Eastern Zone. This research station has already developed two promising varieties denoted CoB and also developed promising clones which are at various clonal stages for evaluation.

Future prospect of Sugarcane based industries in West Bengal

A big gap between consumption and production of sugar and gur (Table 7) clearly indicate the huge prospect of sugarcane based industries in this state. In addition to that organic sugar can also be produced in this state, which has more nutritional value due to characteristic flavour of natural compounds in it, showing better prospects for it in domestic/international markets. Production of VVHP dextrin free raw sugar, bio-ethanol and organic sugar has bright future, which may change the present scenario of sugarcane based industries in this state.

Conclusion

Convergence of sugarcane research with industries may change the sugar factory into “Bio-refinery” or “Agri Business Complex” and able to produce sugar of improved quality as per the consumer preferences and also able to produce bio ethanol for blending up to 10% with automobile fuel. This industry and jaggery units spread over the state plays an important role for sustaining the livelihoods of thousands of sugarcane growers of rural areas. Sugarcane juice vending is popularizing day by day and an alternative sustainable livelihood option may be created, if convergent with research by developing new varieties resistant to red rot and suitable for various purposes for different agro climatic zones of this state.

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Table 1: Wild sugarcane germplasm collected at SBI, Coimbatore from West Bengal

Species	No of accession collected during the year		Total
	1949	2010	
<i>Erianthus arundinaceus</i> (Retz.) Jeswiet	1	3	4
<i>Erianthus bengalense</i> (Retz.) C. E. Hubb	2	0	2
<i>Erianthus elephantinus</i> Hook.f.	0	1	1
<i>Erianthus procerus</i> (Roxb.) Raizada	2	0	2
<i>Erianthus rufipilus</i> (Steud.) Griseb	0	1	1
<i>Saccharum spontaneum</i> L.	12	36	48
Total	17	41	58

Table 2: Performance of Sugar Industry (Khaitan India Ltd.) in West Bengal

Performance	2017-18	2016-17	2015-16	2014-15
Crushing Cap. (MT)	1800	1800	1800	1800
Crushed (Lakh MT)	0.69	0.66	0.75	0.59
Sugar (Lakh Qtl.)	0.36	0.48	0.50	0.49
Recovery (%)	5.21	7.18	6.63	8.36
National Average Recovery (%)	9.30	10.48	10.62	10.37
Molasses (MT)	3800	3700	5200	3200

Source-SugarIndia, YearBook, 2018

Table 3: State wise duration of crushing season (Days)

State	2016-17	2015-16	2014-15
West Bengal	19	9	71
Bihar	106	95	100
Orissa	70	97	74
Uttar Pradesh	139	111	125
Haryana	168	136	143
Punjab	133	136	128
Rajasthan	99	91	92
Maharashtra	70	114	145
Goa	43	78	98

Source-SugarIndia, YearBook, 2018

Table 4: Present Status of Sugarcane Cultivation in West Bengal compared to India

Year			Sugarcane Yield (t/ha)	
	West Bengal	India	West Bengal	India
2014-15	18	5067	117.0	71.5
2015-16	17	4927	122.1	70.7
2016-17	21	4436	73.8	69.0
2017-18	17	4774	76.1	74.4

Source-SugarIndia, YearBook, 2018

Table 5: Temperature, Humidity, Sunshine hour and Rainfall requirement for sugarcane cultivation

Sugarcane crop stages	Growth stages duration (days after planting)	Temperature		Humidity Requirement (%)		Sunshine Hour	Rainfall (mm)
		Max.	Min.	Max.	Min.		
Germination & emergence phase	15-30	30	15	70	50	10	1500-2500 (Evenly distributed over the growing season)
Tillering & stem elongation phase	31-120	30	15	70	50	10	
Grand growth phase	121-210	30	20	85	80	11	
Ripening phase	211-365	15	12	65	45	10	

Source: Shukla, S.K.; Sharma, Lalan; Awasthi, S.K.; Pathak, A.D.(2017)

Table 6: List of Sugarcane varieties recommended for cultivation in West Bengal

Name of Variety	Maturity Group	Year of release and notification	Cane yield (t/ha)	Sucrose (%) in juice	Reaction to diseases & insect-pests.	Special characters
CoP06436	Mid-late	2015 268(E)	74.45	17.35	MR to red rot, smut & wilt.	Good ratooner & tolerant to lodging.
CoSe01421 Imarti	Early	2013 2817(E)	65.87	17.36	MR to red rot, smut & wilt.	Good ratooner.
Co0232 Kamal	Early	2009 454(E)	67.82	16.51	MR to red rot. Tolerant to top borer.	Tolerant to water logging & early drought.
Co0233 Kosi	Mid-late	2009 454(E)	67.77	17.54	MR to red rot. Tolerant to top borer.	Tolerant to water logging & early drought.
CoLk94184 Birendra	Early	2008 2458(E)	76.00	18.00	MR to red rot.	Tolerant to drought & water logging. Good ratooner.
CoSe96234 Rashmi	Early	2004 642(E)	64.10	17.90	MR to red rot, tolerant to major insect -pests.	Non lodging, suitable for autumn, spring, early & late sown condition.
CoSe96436 Jalpari	Mid-late	2004 642(E)	67.12	17.73	MR to red rot.	Tolerant to water logging.

CoB94164 Madhuri	Mid-late	2004 161(E)	96.00	17.5	MR to red rot, smut & wilt and tolerant to top borer.	Tolerant to lodging.
CoSe95422 Rashbhari	Early	2001 1134(E)	67.80	17.66	MR to red rot.	Suitable for normal irrigation condition.
CoSe92423 Rajbhog	Mid-late	2001 1134(E)	70.10	17.50	MR to red rot.	Excellent ratooner.
Co89029 Gandak	Early	2001 1134(E)	71.08	17.13	MR to red rot, tolerant to top borer & shoot borer.	Tolerant to drought & water logging.
BO128 Pramod	Mid-late	2001 92(E)	69.64	17.60	MR to red rot, smut, wilt & low incidence of insect-pests.	Tolerant to water logging & salinity.
UP 09453	Early	Identified by AICRPS in 2016	74.74	17.90	MR to major diseases.	Better suited for water logged condition.
CoP09437	Mid-late	Identified by AICRPS in 2016	77.68	17.60	Resistant to red rot, smut & wilt.	Tolerant to lodging.
BO91	Mid-late	Identified by AICRPS in 1983	72.20	16.80	Resistant to red rot, smut & wilt and has low incidence of insect-pests.	Good ratooner and tolerant to all types of biotic & abiotic factors. Best for quality jaggery(gur) production.
CoB99161 Swapan	Early	SVRC released	88.00	16.8	MR to red rot & smut.	Non lodging. Tolerant to water submergence & drought.

Co = Coimbatore (Tamil Nadu), B = Bethuadahari (West Bengal), P = Pusa(Bihar) , Lk = Lucknow (Uttar Pradesh) Se = Seorahi (Uttar Pradesh), BO = Bihar Orissa, UP = Uttar Pradesh, MR = Moderately Resistant

Crop duration: Early (300 days), Mid-late (360 days).

Source: *Shukla, S.K.; Zubair, Adil; Awasthi, S.K.; Pathak, A.D.(2018)*

Table 7: Production and consumption of sugar & gur in West Bengal (2017-18 Estimated)

Item	Consumption		Production		Import	
	Quantity	Value (Cr Rs.)	Quantity (‘000t)	Value (Cr Rs.)	Quantity (‘000t)	Value (Cr Rs.)
Sugar	1643	4929	3.6	10.8	1639.4	4918.2
Gur	456.5	1141.25	110	275	346.5	866.25

[Population 9.13 crore-census 2011. Per capita consumption of Sugar @ 18 Kg, Gur @ 5 Kg. Price of Sugar @ Rs 30,000/t & Gur @ Rs 25,000/t](Mahata,G., 2018)