

SWEETENING FOOD SECURITY IN BANGLADESH: PRESENT SITUATION AND FUTURE STRATEGY

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ABSTRACT

Sugar and jaggery (locally called 'gur') are the main important sources of sweetener (source of carbohydrate) in Bangladesh. Sugar is indispensable for health and if it is not taken directly, it must be taken from other sources of carbohydrates in the food. During 1990-91 to 2006-07 availability of sugar and gur in Bangladesh was 0.99 million tons on an average both from internal production and importation. During the same period mean domestic production of sugar and gur were 0.18 million tons and 0.42 million tons respectively which could meet 33% of the internal demand of sugar and gur. Deficit of demand was 0.75 million tons about 39 % of the internal demand and the rest 28% of the demand was met by importation. Per capita availability of sugar and gur were 5.8 kg and 3.0 kg as against demand of 10 kg sugar and 3 kg gur respectively during the aforementioned period. Sugarcane cultivation area, sugarcane production and sugar production showed negative trend which were -1.06, -1.37 and -4.43% respectively whereas yield of sugarcane, gur production and importation of sugar showed positive trend which were 0.62, 0.05 and 19.33% respectively. The sugar industry of Bangladesh made losses of Tk. 461.48 million per year on an average during aforementioned period. Date palm and palmyra palm plantation in homestead, embankment, ponds, road sides, marginal lands and ail (demarcation mark) that remain fallow would be an alternative source of sugar and gur to meet up the increasing demand of sugar and gur in Bangladesh.

Key words: Date palm, food security, sugarcane, sugar, gur, demand, supply.

INTRODUCTION

The issue of food security is now not only the concern of developing countries but also the matter of whole world. Although, Bangladesh as one of the developing countries has made considerable progress in augmenting domestic production especially rice production over the past years. However, sustainability of production and hence availability of food is a big issue which is being raised very strongly recently. Bangladesh will have to produce about 35 million metric tons of food grain by the year 2020, with a reduced availability of agricultural land. If all or most of this magnitude of food will have to be produced domestically, it should be real challenges for the nation. Nutritious food is also included in the system of food security. According to FAO, food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Healthy and energetic survival in the world should be the main importance of food security than normal survival. Sweetening food is very important to become energetic and healthy. It provides instant energy to human body (carbohydrates). National nutritional level is much dependent on the consumption of sugar and gur in Bangladesh (Alam, 2008). Per capita consumption of sugar is very important in the context of health, IQ, calorie intake of the nations. Sugar is indispensable for health and if it is not taken directly, it must be taken from other sources of carbohydrates in the food. Since sugar, as it is called, a cheap source of instant energy, a person should take it liberally. According to the nutritionists (CSIR, 1957), "a person requires a minimum of 44 lb (20 kg) of sugar or equivalent quantity of gur per year in his (or her) diet". It is believed that there is a strong positive relation between total sugar consumption

and health standard of a nation. Hence, it is necessary to produce more domestic sugar and gur to maintain our minimum health standard for our growing population through the increase production of sugarcane and other allied sweetening crops in Bangladesh.

Sugar industry is the most important agro-based rural industry in Bangladesh. More than 0.6 million farm-families are dependent on sugar industry for their subsistence. But now the existence of this industry is questionable due to its huge losses each year. Currently, on an average, the principal raw materials, sugarcane, for producing sugar is growing in 0.18 million hectare of land of which almost 50% is located in the sugar mills zones, where sugarcane is mostly used for sugar production and remaining 50% is situated in the non-mill zones, where sugarcane is mostly diverted for gur and juice production (Bench mark survey of Sugarcane, 1996). Sugar industry added value to final output in the form of sugar and its by-product. Further it is value added in our national economy when the final output is marketed to the consumer via dealer (distributor, wholesaler and retailer). Therefore, there is a wide scope of increasing sugar production and its by-product through sugarcane processing which will meet up not only to growing demand of sugar but also to create enormous scope of employment in the country (Alam *et al.*, 2006).

With the present population growth rate at 1.48 per cent per annum, the population will be at 20 cores in 2020 (Economic Review, 2007). At present, 15 sugar mills are in operation under BSFIC (Bangladesh Sugar and Food Industries Corporation) with a capacity of 0.20 million tons of sugar production per year. Demand of sugar and gur are being increased with population increase and urbanization, while sugarcane acreage is being gradually decreased and/or pushed to low lying marginal lands due to higher demand for cereals, vegetables etc and utilization of crop lands for houses, roads, industries etc (Alam, *et al.*, 2008). Therefore, there is little or no scope to increase both cane yield and sugarcane acreage to meet higher demand of sugar and gur for ever increasing population in Bangladesh. According to FAO recommendation, per capita at least 13 kg sugar is required for human balanced diet, and as such present requirement of sugar for 140 million populations in Bangladesh is about 1.8 million tons. Present production of sugar and gur in the country is about 0.07-0.2 million tons and 0.35- 0.5 million tons respectively, and as such shortfall of sugar/gur is about 1.38-1.1 million tons. Date palm gur may be an alternative source of sugar to supplement the increasing demand for sugar/gur in Bangladesh (Alam *et al.*, 2008). As not only sugarcane land but also total cultivable land is decreasing so it is important to find ways to meet up the escalating demand of sugar and gur and thus ensuring the availability of sweetening food in Bangladesh. So, this study has been undertaken to critically evaluate the present situation and future prospect of sugar and gur production in Bangladesh.

MATERIALS AND METHODS

All the sugar mills of Bangladesh were selected for the study. Data were collected from published sources like annual report/MIS report of Bangladesh Sugar and Food Industries Corporation (BSFIC), Bangladesh Sugarcane Research Institute (BSRI), Directorate of Agricultural Extension (DAE), Bangladesh Bank (BB) and Bangladesh Bureau of Statistics from 1990-91 to 2005-06 crushing seasons. Descriptive statistics and time series data were used to analyse the data of the study. For growth analysis exponential growth rate model was used.

$$y = ae^{bt} \text{ or, } \log e^y = \log e^a + bt \quad \text{Where,}$$

y = Sugarcane area, production, yield, sugar production,
 t = time period, and
 $e^b - 1$ be the compound growth rate.

RESULTS AND DISCUSSION

Current trend of sugarcane area, production, yield and gur production

The area under sugarcane cultivation has been decreasing over the last decades. There were considerable temporal fluctuations in both acreage and production of sugarcane which resulted in sugar production in Bangladesh. During 1990-91 to 2006-07 average total area under sugarcane cultivation was 88.71 thousand hectares where as production was 4164 thousand tons. For the same period average yield of sugarcane was 46.89 t ha⁻¹ and sugar production was 166 thousand tons. At present, total cultivated area in Bangladesh is 8.29 million hectares of which only 1.07 per cent under sugarcane cultivation (BBS, 2006). The growth rate of sugarcane cultivation area, sugarcane production and sugar production showed negative trend which were -1.06, -1.37 and -4.43% respectively whereas yield of sugarcane, gur production and importation of sugar showed positive trend which were 0.62, 0.05 and 19.33% respectively (Table 1). The variation in sugarcane production was mainly due to the reducing of sugarcane areas which is subjected to relative profitability of competitive crops, especially short duration vegetables and pulse crops. However, damages of sugarcane due to natural calamities and non-availability of sugarcane to the sugar mills for milling was also responsible. Availability of sugarcane for milling is highly co-related with the price of sugarcane offered by the sugar mills (Alam, et al., 2008).

Domestic production of sugar and gur Vs importation of sugar

The demand of sugar and gur is increasing with the increase of population in Bangladesh. Due to low recovery, supply shortage of sugarcane to mills and under capacity utilization, sugar production is not increasing and last few years importation of sugar increased tremendously to met up the required amount of sugar as Bangladesh is not self sufficient in sugar production. During 1990-91 to 2006-07 mean production of sugar was 0.17 million tons far below than installed capacity of 0.21 million tons (Table 2). The gap between demand and supply of sugar and gur in the country is still high. In 2006-2007 season internal demand of sugar considering annual per capita demand of sugar 10.0 kg stand at 1.40 million tons. Sugar production in 2006-07 was 0.11 million tons which met only 8 percent of the internal demand of sugar. Bangladesh, through BSFIC and private agencies imported 1.25 million tons of sugar about 89% of internal demand of sugar in 2006-2007 against the effective demand of 1.40 million tons of sugar.

During 1990-91 to 2006-07 mean domestic production and importation of sugar and gur were 0.99 million tons met 56% of the country's demand and deficit was 0.75 million tons (43% of the internal demand). Availability of sugar both from internal production and importation during the period 1990-91 to 2006-07 was 0.58 million tons on an average. Per capita availability of sugar and gur were 5.8 kg and 3.0 kg as against demand of 10 kg sugar and 3 kg gur respectively during the period. For the last 17 years from 1990 to 2007 there were deficit of around 0.75 million tons of sugar and gur on an average (Table 2). This huge deficit amount of sugar was met up by illegal border trade or either low per capita consumption of sugar or both. This deficit can be met up either by increasing domestic sugar production as there is scope to increase domestic sugar production upto 0.21 million tons by increasing recovery per cent, full capacity utilization and management improvement or either by importation of sugar for which require more foreign currency. So, we have to find domestic alternatives. As we have long tradition of cultivating date palm and palmyra palm which are the most important sources of gur in Bangladesh could be the best alternatives.

Profit and loss of the sugar industry

Sugar industry of Bangladesh is making huge losses every year. During 1990-91 to 2005-06 the industry made losses of Tk. 8124.25 million and profit of Tk. 740.49 million only in the crashing year 1994-95 and 2005-06 the industry made profit. However, the industry provided Tk. 26134.22 million to the national exchequer as VAT, Tax, Excise duty, Lavy etc during the said period (Table 3). The reason of making profit in the year 1994-95 and 2005-06 was higher domestic sugar price than the production cost of domestic sugar. Besides, imported sugar price was higher than domestic sugar price due to world high sugar price during these two years respectively. In 2005-06 year, sugar production cost of BSFIC was Tk. 32 per kg and sold in domestic market at Tk. 60 per kg which indicates only increased sugar price could make the industry viable. The sugar industry of Bangladesh made losses on an average Tk. 461.48 million per year during aforementioned period.

World sugar market

World sugar market is surplus and subsided. For the year 2006-07, the International Sugar Organization (ISO) has estimated a higher global sugar surplus of 7.2 million tons. The ISO had in November, 2006 estimated the surplus at around 5.8 million tons. In its quarterly report released in February 2007, the ISO said global sugar output is estimated at 160.2 million tons against a consumption demand of 153 million tons. World consumption is projected to grow by 2.15% only a fraction down from the 10- year average of 2.29% (ISO, 2006). The sugar industry of Bangladesh made profit in 2005-06 year due to higher price of sugar in the world market. The EU and USA provide huge amount of export subsidy for sugar every year which resulted low world sugar price.

Cost and Return from date palm plant

It can be shown from Table 5 that date palm gur production cost was Tk. 330.0 plant⁻¹ per season of which about 62, 18 and 14 per cent were for fuel, gachee and labour cost respectively. Higher standard deviation indicating variation of cost among respondents. Per plant gross return was Tk. 688.4 and gross margin was Tk. 358.4. Return per Taka investment (variable cost basis) was Tk. 2.08.

CONCLUSION AND RECOMMENDATIONS

In one hand, the demand of sugar and gur for various purposes keeping pace with population growth is increasing. On the other hand, sugarcane cultivation is now gradually being pushed to low-lying marginal lands prone to water-logging, flooding, drought and salinity stresses due to increased demand/production of cereal and vegetables crops. So, there is hardly scope to increase sugarcane acreage to meet the higher demand of sugar and gur for ever increasing population in Bangladesh. So to meet up future demand of sugar and gur we have to find alternatives.

Develop date palm plant as an alternative source of sugar/gur

A recent study by Alam *et al.*, 2008 revealed that a farmer could get 23.12 kg gur per date palm tree during juice tapping season (about three months). According to FAO recommendation per capita 13 kg sugar/gur is required for human diet. One date palm plant cultivation in homestead/

embankment/ponds/road sides/marginal lands or boundary of plots of different crops that remain fallow might meet the demand of sugar and gur of a person in Bangladesh. So, date palm cultivation in homestead, embankment, ponds, road sides, marginal lands and boundary of plots of different crops that remain fallow would be an alternative of sugar/gur in Bangladesh. This will increase production of gur and also sugar as sugarcane used for juice and gur making will be reduced and also will increase income of rural population and thus contribute to reduce poverty and uplift meant of nutritional status of mass rural peoples (Alam *et al.*, 2008). According to BBS report, date palm and palmyra palm is grown in around 10755 to 10767 hectares of land and total estimated juice production is 3.34 to 3.48 million tons and @ 10% gur recovery about 0.334 to 0.348 million tons of gur is produced per year in Bangladesh. These trees survive in severe drought, flood and water logging conditions. Besides, millions of additional trees can be grown through application of agro forestry approach in the crop fields. Steps should be taken to develop this sweeteners crop in Bangladesh with a view to meet up increasing demand of sugar and gur of growing population.

Increase yield per unit area

Per hectare yield of sugarcane in Bangladesh is low about 48 ton/hectare in mills zone compared to other countries. Higher sugar containing varieties so far evolved by BSRI could be cultivated at farm level with recommended input use. Many farmers cultivate traditional varieties in the mills zone and those cultivate high yielding sugarcane varieties; usually do not follow proper management practices, and do not use recommended input which resulted low sugar yield. All the extension agencies BSFIC, DAE, NGOs should work together to disseminate modern technologies towards sugarcane farmers.

Increase area under intercropping

As there is hardly scope to increase sugarcane land in Bangladesh so to sustain sugarcane cultivation i.e. sugar industry the only alternative is to increase yield per unit area. Per hectare yield of sugarcane in Bangladesh is low about 48 ton/hectare in mills zone compared to other countries. Higher sugar containing varieties so far evolved by BSRI could be cultivated at farm level with recommended input use. Many farmers cultivate traditional varieties in the mills zone and those cultivate high yielding sugarcane varieties; usually do not follow proper management practices, and do not use recommended input which resulted low sugar yield. All the extension agencies BSFIC, DAE, NGOs should work together to disseminate modern technologies towards sugarcane farmers.

Subsidy for sugarcane

The ongoing subsidy programme for sugarcane should be continued and extended. Government should provide subsidy on sugar production to minimize sugar production cost. The difference between domestic sugar production cost and imported sugar price should be adjusted through subsidy. BSFIC should again get responsibility to control importation of sugar and fixing price of imported sugar.

Develop different linkages of sugar industry

Sugar industry has diverse linkages opportunity that should be explored so that more attention can be given on that area to develop and make the industry more profitable. Sugar is used for many purposes as in sweet meat shop, tea stall, medicine, beverage, confectionery and for direct

consumption that act in favour of forward linkages of sugar industry. By product of sugar industry (molasses, baggase, pressmad) can be used for many purposes. Sugarcane is the main raw materials of sugar industry. To develop sugarcane many scientists and institutions are involved that creates backward linkages of the industry. Sugarcane is also used for gur, juice and chewing purposes creating new scope for employment. These areas are not taken into consideration to develop. Now it is necessary for Bangladesh to develop at first the backward linkages of sugar industries that help to increase the production of sugar and reduce importation of sugar. At the same time the increased domestic production will create the opportunity of forward linkages industries viz Bakery and confectionary, beverage, pharmaceuticals products. By-product of sugar industries can also provide opportunities of distillery plant, livestock feed, paper and pulp and also generation of electricity and ethanol that will create huge employment opportunity. Now, it is important to explore the backward and forward linkages opportunity of sugar industry where by giving due importance new form of employment can be created and would viable sugar industry and thus contribute to reduce mass poverty of Bangladesh (Alam *et al.*, 2008).

However, steps should be taken to increase sugar recovery percent. For this more efforts on developing high sugar recovery varieties suitable for different agro-ecological zones of Bangladesh is a priority task. Sugar recovery can be increased through effective management, maturity based harvesting, scheduling and minimizing of time lag in between sugar industry and sugarcane crushing in the mills etc. More biological and agronomical research on date palm and palmyra palm should get priority as alternative sources of sugar and gur in Bangladesh.

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Table 1: Acreage, production and yield of sugarcane in Bangladesh (1990-91 to 2005-06)
(In Thousand)

Year	Area (ha.)	Production of Sugarcane (ton)	Yield (t ha ⁻¹)	Sugar Production (ton)	Gur Production	Sugar Import
1990-91	95	4696	49.19	246	432	138
1991-92	96	4491	47.03	196	482	50
1992-93	88	4247	48.28	187	415	64
1993-94	92	4576	49.61	222	334	86
1994-95	99	5030	50.81	270	285	156
1995-96	96	4341	45.25	184	371	28
1996-97	86	4098	47.33	135	463	207
1998-98	88	4191	47.56	166	415	160
1998-99	94	4124	43.71	153	359	191
1999-00	86	3526	42.82	123	427	115
2000-01	75	3362	44.90	98	436	328
2001-02	88	4476	50.71	204	306	210
2002-03	105	4595	44.59	177	322	600
2003-04	84	3948	46.52	119	450	700
2004-05	78	3516	44.99	106	450	1000
2005-06	75	3458	46.84	133	420	1200
2006-07	83	4112	47.03	109	400	1250
Average	89	4164	47	166	398	381
Growth rate	-1.06	-1.37	0.62	-4.43	0.05	19.33

Source: BSFIC Annual Reports (1990-91 to 2005-06) and BBS (2005)

Table 2: Production, demand and import of sugar and gur in Bangladesh (1990-2006).

Year	Population (million)	Per capita demand of sugar and gur @13Kg. ('000 ton)	Sugar production ('000 ton)	Sugar import ('000 ton)	Gur production ('000 ton)	Supply of sugar and gur ('000 ton)	Deficit ('000 ton)
1990-91	109.6	1425	246	138	432	816	609
1991-92	111.4	1448	195	50	482	682	766
1992-93	113.2	1472	187	64	415	666	806
1993-94	117.7	1530	221	86	334	641	889
1994-95	119.9	1559	270	156	285	711	848
1995-96	122.1	1587	184	28	371	583	1004
1996-97	124.4	1617	135	207	463	805	812
1997-98	126.7	1647	166	160	415	741	906
1998-99	129.1	1678	153	191	359	703	975
1999-00	131.5	1709	123	115	427	665	1044
2000-01	132.0	1716	98	328	436	862	854
2001-02	133.0	1729	205	210	306	721	1008
2002-03	134.0	1742	177	600	322	1099	643
2003-04	134.0	1742	119	700	450	1269	473
2004-05	140.0	1820	106	1000	450	1556	264
2005-06	140.0	1820	133	1200	420	1753	67
2006-07	140.0	1820	109	1250	400	1759	61
Mean	-	-	176.29	400.41	421.59	995.65	751.7

Source: BSFIC Annual Reports (1990-91 to 2005-06), Bangladesh Bank (2006) and BBS

(2005).

Table 3. Profit and loss of sugar industry in Bangladesh (1990-91 to 2005-06).**(Tk. in million)**

Crushing Season	Sugar Production (MT)	Recovery (%)	Sugar Production Cost (Tk/kg)	Sale Price (Tk/kg)	Profit	Loss	Revenue to the National Exchequer
1990-91	246.49	7.93	26.48	27.18	-	95.94	1293.60
1991-92	195.59	8.18	28.59	25.00	-	655.74	1306.19
1992-93	187.48	8.4	28.86	25.10	-	829.49	874.70
1993-94	221.55	8.21	27.74	26.50	-	252.51	1127.05
1994-95	270.20	7.76	26.77	27.00	78.89	-	1046.06
1995-96	183.93	7.71	30.41	27.00	-	379.28	1344.08
1996-97	135.32	7.67	33.79	27.00	-	659.19	1802.80
1997-98	166.46	7.84	31.65	27.47	-	385.73	1794.55
1998-99	152.98	6.61	36.57	27.47	-	1305.90	1771.03
1999-00	123.50	7.66	37.19	27.47	-	1117.71	1382.76
2000-01	98.36	7.18	45.09	27.47	-	1352.26	1358.25
2001-02	204.33	7.27	34.29	27.47	-	1181.19	858.70
2002-03	177.40	6.73	32.92	26.50	-	972.49	299.49
2003-04	119.15	7.26	37.65	27.00	-	594.80	349.10
2004-05	106.65	7.53	35.32	32.00	-	175.70	NA
2005-06	133.28	7.19	32.50	42.00	661.60	-	NA
Total					740.49	8124.25	16608.36

Source: MIS Report, BSFIC, 2006.

Table-4: Price of sugar in domestic market, world market & preferential market (1990-2007).**(Taka/Ton)**

Year	Domestic Production Cost	Domestic Price	World Market Price (CIF)	Import price (CIF)+ Duties	Preferential Price
1999-00	37190	29470	14000	21908	38500
2000-01	45090	29470	14700	23003	38850
2001-02	34290	29470	14700	24482	39200
2002-03	32920	28500	15400	25858	39550
2003-04	37320	34000	21700	31792	39900
2004-05	37000	36000	24500	36382	40250
2005-06	32000	60000	33880	52175	40600
2006-07	36000	26000	21350	24000	40950

Source: BSFIC, BBS, BB, USDA & BSRI.

Table 5: Average cost of gur production in 2006-07 cropping year per date palm plant.

Particulars	Cost (Tk ⁻¹ plant)	Standard deviation	Percentage of total cost
Gachee (juice tapping)	60	23	18
Fuel for gur production	205	40	62
Labour	45	23	14
Pot and others	20	15	6
Total	330.0		100
Gross return (Per Plant)	688.4		
Gross Margin	358.40		
Return per Taka investment (variable cost basis)	2.08		

Source: Adopted from Alam *et al.*, 2008