REPORT
OF
THE HIGH POWERED COMMITTEE
ON
SUGAR INDUSTRY

VOLUME-I

GOVERNMENT OF INDIA
MINISTRY OF FOOD & CONSUMER AFFAIRS
(DEPARTMENT OF SUGAR & EDIBLE OILS)
NEW DELHI

APRIL, 1998

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List of Abbreviations

1.	AABIDA	All India Alcohol-based Industries Development Association
2.	APEDA	Agricultural and Processed Food Products Export Development Authority
3.	BICP	Bureau of Industrial Costs & Prices
4.	BIFR	Board of Industrial & Financial Reconstruction
5.	BIS	Bureau of Indian Standards
6.	BOD	Biological Oxygen Demand (mgs/litre)
7.	CACP	Commission for Agricultural Costs and Prices
8.	CAW	Cane Agricultural Waste
9.	COD	Chemical Oxygen Demand
10.	CPI	Consumer Price Index
11.	CSIR	Council of Scientific and Industrial Research
12.	EC Act	Essential Commodities Act
13.	ECF	Elemental Chlorine Free
14.	EEC	European Economic Community
15.	ESP	Electrostatic Precipitators
16.	ETP	Effluent Treatment Plant
17.	FAO	Food and Agriculture Organisation
18.	FCI	Food Corporation of India
19.	FD	Forced Draft
20.	FOR	Free on Rail
21.	GATT	General Agreement on Trade and Tariff
22.	GDP	Gross Domestic Product
23.	ha	Hectare
24.	HP	Horse Power
25.	HRA	High Recovery Area
26.	ICAR	Indian Council of Agricultural Research, Lucknow
27.	ID	Induced Draft
28.	IDBI	Industrial Development Bank of India
29.	IDR Act	Industrial (Development & Regulation) Act
30.	IFCI	Industrial Finance Corporation of India
31.	IISR	Indian Institute of Sugarcane Research, Lucknow
32.	IIT	Indian Institute of Technology
33.	ISA	International Sugar Agreement
34.	ISGIEIC	Indian Sugar and General Industry Export and Import Corporation
35.	ISI	Indian Standards Institution
36.	ISMA	Indian Sugar Mills Association
37.	ISO	International Sugar Organisation
38.	ISSCT	International Society of Sugarcane Technologists
39.	KLD	Kilolitres per day
40.	KVIC	Khadi and Village Industries Commission
41.	KWh	Kilowatt hour
42.	LDPE	Low Density Polyethylene
43.	LOI	Letter of Intent
44.	LSPEF Act	Levy Sugar Price Equalisation Fund Act
45.	MNES	Ministry of Non-conventional Energy Sources
46.	MPCE	Monthly Per Capita Expenditure
47.	MT	Metric Tonne
48.	MW	Mega watt
49.	NABARD	National Bank for Agricultural and Rural Department
50.	NCDC	National Cooperative Development Corporation
51.	NDR	Net Disposable Resources
52.	NFCSF	National Federation of Cooperative Sugar Factories
53.	NGO	Non-Governmental Organisation
54.	NSI	National Sugar Institute, Kanpur
55.	NSSO	National Sample Survey Organisation
56.	OBC	Other Backward Castes
57.	OGL	Open General Licence
58.	ORA	Other Recovery Area
59.	PCB	Pollution Control Board
60.	PDS	Public Distribution System
61.	PVC	Poly-Vinyl Chloride
62.	RBHR	Reduced Boiling House Recovery
63.	RBI	Reserve bank of India
64.	R&D	Research & Development
65.	RME	Reduced Mill Extration
66.	SBI	Sugarcane Breeding Institute, Combatore
67.	SCs	Scheduled Castes
68.	SDF	Sugar Development Fund
69.	SEB	State Electricity Board
70.	SICA	Sick Industrial Companies Act
71.	SMP	Statutory Minimum Price
72.	SO_2	Sulphur Dioxide
73.	SPEF	Sugar Price Equalisation Fund
74.	SPM	Suspended Particulate Matter (mg. N cubic metre)
75.	STs	Scheduled Tribes
76.	STAI	Sugar Technologists' Association of India
77.	STM	Sugar Technology Mission
78.	TAPPI	Technical Association of the Pulp and Paper Industries
79.	TCD	Tonnes of cane crushed per day
80.	TCF	Total Chlorine Free
81.	TIFAC	Technology Information & Forecasting Council
82.	TPA	Tonnes per annum
83.	UCV	Useful Calorific Value
84.	USDA	United States Department of Agriculture
85.	VAT	Value Added Tax
86.	VSI	Vasantdada Sugar Institute, Pune
87.	WHO	World Health Organisation
88.	WPI	Wholesale Price Index

Chapter 1

Introduction

1.1 Under the policy of partial control, statutory minimum cane price is fixed by the Central Government. The State Governments in a number of States have been announcing State advised prices for sugarcane. Sugar factories in the State of UP filed a writ in the Allahabad High Court challenging the power of the State Government to advise them on the cane prices payable to the cane farmers. The case was heard in the Allahabad High Court and the Advised Cane Prices were struck down as illegal. The State Government was restrained from enforcing prices announced by them. The Hon. Justices of the High Court observed as follows before parting with this case :

> "Before parting with this case, we would like to mention that the laws relating to sugar industry and sugarcane appear to be totally outdated in India and need to be immediately reviewed by a High Powered Committee to be appointed by the Central Government. In this connection, it may be mentioned that in the early thirties of this century, the British Government felt that the sugar industry needed to be protected and developed in this country, and hence various laws were made at that time and subsequently, even after independence in this connection (see Bhargava Commission Report). The purpose of making these laws was to encourage setting up of sugar factories and to encourage sugarcane plantation. Since promulgation of these laws, several decades have expired and many of these laws have served their purpose and are no longer needed. In fact, many of these laws are actually acting as a fetter on production, and are obstructing the modernisation of the sugar industry in our country. Many of the sugar factories in the State of UP are using outdated machinery and have not introduced the latest technology which is prevalent in many sugar producing countries in the world. In our opinion, there is pressing need of a thorough review of the existing laws relating to sugar and sugarcane in the country, and outdated laws and encourage modernisation and introduction of latest technology. This will not only greatly enhance sugar production in the country but will also make sugar available at a much cheaper price to the general public.
>
> We are of the opinion that a High Powered Committee should be immediately set up by the Central Government consisting of technical experts conversant with the sugar industry as well as representatives of business, the cane growers, as well as the Central and State Governments. This Committee should study the sugar industry in the other sugar producing countries and study the laws and regulations prevailing there and then make recommendations to the Central Government to thoroughly revise the laws prevailing in India relating to sugar and sugarcane so as to help modernise the same. The Committee may consider whether it is time now to deregulate the sugar and cane industry to achieve

modernisation and increase production. We, therefore, direct that the Central Government will set up a High Powered Committee within three months of the date of this judgement and this High Powered Committee will study all aspects of the matter including the factual position and the regulations and rules prevailing in other sugar producing countries countries as well as in our country and will make its recommendations within six months of setting up of the Committee. The whole exercise by the Committee must be to aid the modernisation of the sugar industry so as to increase production and reduce the price of sugar for the general public. On receipt of the report of the Committee, the Central Government may pass such order or make such rules as it deems fit in the interest of the nation".

1.2 In compliance with the directive of the Allahabad High Court, the Central Government vide its Resolution dated 14th March, 1997 of Ministry of Food (Deptt of Food), set up a High Powered Committee consisting of the following persons :-

1.	Shri B.B. Mahajan Retired Food Secretary	Chairman
2.	Chairman National Federation of Cooperative Sugar Factories Ltd.	Member
3.	Chairman Indian Sugar Mills Association	Member
4.	Representative of Confederation of Indian Industry	Member
5.	Shri Chandra Pal Singh, Chairman UP Cane Union Federation	Member
6.	Prof. Ishwari Prasad Retired from JNU 42, Vidya Vihar, Pitampura New Delhi - 110 034	Member
7.	Shri R.L Srivastava Executive Director, IFCI	Member
8.	Secretary (Incharge of Sugar), UP	Member
9.	Secretary (Incharge of Sugar) Maharashtra	Member

10.	Secretary (Incharge of Sugar) Karnataka	Member
11.	To be nominated by the Ministry of	
12.	Joint Secretary (Sugar), Deptt of Sugar	Member
13.	Representative from Commission for Agricultural Costs and Prices	Member
14.	Representative from Bureau of Industrial Costs and Prices	Member
15.	Shri J.J. Bhagat, Mission Director Sugar Technology Mission	Member Secretary

1.3 The Terms of Reference of the Committee are as follows :-

(i) To study the development and growth of sugar industry in India vis-a-vis other sugar producing countries.

(ii) To study the laws and rules and regulations relating to sugar, sugarcane and sugar industry in India and other sugar producing countries.

(iii) To suggest modifications, amendments and repeal of any existing law and controls with a view to ensure healthy growth and development of the sugar industry, and building a healthy relationship between the farmers and the industry.

(iv) To suggest ways and means to increase production and efficiency through modernisation so that sugar is available to the general public at reasonable prices.

(v) To suggest methods for increasing productivity of sugarcane and way to ensure fair and remunerative prices to sugarcane growers.

A copy of the Resolution dated 14th March, 1997 is at Annexure 1.1

1.4 Shri Dhruv M. Sawhney was nominated representative of Confederation of Indian Industry as Member of the Committee. Ministry of Agriculture nominated Mrs Neela Gangadharan, Joint Secretary (Crops), Department of Agriculture and Cooperation and Deputy Director General (Crop Sciences) by designation and Shri Babu Rao Phalke, a progressive cane grower from Maharashtra as representative of cane growers. Commission for Agricultural Costs and Prices initially nominated Dr. S.M. Jharwal, Secretary of the Commission as its representative. Subsequently, on transfer of Dr. Jharwal, Commission nominated Mr. Dinesh Marothia, Member (Official) of the CACP as member in his place. The Bureau of Industrial Costs & Prices regretted their inability to nominate their representative in the Committee. On the transfer of

Mrs Neela Gangadharan, Joint Secretary (Crops), representing Ministry of Agriculture, her successor Shri P.D. Sudhakar was nominated.

1.5 The names of representatives of various organisations were received from Ministry of Food on 24th April, 1997. The first meeting of the Committee was held on 25th April, 1997. Thereafter, a Public Notice was published in various newspapers inviting suggestions on the Terms of Reference of the Committee from the public. A list of persons / organisations who sent their memoranda in response to the Public Notice is at Annexure 1.2.

1.6 Thereafter, a questionnaire was finalised in the meeting of the Committee held on 2nd June, 1997 and issued to various organisations and State Governments during June 1997. A copy of the questionnaire is at Annexure 1.3. A list of persons / organisations from whom replies have been received is at Annexure 1.4.

1.7 The teams of the Committee comprising Chairman, Member Secretary and two or three members have visited the major sugar producing States, namely, Maharashtra, Gujarat, Karnataka, Andhra Pradesh, Tamil Nadu, UP, Bihar, Punjab and Haryana. During these visits, teams held discussions with the representatives of the cane growers, mill managements and State Governments, and visited a few factories in the State. They also visited National Sugar Institute, Kanpur, Sugarcane Breeding Institute, Coimbatore, Indian Institute of Sugarcane Research, Lucknow and Vasantdada Sugar Institute, Pune, and discussed the progress and problems of research in sugarcane and cane processing with the scientists at these institutes. The team visting Maharashtra held discussions with the officers of the Reserve Bank of India and NABARD and financial institutions such as IFCI and IDBI, State Bank of India etc. in regard to problems of financing of sugar industry.

1.8 The Committee started discussions with the State Governments, representatives of the cane growers, sugar industry, research institutes for sugarcane and cane processing and other concerned organisations on 1st August, 1997. These discussions continued till 7th October, 1997. Discussions were also held with the concerned Departments of Central Government and relevant industrial organisations on specific issues such as utilisation of bagasse for paper manufacture, utilisation of alcohol for mixing with petrol, countervailing duty on import of sugar, compulsory use of jute for packaging of sugar, pollution control, desirability and feasibility of starting futures market in sugar etc. The list of State Governments, Central Government's Departments and organisations with whom discussions were held is at Annexure 1.5.

1.9 Terms of Reference of the Committee require it specifically to study the development and growth of sugar industry in other sugar producing countries and the laws, rules and regulations relating to sugarcane and sugar industry in those countries. A questionnaire was accordingly sent to the concerned authorities in major sugar producing countries viz., Thailand, Brazil, Colombia, Cuba, Fiji, Philippines, South Africa, Taiwan, Australia, China, Germany, France, Indonesia, Mauritius, Mexico, Pakistan, Sri Lanka, USA and UK for eliciting information in regard to

various laws, rules and practices. A copy of the questionnaire sent to those countries is at Annexure 1.6. Replies have been received from South Africa, Philippines, Mauritius, Taiwan, Indonesia, Sri Lanka, Brazil and European Union.

1.10 It was considered necessary to supplement the information received from these countries and to ascertain the impact of various policies and practices followed in those countries by discussions with representatives of the cane growers, mill managements, scientists in research institutes and Government authorities in those countries and to observe the working of the industry by visit to a few mills and concerned institutes. A proposal for visit to 12 important sugar producing countries, namely, Australia, Thailand, Philippines, Indonesia, Pakistan, Mauritius, Reunion, South Africa, Brazil, Colombia, Mexico and USA was accordingly submitted to Government for approval on 12.6.97. It was proposed to divide the Committee into three teams, each team spending about 12-15 days visiting group of four countries.

1.11 The Government, however, on 26th December, 1997 communicated approval to the visit of a team of the Committee only to four countries, namely, Australia, Thailand, South Africa and Mauritius for 14 days excluding travel time. The Ministry of Food & Consumer Affairs decided to bear the expenditure of foreign travel of the Chairman and Joint Secretary (Sugar) in the Ministry and asked the concerned organisations about their willingness to bear the expenditure of their nominees. Based on their replies, the sanction for deputation of the team comprising the following was conveyed:-

1. Shri B.B. Mahajan, Chairman, HPC (Retired Food Secretary to the Govt. of India)
2. Shri Surendra Kumar, Member, HPC {(Joint Secretary (Sugar)}
3. Shri Siddharth Behura, Member, HPC (Principal Secretary to the Govt of UP)
4. Shri J.J. Bhagat, Member Secretary, HPC (Mission Director, TIFAC, Ministry of Science & Technology)
5. Shri M. Manickam, Member, HPC (non official)
6. Shri R.M. Prem Kumar, Member, HPC (Principal Secretary to the Govt of Maharashtra)

S/Shri Siddharth Behura and Prem Kumar could not undertake the tour. Shri Manickam could join the team only during its visit to Australia. The other three members of the team, namely, S/Shri B.B. Mahajan, Surendra Kumar and J.J. Bhagat visited Thailand, Australia, South Africa and Mauritius from 12.1.98 to 27.1.98. The members of the team studied the working of the sugar industry in those States and had detailed discussions with the Government officers, research institutions, millers and growers' associations and other organisations concerned with the working of the sugar industry. A note on the visit, which was circulated to all members of the Committee to help them during the deliberations on various issues is at Annexure 1.7.

1.12 The Committee held 57 meetings in which it held discussions with State Governments, representatives of the cane growers, sugar industry research institutes for sugarcane and cane processing and other concerned organisations and deliberated upon various issues falling within the Terms of Reference of the Committee.

1.13 Report has been divided into two parts. In the first part, the present status of the sugar industry in the country and development of sugar industry in other cane sugar producing countries and laws and practices relating to sugar industry in those countries have been discussed. In the second part, the various issues concerning sugar industry in the country have been examined and recommendations made for improvements for achieving the objectives mentioned in the Terms of Reference of the Committee. General approach followed by the Committee has been indicated in Chapter 11. Paras, tables and diagrams under each chapter have been separately, serially numbered. Thus in chapter 14, paras are numbered 14.1, 14.2, 14.3....., the tables are numbered as table 14.1, table 14.2..... and the diagrams are numbered as diagram 14.1, 14.2.....and so on. Annexures are also similarly numbered and placed at the end of the Report. In chapters 12 to 31, which deal with issues, the factual position, historical background, legislative provisions etc. are mentioned in the beginning of the chapter and the views of the Committee indicating its recommendations are incorporated thereafter.

Chapter 2

Development of Sugar Industry

Status of Industry 1903 to 1936-37

2.1 The first sugar mill was set up in the State of United Provinces in 1903 with a modest cane crushing capacity. Imports were the mainstay of the economy with no protection to the fledgelling industry. Factories started springing up in the States of UP and Bihar over the next 30 years.

2.2 In 1930, with a sizeable crop of sugarcane, which gave the most assured income to farmers as compared to other crops, in the offing and poor gur price, it was felt that unless industry is developed properly, there would be a crisis and the only way out was enhancing capacity to manufacture white sugar. In order to cushion the industry from imports, tariff protection was considered essential and the case was referred to the Tariff Board in 1930-31. As a result of the enquiry, Sugar Industry (Protection) Act, 1932, was passed by the Indian Legislature by virtue of which the industry was granted protection for fourteen years upto 1st March, 1946. At this point of time, there were 29 vacuum pan sugar factories and 10 refineries in the States of UP, Bihar and Orissa. In the next six years, there was phenomenal increase in the number of sugar factories in UP and Bihar. Table 2.1 below illustrates the growth of industry during the initial years of protection:-

Table 2.1 - Growth of sugar factories (1930-31 to 1936-37)

Year	Number of		Sugar production (in lac tonnes)
	Vacuum pan factories	Refineries	
1930-31	29	10	1.2
1931-32	32	17	1.59
1932-33	57	27	2.9
1933-34	112	16	4.54
1934-35	130	13	5.78
1935-36	137	13	9.32
1936-37	140	9	11.29

(ISMA Memorandum to Sugar Industry Enquiry Commission & Indian Sugar Industry 1995-96 Annexure)

Expansion from 1950-51 to 1996-97

2.3 In a matter of six years, the number of factories installed rose by 111, while production leap-frogged from 1.20 lakh tonnes to 11.29 lakh tonnes, as a result of the protection afforded to the industry. Out of 111 factories added, 80 came up in UP and Bihar and 31 in rest of the States in the country. Further progress of the industry started after 1950-51 with the commencement of Five Years Plans. The number of factories installed, cane crushed and sugar production from 1950-51 upto 1996-97 is shown in Table 2.2.

Table 2.2 - Growth of the industry (1950-51 to 1995-96)

Year	Number of factories in position	Cane crushed (lakh tonnes)	Sugar produced (lakh tonnes)
1950-51	139	113.48	11.00
1960-61	174	310.21	30.21
1970-71	215	382.05	37.40
1980-81	315	515.84	51.50
1990-91	385	1,223.38	120.47
1995-96	416	1,747.08	164.52
1996-97	412	1,295.57 (P)	129.05

(Cooperative Sugar, June 1997 - Table 1)

(P) - Provisional

Now and then, the sugar cycle manifested itself leading to poor sugar production during years in-between.

Location of factories

2.4 In the initial years, the growth of the industry was in sub-tropical belt, comprising States of Uttar Pradesh, Bihar, Punjab and Haryana. After 1950-51, more and more sugar factories were installed in tropical belt comprising Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. Table 2.3 traces the progress from 1950-51.

Table 2.3 - Geographical spread of installed factories over years

Year	Number of factories in position		
	Sub-tropical belt	Tropical belt	Total
1950-51	107	32	139
1960-61	112	62	174
1970-71	115	100	215
1980-81	142	173	315
1990-91	174	211	385
1996-97	202	258	460

(Statistics of Sugarcane and Sugar, Directorate of Sugar)

Sector-wise factories

2.5 Prior to 1950, out of 139 sugar factories, only two belonged to the cooperative sector and the balance were in private sector. The two cooperative factories were located in Andhra Pradesh and Maharashtra, one in each. In 1967-68, the number of cooperative factories rose to 58 out of a total of 200. Thereafter, it continued to rise steadily and as on 28.2.98, out of 460 factories installed, 254 are in the cooperative fold. Table 2.4 traces the growth of cooperative sector in sugar factory establishment over the years :-

Table 2.4 - Number of sugar factories in different Sectors in production

Year	Number of factories in production		
	Private/Govt. Sector	Cooperative Sector	Total
1950-51	137	2	139
1967-68	142	58	200
1972-73	143	85	228
1978-79	163	136	299
1984-85	161	178	339
1990-91	165	220	385
1996-97	183	229	412

(Cooperative Sugar Directory, 1989-92 & Directorate of Sugar)

Current status (Statewise and sectorwie)

2.6 The breakup of installed factories Statewise and sectorwise as on 30.6.97 is given in Table 2.5 :-

Table 2.5 - Number of installed factories as on 28.2.98

Name of State	Sector			Total
	Government	Private	Cooperative	
Andhra Pradesh	7	15	18	40
Assam	1	-	2	3
Bihar	13	15	-	28
Goa	-	-	1	1
Gujarat	-	-	20	20
Haryana	-	3	10	13
Karnataka	3	10	19	32
Kerala	-	1	1	2
Madhya Pradesh	1	5	3	9
Maharashtra	-	6	112	118
Nagaland	1	-	-	1
Orissa	-	4	4	8
Pondicherry	-	1	1	2
Punjab	-	6	16	22
Rajasthan	1	1	1	3
Tamil Nadu	3	17	14	34
Uttar Pradesh	35	55	32	122
West Bengal	1	1	-	2
ALL INDIA	66	140	254	460

(Directorate of Sugar)

Capacitywise distribution of factories

2.7.1 In the initial years, the new sugar factories installed had small capacities and were well below 1000 TCD. Factories completed expansion in stages and raised their crushing capacities. Licensing was made mandatory for the industry after IDR Act came into force in 1951. Thereafter, new sugar factories were allowed with a capacity of 1250 TCD, defined as the minimum economic capacity. This was raised to 2500 TCD in 1987.

2.7.2 Capacitywise breakup of existing sugar factories as on 28.2.98 is given in Table 2.6 below :-

Table 2.6 - Breakup of sugar factories capacitywise

Sector	No. of factories with capacity in TCD					
	< 1250	1250-2499	2,500	2501-5000	> 5000	Total
Government	29	19	12	6	-	66
Private	17	28	67	22	6	140
Cooperative	11	137	76	29	1	254
Total	57	184	155	57	7	460

(Source : Directorate of Sugar)

Statewise details are given in Annexure 1(1). Further sectorwise details are given in Annexure 2(1)(a) to 2(1)(c). 53% of the total factories are below minimum economic capacity of 2500 TCD. Percentage of factories below 2500 TCD is higher in cooperative sector and public sector. It is also seen that out of 241 units below 2500 TCD, 57 had installed capacity below 1250 TCD. 37 out of these are located in Bihar and UP, out of which 26 are in public sector and 11 in private sector. All these units are very old with obsolete plant and machinery. For want of cane, they run for very short durations and produce sugar at prohibitive cost. Private sector leads in capacities higher than 5000 TCD. Average cane crushing capacity of a sugar factory has increased from 859 tonnes per day in 1950-51 to 2532 tonnes per day in 1995-96.

Installed capacity growth

2.8 The increase in total capacity in terms of sugar production from 1950-51 to 1995-96 is given in Table 2.7. As on 28.2.98, 460 factories are in position with an installed capacity of 137.75 lakh tonnes.

Table 2.7 - Growth of installed capacity over years

Year	No. of factories in operation	Installed capacity (L/tonnes)	Actual sugar production (L/tonnes)	Duration of crushing (Days)
1950-51	139	16.68	11.01	101
1955-56 (I)	143	17.77	18.90	145
1960-61 (II)	174	24.47	30.21	167
1965-66 (III)	200	32.25	35.41	159
1973-74 (IV)	229	43.06	39.48	138
1978-79 (V)	299	59.10	58.44	140
1984-85 (VI)	339	72.74	61.64	107
1990-91 (VII)	377	98.48	120.46	166
1995-96 (VIII)	415	127.61	164.29	182
1996-97	412	134.59	129.05	128

(I), (II).....etc. refer to terminal year of Five year Plans starting with First Five Year Plan & upto VIIIth Five Year Plan.

(Directorate of Sugar & Year Book)

Production during 1995-96 was 164.29 lakh tonnes. Upto 30.4.96, 138.68 lakh tonnes were produced, which shows that actual installed capacity is considerably in excess of the stated capacity.

2.9 Sugar industry is at present the second largest agro-based industry in the country next to cotton textiles. It is, in fact, the largest agro-based industry located in rural areas as most of the textile mills are located in urban areas. It is now the largest producer of sugar in the world. The growth in production has more or less kept pace with the growth in consumption demand which has mainly been met primarily from domestic production with only marginal imports. The industry, however, is not most competitive in the world. The technical status of the industry and its comparison with the industries in other major cane sugar producing countries in the world have been given in subsequent chapters. There are also wide cyclic fluctuations in production with attendant effect on sugar availability and financial health of the industry which are also discussed in detail in later chapters.

Chapter 3

Growth of Sugarcane Cultivation

3.1 *Area under sugarcane*

There has been steady increase in area under sugarcane in the country. The area under sugarcane which was 17.07 lakh hectares in the year 1950-51 has increased to 41.39 lakh hectares in the year1995-96. Since the area fluctuates from year to year, it may be useful to compare the average area for five year periods. The area under sugarcane for the last thirty years in the quinquennium 1966-67 to 1970-71 to quinquennium 1991-92 to 1995-96 is shown in Table 3.1.

Table 3.1 - Area under sugarcane (All India)

Period	Area ('000 hectares)	% increase over the base 1966-67 to 1970-71	% increase over the previous quinquennium
1966-67 to 1970-71 (Av)	2449	-	-
1971-72 to 1975-76 (Av)	2650	8.20	8.20
1976-77 to 1980-81 (Av)	2876	17.43	8.52
1981-82 to 1985-86 (Av)	3092	26.25	7.51
1986-87 to 1990-91 (Av)	3362	37.27	8.73
1991-92 to 1995-96 (Av)	3769	53.90	12.10

(Source: Co-operative Sugar - Sugar Statistics, Table 1, June 97)

The area has increased by 54% in 25 years. Average increase in each 5 year period has been about 9%. On long term basis, the area increased at compound rate of 1.83% p.a. during 1949-50 to 1995-96. Out of this period, the area increased @ 3.28% p.a. during 1949-50 to 1964-65 and @1.72% during 1967-68 to 1995-96. (Agricultural Statistics at a Glance).

3.2 However, the area under sugarcane as percentage of total cropped area in the country has remained more or less constant. The gross cropped area and area under sugarcane alongwith the percentage of area under sugarcane to gross cropped area for the years 1986-87 to 1994-95 are given below in Table 3.2. It will be observed that the area under sugarcane as percentage of total gross cropped area is about two per cent for each of the years.

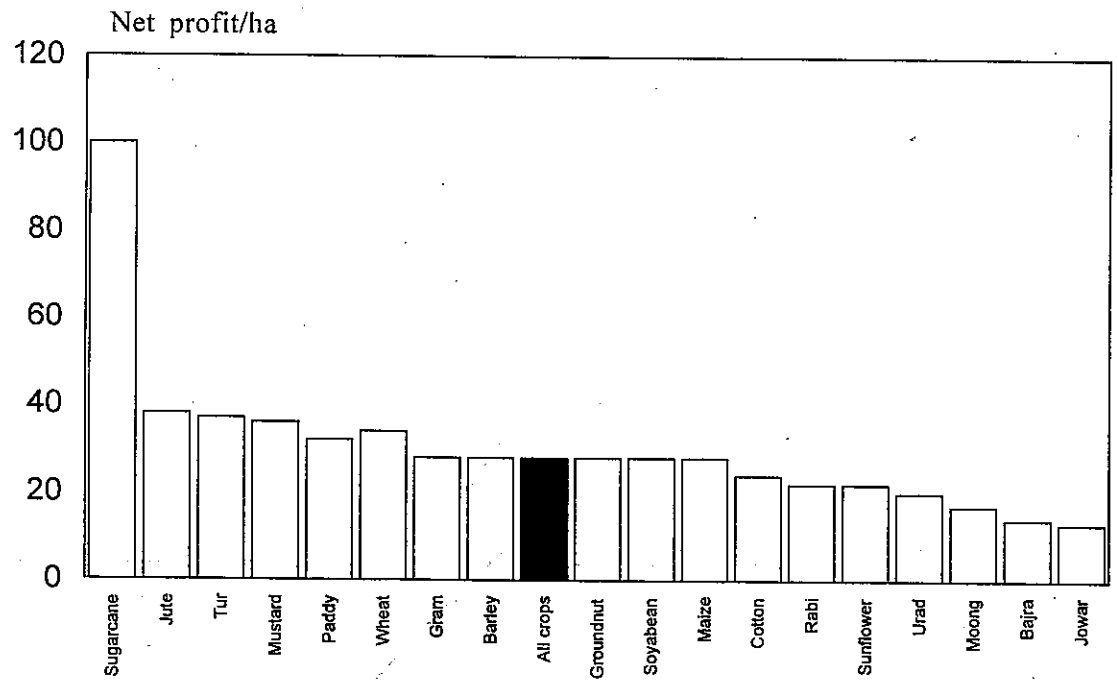
Table 3.2 - Area under sugarcane as percentage of cropped area

Year	Total gross cropped area (lakh hectares)	Area under sugarcane (lakh hectares)	Total area under cane as %age of gross cropped area
1986-87	1766.56	32.02	1.8
1987-88	1728.81	33.91	2.0
1988-89	1810.75	33.97	1.9
1989-90	1811.43	35.25	1.9
1990-91	1854.77	37.73	2.0
1991-92	1822.44	41.12	2.2
1992-93	1856.18	39.30	2.1
1993-94	1864.20	38.51	2.1
1994-95	1881.47	42.28	2.2

(Source: Agricultural Statistics At a Glance)

3.3 Sugarcane is generally more profitable relative to other crops in the areas where it is planted. As per the recent study by the World Bank, the relative profitability per hectare of different crops in India during 1980s was as indicated in the following graph :-

Relative profitability per hectare of different areas in India during 1980s (Sugarcane = 100)



(Source: World Bank unpublished Draft Report on India's Sugar Industry: Priorities for Reforms April, 1997)

Sugarcane takes longer time to grow relative to other crops. It may, therefore, be more realistic to compare the return from sugarcane with two crops in 10-12 months plantings and with three crops in adsali (18 months plantings). The above World Bank study, however, shows that even on the basis of relative profits per hectare per month, sugarcane is more profitable than other crops in both Maharashtra and U.P for which a detailed study has been made. This is corroborated by the fact that whenever growers are able to get their cane dues in time and there are no heavy arrears, the area under sugarcane goes up substantially. It is the higher sugar production in the subsequent year in excess of the demand for internal consumption leading to fall in sugar prices and consequent accumulation of cane price arrears that makes the farmers switch back to other crops. Since India has been broadly self-sufficient in sugar, the increase in area and production of cane has thus mainly been determined by increase in the demand for sugar for internal consumption.

3.3.1 Sugarcane in India is mainly planted on irrigated land. Table below shows the percentage of irrigated area to total area used for sugarcane in respect of major sugarcane producing States for the year 1987-88 to 1990-91, 1992-93 to 1994-95. In Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Punjab and Tamil Nadu, 90 to 100 per cent of cane area is under irrigation. In UP, it is between 82 to 87 per cent, except in one year when it was 95%. In Bihar, it varies between 13 and 22 per cent.

Table 3.3 - Percentage of irrigated area under sugarcane to total sugarcane area

	Year						
STATE	1987-88	1988-89	1989-90	1990-91	1992-93	1993-94	1994-95
Andhra Pradesh	99.4	99.5	99.0	98.7	97.2	96.7	95.7
Bihar	21.4	19.7	22.4	14.1	14.3	14.2	13.0
Gujarat	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Haryana	94.3	96.2	96.4	95.9	95.7	96.4	96.6
Karnataka	99.0	99.6	99.6	99.6	99.2	99.3	99.7
Maharashtra	100.0	91.5	91.5	100.0	100.0	100.0	100.0
Punjab	92.5	93.8	95.1	95.0	95.0	94.8	95.0
Tamil Nadu	100.0	100.0	100.0	100.0	99.5	100.0	100.0
Uttar Pradesh	82.6	83.1	83.1	83.9	95.1	86.2	87.3
All India	86.9	85.1	85.7	84.1	87.9	89.0	87.9

(Source: Agricultural Statistics At a Glance)

3.3.2 Details showing the net area irrigated from different sources (e.g. canals, tanks, tubewells, other wells and other sources) in respect of major sugarcane producing States are given in Annexure 3.1, for the years 1993-94 and 1994-95. Table below summarises the position in respect of the year 1994-95.

Table 3.4 - Sourcewise net irrigated are in different States (in %)

State	Canals	Tanks	Tubewells	Other wells	Others	Total
Andhra Pradesh	41	18	15	22	4	100
Bihar	28	4	47	3	18	100
Gujarat	20	1	24	55	-	100
Haryana	51	-	48	-	1	100
Karnataka	40	11	15	20	14	100
Maharashtra	20	13	-	61	6	100
Punjab	39	-	59	-	2	100
Tamil Nadu	29	23	6	40	2	100
Uttar Pradesh	27	-	65	4	4	100

(Source : Land use statistics, E & S Directorate, Ministry of Agriculture)

It will be observed from the table that in case of Andhra Pradesh, Haryana and Karnataka, canal irrigation is predominant. In case of Bihar, Punjab and UP, tubewell irrigation is predominant. In Gujarat, Maharashtra and Tamil Nadu, well irrigation is the predominant source of irrigation. In States where tubewells are major source of irrigation, the adequacy and reliability of irrigation would depend on adequacy of power supply in rural areas. In States where wells are predominant source, the extent of rainfall during preceding year determines the availability of water for irrigation.

3.4 *Yield*

3.4.1 The yield per hectare which was 40.96 tonnes in 1950-51 has been steadily increasing and has risen upto 67.4 tonnes during the 8th Plan period (1991-92 to 1995-96). Since the yield also fluctuates, the average yield for the last thirty years during the quinquennium 1966-67 to 1970-71 to quinquennium 1991-92 to 1995-96 has been shown in Table 3.5.

Table 3.5 - Increase in yield of sugarcane (all India)

Period	Average yield (tons/hectare)	%age increase over the base (1966-67 to 1970-71)	%age incease over the previous quinquennium
1966-67 to 1970-71	46.72	–	–
1971-72 to 1975-76	50.08	7.19	7.19
1976-77 to 1980-81	53.18	13.83	6.19
1981-82 to 1985-86	57.68	23.46	8.46
1986-87 to 1990-91	62.48	33.73	8.32
1991-92 to 1995-96	67.34	44.14	7.78

(Source : E & S Directorate, Ministry of Agriculture)

It will be seen that the yield has increased by about 8% during each quinquennium. Over the 25 years period, it has increased by 44%. The rate of growth in yield which was 0.95% p.a. during the period 1949-50 to 1964-65 increased to 1.36% p.a. during the period 1967-68 to 1995-96. Over the entire period 1949-50 to 1995-96, the yield has increased at compound annual growth rate of 1.21%. (Agricultural Statistics at a Glance)

3.4.2 The yield per hectare is much higher in tropical than in sub-tropical areas. However, the yield in sub-tropical areas has been rising while that in tropical areas has been stagnant. Annexure 3.2 gives details regarding area under sugarcane, sugarcane production and yield per hectare for the years 1985-86 to 1995-96, broken up into tropical and sub-tropical area. Along with this all India figures are also indicated. It will be seen that during the above period of eleven years, the yield per hectare in sub-tropical area has increased from 48.7 tonnes to 59.9 tonnes, while in tropical area, it has been stagnant and fluctuated between 84 and 87 tonnes per hectare.

3.4.3 Annexure 3.3 gives details of Statewise yield per hectare for the years 1987-88 to 1996-97 in respect of major sugarcane producing States. The average yields for the two quinquenniums 1987-88 to 1991-92 and 1992-93 to 1996-97 are summarised in Table 3.6.

Table 3.6 - Average yield of sugarcane

STATE	Average for the quinquennium 1987-88 to 1991-92	Average for the quinquennium 1992-93 to 1996-97
Andhra Pradesh	70.16	72.54
Bihar	47.24	43.82
Gujarat	84.00	73.10
Haryana	49.86	55.84
Karnataka	81.32	90.82
Maharashtra	83.9	81.68
Punjab	62.5	59.5
Tamil Nadu	104.2	110.7
Uttar Pradesh	54.12	58.8

(Source : E & S Directorate, Ministry of Agriculture)

It will be seen that the highest yield is in Tamil Nadu followed by Karnataka and Maharashtra during the five year period 1992-93 to 1996-97. Average yield in U.P. is about half of that of Tamil Nadu. Yield in Bihar is the lowest among major sugar producing States.

3.4.4 Maharashtra has some area under Adsali crop which is grown over 15-18 months period. Details of yearwise area under sugarcane in Maharashtra broken up into area under Adsali crop and non-Adsali crop is given in Table 3.7. Yield per hectare in case of Adsali crop is more than that of non-Adsali crop. Since Adsali crop takes 18 months to mature as against about 12 months for a normal crop, the difference in yield per hectare per unit time may not be significant. This, however, explains to some extent, the higher yield per hectare in Maharashtra.

Table 3.7 - Area & yield of Adsali and non Adsali crop in Maharashtra

Year	Total area under sugarcane in lac hectares	Area under Adsali crop in lac hectares	Area under non Adsali crop in lac hectares	Production of sugarcane (lakh tonnes)		Yield (tons/ hectare)	
				Adsali crop	Non Adsali crop	Adsali crop	Non Adsali crop
1991-92	4.53	1.05	3.48	114.23	228.32	109.00	65.52
1992-93	4.04	1.07	2.97	104.86	225.56	98.00	76.00
1993-94	3.44	1.20	2.24	111.97	181.12	92.97	80.98
1994-95	5.18	1.55	3.63	164.51	300.84	105.96	83.05
1995-96	5.80	1.16	4.64	129.00	391.20	107.76	75.69
1996-97	5.13	0.62	4.51	62.00	315.56	99.60	70.00

(Source: Details furnished by Government of Maharashtra)

3.4.5 The yield of ratoon crop is generally lower than that of plant crop. The average proportion of ratoon crop to the total crop of sugarcane and yield of ratoon and planted cane for the last five years for major sugar producing States are given in Annexure 3.4. While ratooning of the crop is a common practice in all the major States, it is more prevalent in Uttar Pradesh. Of the total cane, nearly 54% of the crop is estimated to be ratoon. Ratooning is necessary to bring down the cost of production and being early maturing, it is this crop which is available to feed the factories earlier than the planted crop. The yield of the ratoon crop has been much lower than the planted crop in several States as indicated in Annexure 3.4. This has a depressing effect on the average yield of the sugarcane crop and may partly explain the lower yield in Uttar Pradesh.

3.4.6 Annexure 3.5 gives details of Statewise yield of irrigated sugarcane for the years 1984-85 to 1994-95 in respect of different sugarcane producing States. It will be observed that based on the data available, highest yield is reported by Tamil Nadu followed by

Karnataka, Maharashtra, Andhra Pradesh and Punjab. Rajasthan has reported the lowest yield.

3.4.7 While the higher percentage of irrigated area (vide Table 3.3), longer growing period of adsali crop and relatively lower percentage of area under ratoon may partly explain difference in yield between Maharashtra and U.P, the inputs in the crop are also significantly higher in Maharashtra than in U.P. Table below gives the usage of fertiliser per hectare in the selected major sugar producing States. Usage of fertiliser is the highest in Maharashtra, followed by Karnataka, Tamil Nadu, Andhra Pradesh, Uttar Pradesh and Bihar.

Table 3.8 - Use of fertiliser in different States for production of sugarcane

Maharashtra		Tamil Nadu		Uttar Pradesh		Karnataka		Bihar		Andhra Pradesh	
Year	Qty (kg)	Year	Qty (kg)	Year	Qty (kg)	Year	Qty (kg)	Year	Qty (kg)	Year	Qty (kg)
88-89	463.43	83-84	298.56	88-89	123.95	87-88	380.93	91-92	38.54	92-93	336.42
89-90	568.93	87-88	271.74	89-90	113.01	88-89	388.63				
90-91	501.25	94-95	352.97	90-91	119.27	89-90	435.03				
92-93	417.32			91-92	120.36						
94-95	445.97			92-93	109.20						
				93-94	142.39						

(Source : CACP Reports)

Large parts of Central and Eastern U.P. suffer from frequent floodings which restricts the use of fertilisers and other inputs, while in Western U.P., an unreliable electric supply means that growers are frequently unable to irrigate their crops.

3.4.8 A part of the increase in all India average yield during the last thirty years has been achieved because of the increase in the proportion of area under cane in Maharashtra, Tamil Nadu and Karnataka where the yields are higher than U.P. and other States. The details are indicated in Table 3.9.

Table 3.9 - Increase in area under sugarcane in different States (area in 000 hectares)

Period	Maharashtra	Tamil Nadu	Karnataka	Uttar Pradesh	Other States	All India	% of area in Maharashtra, TN & Karnataka to all India
1966-67 to 1970-71 (Av)	191	128	90	1,222	818	2,449	16.70
1971-72 to 1975-76 (Av)	178	147	115	1,398	812	2,650	16.60
1976-77 to 1980-81 (Av)	242	161	150	1,493	830	2,876	19.23
1981-82 to 1985-86 (Av)	295	178	175	1,632	812	3,092	20.96
1986-87 to 1990-91 (Av)	343	215	232	1,771	801	3,362	23.49
1991-92 to 1995-96 (Av)	460	269	301	1,873	866	3,769	27.33

(Source: Directorate of Sugar)

The percentage of area in Maharashtra, Tamil Nadu and Karnataka has increased from 16.70% of total area in the country in 1966-67 to 1970-71 to 27.33% in 1991-92 to 1995-96. The productivity increase in sugarcane is thus much lower than 1.36% per annum mentioned in para 3.4.1.

3.4.9 The yield of sugarcane per hectare per year in India and other major sugar producing countries is indicated in Annexure 3.6. The average yield in India compares reasonably well with the average yield in the other major cane producing countries. The yields in Australia, Mexico and USA are, however, higher. Moreover, a higher proportion of the Indian crop is irrigated than in other countries. Typically irrigated regions such as Burdekin in Australia have yields averaging 125 tonnes per hectare and irrigated crops in Southern Africa in Zimbabwe, Swaziland and Malawi typically achieve yields of over 100 tonnes per hectare as against about 80-85 tonnes in Maharashtra (World Bank Report, para 2.13).

3.4.10 The number of ratoon crops in India is less than those in other countries. It is common practice for a single ratoon crop to be grown following a seed crop. In Australia, on the other hand, it is common to have four or five ratoon crops. The larger number of ratoon crops reduces seed cost and cost of planting per unit of output. However, ratoon crops have generally lower yield and higher susceptibility to disease. Since the same crop stands on the soil over long periods, the soil also gets more exhausted. They also slow down adoption of improved varieties by the growers and tie them down to production of cane despite changes in relative price of cane and other crops and relative price of cane and inputs.

3.4.11 **Sucrose content of cane** - The sucrose yield per hectare per year in India and other major cane producing countries is at Annexure 3.7. Sucrose yield in India is lower than that in Australia, Mexico and USA. Maharashtra's yield compares favourably with that in other countries, while the yield in U.P. is much lower. Other things being equal, sucrose content tends to be higher in countries where the ripening stages of the crops' development are characterised by dry conditions and large swings between day and night temperatures. This explains the higher sucrose content in Brazil's South Central / Southern region and South Africa. The lower sucrose yield per hectare in India may, apart from climatic factors, be also due to system of payment for sugarcane on tonnage basis without link to sucrose content which provides no incentive to farmers to grow cane with higher sucrose content and the inability of the research institutions to evolve suitable high sucrose varieties of cane for different agro-climatic conditions.

3.5 *Sugarcane production*

3.5.1 The sugarcane production which was 69.92 million tonnes in 1950-51 (Annexure 3.8) has gone upto 282.94 million tonnes in 1995-96. Taking 1950-51 as the base year, the increase in sugarcane production for each Plan period (five years) is indicated below :-

Table 3.10 - Percentage increase in sugarcane production from 1951-52 to 1995-96

Year	Increase (%) over 1950-51
1951-52 to 55-56	(-) 4.56
1956-57 to 60-61	30.00
1961-62 to 65-66	56.20
1966-67 to 68-69	49.20
1969-70 to 73-74	83.31
1974-75 to 79-80	113.39
1980-81 to 84-85	149.34
1985-86 to 90-91	191.51
1991-92 to 95-96	261.97

(Source: ISMA Yearbook 1993-94 Volume I, Table 3)

It will be seen that there has been a steady increase in the production of sugarcane from 1956-57 to 1995-96. Over the period 1949-50 to 1995-96, the production has increased at the compound annual growth rate of 2.67%.

3.6 *Recovery of sugar*

3.6.1 The actual all India recovery of sugar per cent of cane has been varying between the lowest of 9.33% (1969-70) and the highest of 10.31% (1992-93) during the past 4½ decades. Annexure 3.9 gives details of recovery percentage achieved (all India) for the years 1950-51 to 1995-96. Weighted average recovery percentage (all India) achieved for every five years is given below :-

Year	Weighted average recovery (in %)
1950-51 to 54-55	9.91
1955-56 to 59-60	9.87
1960-61 to 64-65	9.89
1965-66 to 69-70	9.66
1970-71 to 74-75	9.73
1975-76 to 79-80	9.88
1980-81 to 84-85	9.98
1985-86 to 89-90	10.01
1990-91 to 94-95	10.03

(Source : Sugar Statistics - Cooperative Sugar)

Recovery has, thus, remained at about 10% throughout this period and has not shown any improvement despite increase in percentage of cane production in Maharashtra and Karnataka where average recovery is much higher than all India average and increase in percentage of new / modernised factories. This shows that there has been no increase in sucrose content of cane during the last more than four decades.

3.6.2 Statewise average recovery of sugar percentage for the years 1985-86 to 1995-96 is given in Annexure 3.10. A summary showing the five yearly average recovery percentage of sugar in respect of major sugar producing States is given in Table 3.11 below :-

Table 3.11 - Recovery of sugar (in %) in major sugar producing States

State	1980-81 to 84-85	1985-86 to 89-90	1990-91 to 94-95
Andhra Pradesh	9.19	9.61	9.81
Bihar	9.01	9.16	9.10
Haryana	8.99	9.80	9.58
Karnataka	10.25	10.33	10.44
Maharashtra	10.99	10.96	11.07
Punjab	10.04	9.68	9.19
Tamil Nadu	9.07	9.58	9.10
Uttar Pradesh	9.38	9.29	9.34

(Source : Sugar Statistics - Cooperative Sugar)

It will be seen that the average recovery is the highest in Maharashtra followed by Karnataka. Maharashtra has not only higher sucrose content in cane but also has relatively more modern mills and system of harvesting and transportation of sugarcane by the mills which ensures supply of fresh cane to the mills.

Chapter 4

Present Technical Status of Sugar Industry in India

4.1 The sugar industry in India has come a long way from its inception in the 1930's when the industry used to be run more asan art than a deep science. It has now grown both in size and statur. Today, India is the largest sugar producing country in the world but not the most efficient.

4.2 India uses two different different methods to produce crystal sugar, namely Vacuum Plan Process and Open Pan Process. Whereas, the Vacuum pan Process is adopted by the organised sector of the industry to produce plantation white sugar, the Open Ppan Process is adopted on a small scale, to manufacture khandsari sugar. Since, the process efficiencies in case of Vacuum Pan technology is far superior, therefore, all new sugar mills which are being set up now have adopted the vacuum pan route.

4.3 *Plant Size and Technical Specifications*

4.3.1 The technical development of the sugar industry in India has a long history. With the liberalisation of the Industrial Licensing Policy of the Govt, a Technical Committee was appointed by the Govt. of India in the year 957 to prepare standard specifications for a 1000 TCD capacity sugar factory. capable for expansion to 1500 TCD. These specifications were reviewed in the year 1959 by the Negotiating Committee constituted by the Ministry of Industry while drawing up the programme for manufacture of complete sugar plant and machinery indigeneously with minimum imported components. Since then, there has been considerable development in respect of design and manufacture of indigenous plant and machinery. The concept of economic capacity of sugar mills also changed and a trend developed towards installing higher capacity plants. The Technical Committee after examining the crushing capacity of milling plants of different sizes fixed the minimum size of the plant at 1250 TCD with provisions for expansion to 2000 TCD. With increase in cost of raw material, consumables and overheads, the economy of scales demanded yet higher capacities and therefore in 1987, the Govt. declared 2500 TCD as the minimum economic size of a sugar plant. The technical committee accordingly prepared specifications of sugar plant capable of crushing @ 2500 TCD with provisions for easy expansion to 3500 TCD. These have now been generally adopted by the industry. However, depending upon the cane potential, agro climatic conditions, need for economy of scales, there is now a distinct trend to move towards higher plant sizes.

4.3.2 The rate of increase in plant capacities, however, has been very gradual so far, due to inadequate measures taken for cane development and paucity of funds. A statement showing the average capacity of sugar units in the country is as under :

Table 4.1 – Statement Showing factories in Operation & Crushing Capacity

Year	No. of factories in operation (tonnes per day)	Average capacity
1984-85	339	1821
1985-86	342	1885
1986-87	354	1862
1987-88	357	1888
1988-89	367	1925
1989-90	378	2036
1990-91	385	2088
1991-92	392	2167
1992-93	394	2325
1993-94	394	2388
1994-95	408	2483
1995-96	416	2301
1996-97	412	2457

However, the capacity of a sugar plant varies considerably and the number of factories of various capacities is given in Table 4.2.

Table 4.2 – Statement Showing No. of Installed Factories of Various Sizes

Size Range	Nos. (as on 30.09.1997)
Below 1250 TCD	60
1250 TCD	119
1251 to 2000 TCD	59
2001 to 25000 TCD	158
2501 to 35000 TCD	32
3501 to 5000 TCD	24
Above 5000 TCD	7

Source : Sugar Directorate, Government of India.

It may be noted that as on the above date as many as 238 out of 459 factories are still below the MES level of 2500 TCD.

4.3.3 A recent study on Indian Sugar Industry-Priorities for Reforms, April 1997-conducted by the World Bank has illustrated the influence of size of plant on milling cost. It has been found that the higher plant size, wages and other overhead cost per tonne of sugar get reduced substantially. It is, to some extent. offset by increase in cost of cane. Transportation as mills have to obtain cane from longer distances. The lower average size of mills in India thus trends to increase the cost of production of sugar in the country.

4.3.4 Some of the problems of the sugar industry include large number of plants in sub economic sizes and obsolescence of plant and machinery. The Technology adopted in many of the sugar factories at present is out dated, because, these plants were set up long back. The sugar factories at present are roughly in the following age groups :

Upto 5 years	55
Between 6 to 15 years	88
Between 16 to 25 years	99
Between 26 to 35 years	52
More than 35 years	165

Source : List of Lugar Mills in India (ISMA)-1995-96

It can be observed from the above that practically half of the sugar factories are more than 25 years old. The physical condition of many of these factories is poor, resulting in high down time and loss of capacity. However, the actual age of the Industry may not be as indicated above, as a large number of factories have also modernised in the past years and therefore a number of equipments in these factories may have already been replaced.

4.4 *Technical Status*

4.4.1 The question of upgradation of technology and rehabilitation has been the subject of study by the committee for re-habilitation and modernisation in 1963, the Sen Commission in 1965 and the Sugar Industry Enquiry Commission in 1973. To revitalise the sugar industry, the Govt. of India created a Sugar Development Fund in 1981-82 to meet the fund requirements at concessional rates for the purpose of modernisation and can development etc. The Govt. of India also set up a Sugar Technology Mission in 1993 to assist the sugar industry in preparing schemes for technology upgradation and for introduction and trials of new efficient technologies. Both the Sugar Development Fund and the Sugar Technology Mission have been usefully assisting the sugar industry in its strive to achieve technological excellence.

There has been a discerning trend in improvements in the level of technology during the past few years. A number of sugar factories have installed the latest equipments and are serving as models for modernisation and re-habilitation of other old existing factories and for the new plants which are being set up currently.

4.4.2 The technical status of the industry can be broadly classified nto the following 3 categories :

i) Near modern

ii) Partially modern

iii) Old

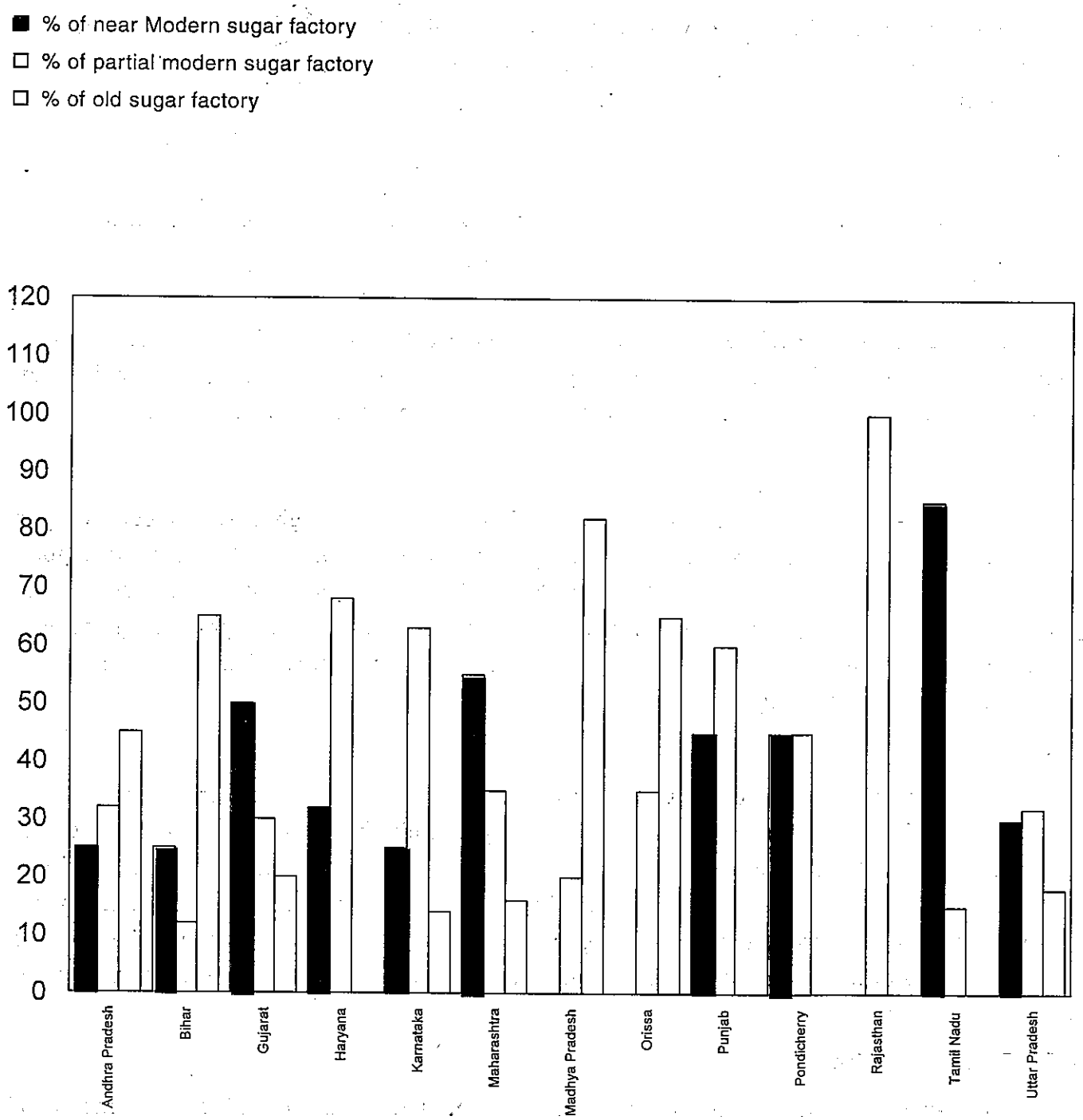
In a recent study undertaken by Technology Information, Forecasting and Assessment Council (FIFAC), based on a sample of 226 factories the technical status of the industry has been categorised statewise on the basis of technologies employed. The result is summarised in Table 4.3 and is graphically shown in Graph-4.1. It can be observed that the States of Andhra Pradesh, Bihar, Madhya Pradesh*, Rajasthan* and West Bengal• have the largest percentage of old industry, whereas, the States of Gujarat, Tamil Nadu & Maharashtra have the largest percentage of near modern industry. In case of U.P., the bulk of modern industry is located in West/Central U.P. and majority of old plants are located in East U.P. Efforts therefore are required to bring about a qualitative change in the status of the industry in the states, which have mostly old factories. This will help in improving the averages of technical performance on a national basis.

Table 4.3 – Statewise Status of Modernisation

Sl. No.	State	% of near Modern sugar factory	% of partial modern sugar factory	% of old sugar factory
1.	Andhra Pradesh	25	31	44
2.	Bihar	25	12	63
3.	Gujarat	50	30	20
4.	Haryana	33	67	—
5.	Karnataka	25	62	13
6.	Maharashtra	53	32	15
7.	Madhya Pradesh*	—	20	80
8.	Orissa	—	33	67
9.	Punjab	44	56	—
10.	Pondicherry	50	50	—
11.	Rajasthan*	—	—	100
12.	Tamil Nadu	87	13	—
13.	Uttar Pradesh	37	39	24
14.	West Bengal*	—	—	100
15.	Kerala*	—	—	100

* These states have very few no. of factories and most of them are quite old.

STATEWISE STATUS OF MODERNISATION



The lack of modernisation in various factories in different states is due to reasons like non-availability of sufficient cane and lack of funds & initiatives on the part of the management.

4.5 *Process & Technology*

India produces direct consumption Plantation White Sugar. The sugar manufacturing process mainly comprise of Juice Extraction Juice Clarification, Evaporation and Crystalisation.

4.5.1 *Juice Extraction*

The Juice Extraction plant consists of cane handling, preparation and milling.

Cane Handiling

The sugarcane is delivered to the factory by trucks, trailers, bullock carts and in some cases by railway wagons. After weighment the sugar cane is unloaded mainly by means of overhead traveling cranes or wagon truck tripplers on the cane carrier.

Cane preparation

Before milling, the sugar cane is prepared by passing through a set of cane cutters and shredder fibrizer. Modern cane preparatory equipment are employed to facilitate good cane preparations to open about 75% to 80% of the tissue cells without extracting the juice. There is scope for improving performance at earlier stages of cane processing, notably for cane preparation, through increased use of cane shredders, rather than knives, for cane preparation prior to milling.

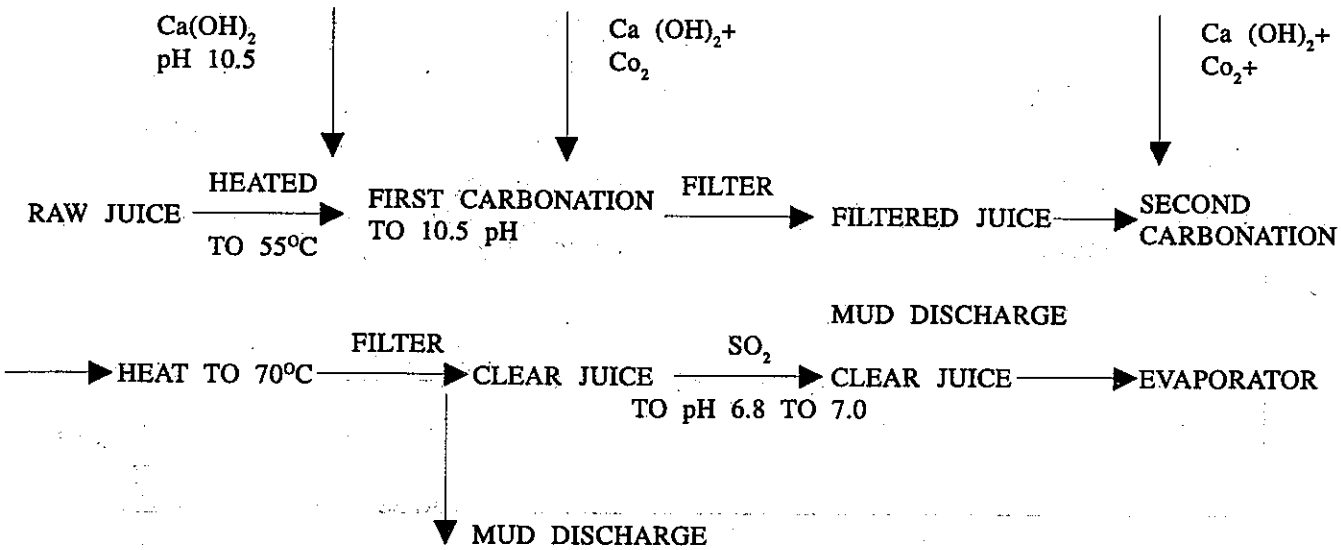
Milling

The prepared can is fed through a milling tandem composed of generally four to six, three roller mills, which extract the juice leaving behind the residue known as bagasse. Simultaneously hot water is added to the bagasse mat before the last mill and the juice extracted by last mill is recirculated to the bagasse entering the previous mill and so on, so as to achieve counter current washing of the bagasse as it moves along the milling tandem. The process is known as compound imbition and it improves the extraction of sugar from cane.

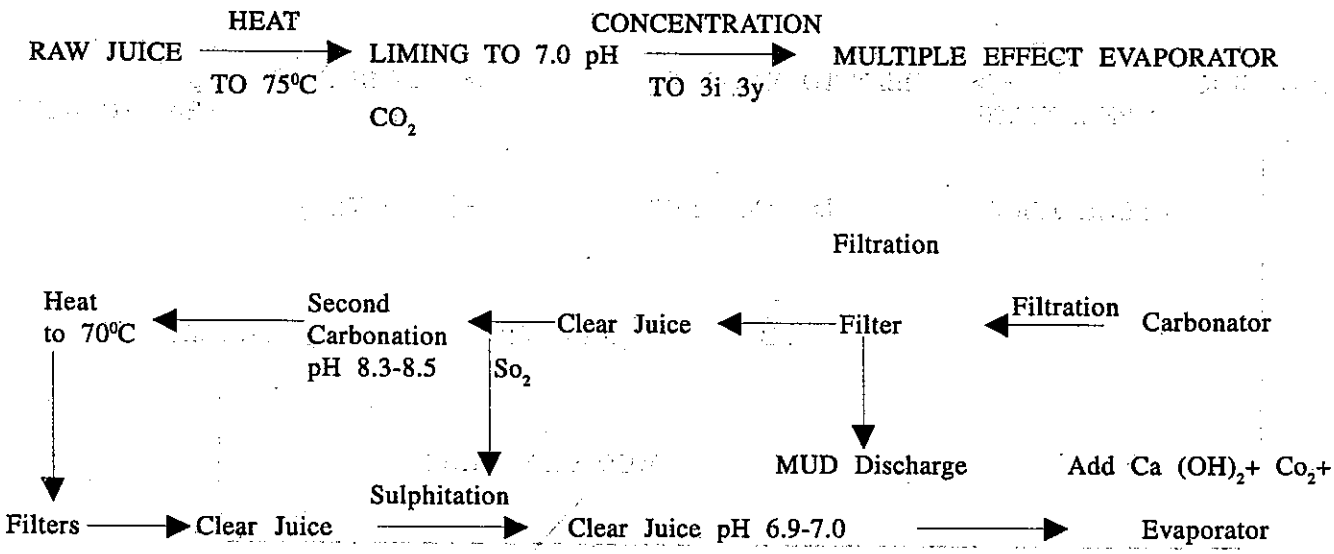
4.5.2 *Juice Clarification*

The juice, as extracted by the mills is weighed, heated and clarified for removal of non sugars. The most common process for juice clarification adopted in India is the Double Sulphitation process. However, a few factories are also using the Double Carbonation and Double Sulphitation process for juice purification.

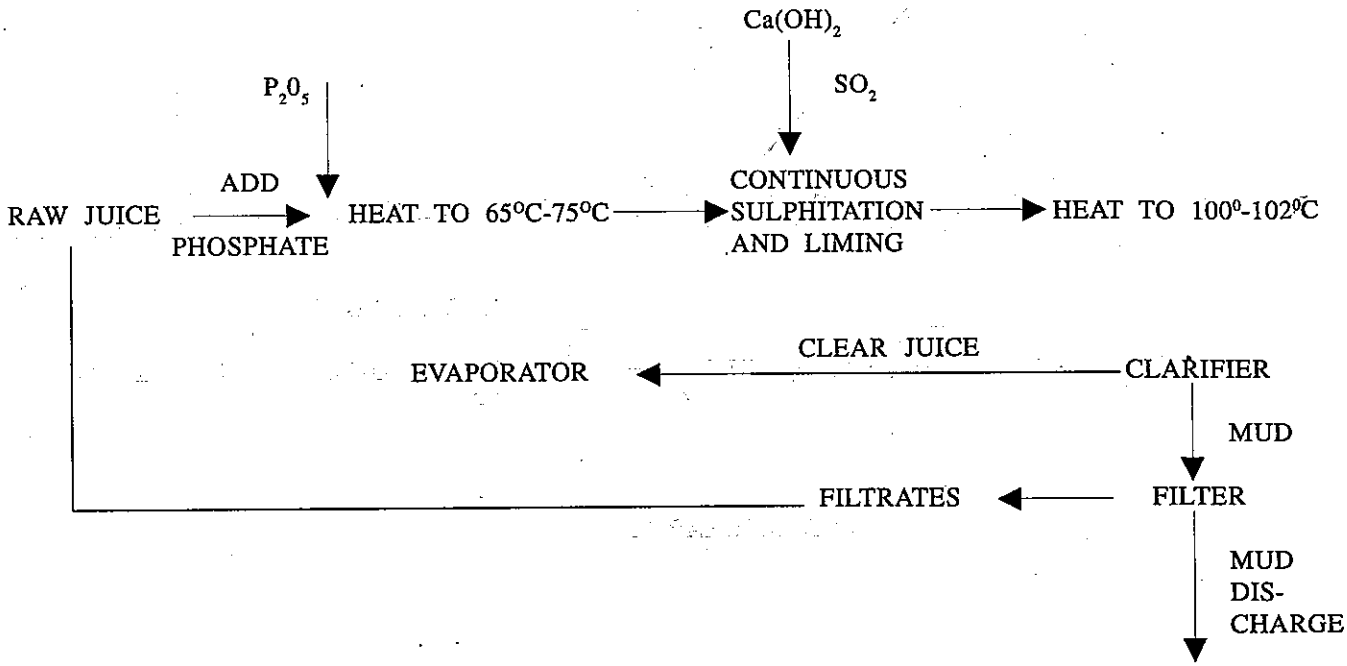
CARBONATION



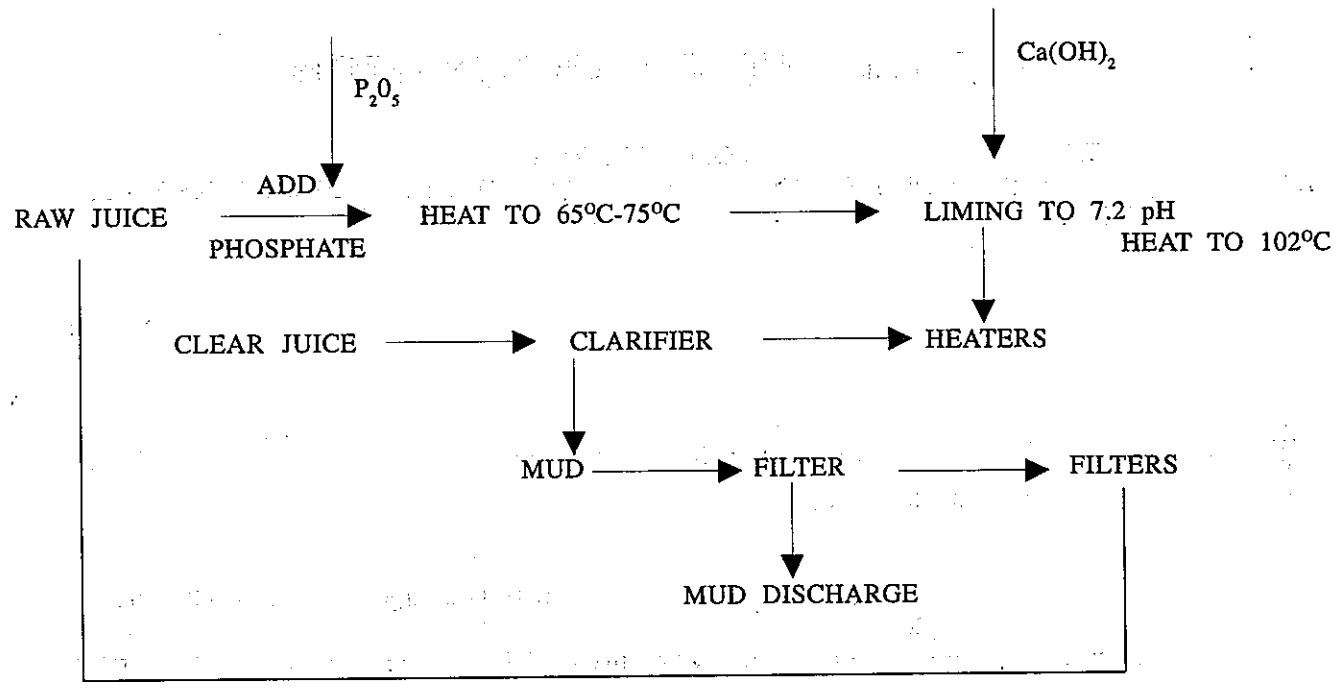
MIDDLE JUICE CARBONATION



SULPHITATION PROCESS



DEFECATION PROCESS



In case of the Double Sulphitation Process, the raw juice is heated in multi-circulation juice heaters to a temperature of 70 to 73°C. The heated juice is sulphited in countinuous sulphitor to a pH of 7.0 to 7.2. The sulphuted juice is heated to temperature of 100 to 103°C and sent to the continuous clarifier for settling. The clear juice from clarifier is evaporated in evaporators to a brix of about 55° to 60°. The vapours are bled from evaporators for heating of juice and boiling of massecuite in vaccum pans.

Very recently the Sugar Technology Mission has taken up trials in 2 sugar mills to produce mill white sugar through the Blanco Direct process and refined sugar through the raw melt phosphotation and Ion exchange route. The results of these are awaited.

4.6 *Process Instrumentation and Automation*

The process instrumentation and automation in the World Cane Sugar Industry particularly in countries like South Africa and Australia is extensive. However, the Sugar Industry in India has considerably lagged in this aspect. Various areas of automation and process control in the Cane Sugar Industry are primarily, the control of mill operation, the control of boiler operation, clarification control, evaporator control, pan control, centifugal control and sugar dying and packing control. Some of the Indian sugar mills have now slowly started adopting the various process control systems and some limited automation has already taken place in respect of cane feed control pH control during juice clarification and boilor combustion control.

4.7 *Efficiency Norms*

4.7.1 Bhargava Commission (Sugar Industry Enquiry Commission in 1974 in their report had suggested broad norms of technical efficiency for the sugar industry as under :

i)	Time loss to total hours available	10-12%
ii)	Reduced mill extraction	93
iii)	Reduced boiling house extraction	90
iv)	Reduced overall extraction	84
v)	Total loss of sugar percent cane (2.3 to 2.5 for carbonation factories and 2.3 to 2.7 for sulphitation factories)	2.3 to 2.7
vi)	Break-up of losses	
	a) Sugar loss in Bagasse	0.9 to 1.1
	b) Sugar loss in press matter	0.1
	c) Sugar Loss in molasses	1.2 to 1.4
	d) Unknown loss	0.1
	Total	2.3 to 2.7
vii)	Sugar percent bagasse	3.0
viii)	Consumption of Steam percent	55 to 60

4.7.2 With a view to improving and maintaining the quality of sugar as well as bringing down the cost of conversion etc. Govt. of India in an order dated 31st May, 1988 introduced the following norms of efficiency for adherence by all sugar factories in the country.

Table 4.4

No.	Description	Sugar factories expanded on the basis of the 1973 standard set up prior of 1972	New factories (on the 1987 standard specification
1.	Reduced Mill Extraction (RME) minimum	94%	95%
2.	Reduced Boiling House Recovery (RBHR)	90%	90%
3.	Total sugar loss percent cane maximum	2.2%	2.0%
4.	Steam percent cane maximum	5%	50%
5.	Down time		
	a) Including general cleaning maximum	10%	10%
	b) Excluding general cleaning maximum	4.5%	4%

However, it may be mentioned that the norms prescribed were not to apply to sugar factories set up prior to Ist October. 1960 and having a daily cane crushing capacity upto and including 1000 TCD till such time, such factories are expanded modernised to the minimum economic capacity of 2500 TCD prescribed by the Govt. of India.

4.8 *Sugar Quality*

Today, industry is bound under the Govt. Notification to produce certain limited grades and quality of sugar. This has stifled the demand of various qualities of sugar in the niche market. Whereas a large number of sugar producing countries in the world produce a variety of sugars like very high pol raw sugar, Refined sugar, Raw sugar, Golden Granulated sugar, Demarera sugar, Mascovada sugar etc. Indian industry only produces Plantation White sugar. The choice of packing by the industry is also limited to 100 Kg in W will jute bags. The ISI specifications No. 5989-1970 for plantation white sugar is as under :

Pol%	99.5 minimum
Moisture %	0.08 maximum
Reduce sugar%	0.10 maximum
Sulphur	70 ppm maximum
Calcium	30 mg/100 gm maximum
Specific conductivity	100x103 mhos
Water insoluble%	0.1 maximum

The white plantation sugar is further graded as large, medium and shall as per the grain sizes and is classified in colour series 29.30 & 31 based on the modulated reflectance value recorded with test bottle. The sugar standards for grading all sugar are prepared by National Sugar institutes, Kanpur every year. The sugar of a particular grain size and colour is packed in a reference bottle and the sugar factories compare the daily production with the standard sugar bottles and assign the grade to the sugar produced accordingly. The various grain sizes as indicated above are in three colour series termed as 29, 30 & 31 colour. The sugar colour is measured in terms of Modulated Reflectance (MR) value of different grades. The MR values are calculated as under :

MR = RXG

R = Mean reflectance value of the 4 surface of the bottle

G = Grain size of sugar in mm

The reflectance value 'R' is measured on 0-100 scale such that the light received by a photo electric cell is 100 when reflected from a freshly prepared MgO surface. Minimum value of MR of Plantation white sugar for the season 1996-97 are as under :

Table 4.5 – Minimum Value of MR for Season 1996-97

Grade	Size in mm		Standard MR values
	Max.	Min.	
L-31	2.36	1.70	94
M-31	1.70	1.18	68
S-31	1.18	0.60	40
L-30	2.36	1.70	82
M-30	1.70	1.18	60
S-30	1.18	0.60	37
L-29	2.36	1.70	70
M-29	1.70	1.18	52
S-29	1.18	0.60	34

There is considerable scope for improvement in sugar quality. This is particularly important for those sections of the industry that, by virtue of their location, are well placed to export sugar to the world market. Moreover, as has happened elsewhere in the world, a booming food processing sector may also create substantial domestic demand for high quality sugar. There has been a great deal of attention paid to the issue of sugar quality in India in recent years, but only a few mills are able to produce refined quality sugar.

4.9 *Energy Consumption*

Most of the sugar mills installed till early 1960's consumed substantial quantities of additional fuel to meet the requirements for manufacture of sugar. However, a number of steps were taken by the industry to minimise energy consumption in the plant, which included the use of efficient prime movers, plant electrification, use of high pressure boilers, extensive bleeding of vapours, recycling of condensate use of extra fuel in the form of furnace oil, coal or fire wood. Some of the factories are now saving has been made during the 1990's and included the use of DC & Hydraulic Drives for operating sugarcane mills for the purpose of juice extraction, use of high pressure boilers with steam pressures at 32 bar and above, use of double effect failing & rising film type vapour cells, re-arrangement of injection and spray systems and use of high gravity fully automatic centrifugals with DC drives. Through various energy conservation measures it has been possible to reduce the energy requirements from 250 KW tonne of sugar to 170 Kwh/tonne of sugar. Similarly, the process steam requirements has reduced from 600 Kgs/tonne cane in the early 1960's to 480 Kg-500 Kg/tonne cane now. As a result of various energy conservation measures taken by different sugar mills have taken up production of additional power through back pressure, (incidental co-generation) or the condensing route.

4.10 *International Comparisons*

4.10.1 *Milling Performance*

A recent study conducted by M/s. LMC International, U.K. indicates the comparative sucrose extraction rates at the mill/diffuser for the Indian Sugar Industry and seven major cane sugar producing countries viz. Australia, Brizil, Cuba, Mexico, South Africa, Thailand and the U.S. as per Table 4.7. The same is shown graphically in Graph 4.2.

The ability of a factory to extract sucrose from cane at the mill-diffuser is dependent not only on the level of technology adopted by the factory, but also on the quality of the raw material entering the factory. A cross-country analysis of the relationship between cane fibre levels and sucrose extraction rates reveals that, despite international differences in cane milling technology, fibre levels are nevertheless correlated with mill performance. Australia stands out as performing particularly well given the fibre content of the cane that it processes. In Australia's case, high milling performance is explained, in part, by widespread use of Shredders with high horse power in cane preparation, as well as overall efficiency of the milling process. At the other end of the spectrum lies Mexico, which performs particularly badly in this stage of the factory process. This is explained by under-investment by factories (which meant that imbibition levels were very low).

Table 4.7 – Sucrose Extraction-Mill/Diffuser, 1984-85 to 1993-94 (Percent)

Year	All India	India Mahara-shtra	U.P.	Rest of India	Australia	Brazil	Cuba (Cane)	Mexico	South Africa	Thailand	United States
1984-85	92.1	92.0	91.5	92.2	96.3	93.8	94.6	91.2	97.4	93.9	93.3
1985-86	92.4	93.3	91.5	92.2	96.3	93.3	94.4	91.0	97.5	94.7	93.5
1986-87	92.6	93.6	91.4	92.8	93.1	93.1	94.0	91.0	97.7	95.4	93.3
1987-88	92.9	93.3	91.2	93.9	96.2	93.9	94.4	91.5	97.6	95.1	93.8
1988-89	92.5	93.3	91.4	92.6	96.3	93.4	94.6	91.7	97.6	95.2	93.3
1989-90	92.2	93.0	91.0	92.5	96.4	93.2	94.4	91.0	97.7	94.5	93.3
1990-91	92-5	93.2	91.1	92.9	96.3	93.4	94.3	91.4	97.8	94.7	93.9
1991-92	93.2	93.5	91.1	94.4	94.1	93.7	94.4	91.1	98.0	94.8	93.7
1992-93	92.9	93.9	91.9	93.0	96.4	93.8	94.0	91.6	97.8	95.3	93.5
1993-94	93.1	94.1	92.1	93.2	96.5	93.7	93.7	92.5	97.8	95.1	93.7
5 Years Averages											
1984-85 1988-89	92.5	93.2	91.4	92.7	96.3	93.3	94.4	91.3	97.6	94.9	93.4
1989-90-1993-91	92.8	93.5	91.4	93.2	96.3	93.6	91.2	91.5	97.8	94.9	93.6

India's performance is, on average, not that much better than Mexico's. However, the country's average performance is dragged down by Uttar Pradesh. Where extraction rates are comparable with those of Mexico at little more than 91%. In Maharashtra, as well as India's "other" cane growing states, sucrose extraction rates are roughly two percentage points higher. Nevertheless, sucrose losses to bagasse of close to 7% are high and milling efficiency is one area where a considerable improvement in factory performance can potentially be made.

4.10.2 *Boiling House recovery*

Boiling house perfomance is influenced by the quality of the raw material received by the factory, in particular, in purity of cane juice. For example, the low levels of cane juice purity prevalent in Thailand are the principal reason behind the industry's poor boiling house recovery rates and the quality of sugar produced. Australia stands out as performing well, achieving lower boiling house losses than the quality of its cane juice would suggest. While the industry's good performance can be explained, in large part, by its technical efficiency, the industry also has the advantage of producing raw sugar only at its cane mills. Even though the quality of raw sugar produced in Australia is very high, mills nevertheless have to work less hard than their counterparts in India, where millers produce all of their sugar as whites.

Despite producing all its sugar in the form of whites, the Indian sugar industry performs well by international standards in terms of boiling house recoveries. The Maharashtra industry, in particular, stands out, reflecting the relatively high quality can (specifically, high cane juice purity) that its mills receive compared with other states of India, notably Uttar Pradesh. The lowest sucrose recovery rates are achieved in Brazil. However, this industry is something of a special case, because sugar undergoes only two boilings, with the result that Brazilian mills produce a relatively sucrose-rich molasses. Which is fermented in annexed distilleries to produce ethanol. This gives a false impression that the industry has inefficient boiling houses, because much of the sucrose that is "lost" to molasses is subsequently recovered in the form of alcohol. It may be noted that there is a need for more effective systems of computing mill house and boiling house efficiency and this can be achieved only if necessary facilities are available for direct estimation of sucrose content in sugarcane. As per the present practice the sugar content in case is inferentially computed by estimating the sugar losses in bagasse and the sugar in mixed juice obtained during the crushing of cane. Both the sugar loss in bagasse and sugar in mixed juice are subject to errors during sampling and analysis. Further the frequency of sampling is inadequate to reflect the actual values. Therefore, systems for direct estimation of sugar content in cane, if used, can assist in more accurate estimation of plant performance.

4.10.3 *Overall Recovery*

Australia leads the field by a clear margin, as a result of exceptional sucrose extraction at the milling stage combined with high boiling house recovery rates. South Aftrica also perform well. When viewed as a whole, the Indian industry does not stand out among this group of industries. However, Maharashtra's performance does rank among the higher performers in this group, with overall sucrose recovery rates similar to those achieved in South Africa, which extract sucrose in large part using diffusers. Once again, India's performance is married by the performance of the sugar industry in Uttar Pradesh, where poor cane quality and mill inefficiency results in overall sucrose recoveries of less than 80%.

4.10.4 *Sugar Recovery*

Based on the same LMC study the average overall recovery rates of sucrose per hectare per year achieved by India and other seven major can sugar producing countries are indicated in Table 4.10 and graphically shown in Graph 4.5. Overall, India's combined field and factory performance when compared with the world's leading sugar industries indicates that the sugar output per hectare per year is lower than countries like Australia. Mexico and U.S. Maharashtra Sector contributes significantly to improve the all India averages, in absence of which the recovery yields per hectare per year in respect of India would have been far inferior to many other can sugar producing countries.

The discussion in paras 4.10.1 to 4.10.4 is based mainly on the unpublished study "Outline of a comparative study of Indian Sugar industries" by M/s. L.M.C. International Ltd., England.

SUCROSE EXTRACTION-MILL/DIFFUSER, AVERAGE 1984-85 — 1989-90 AND 1989-90 — 1993-94

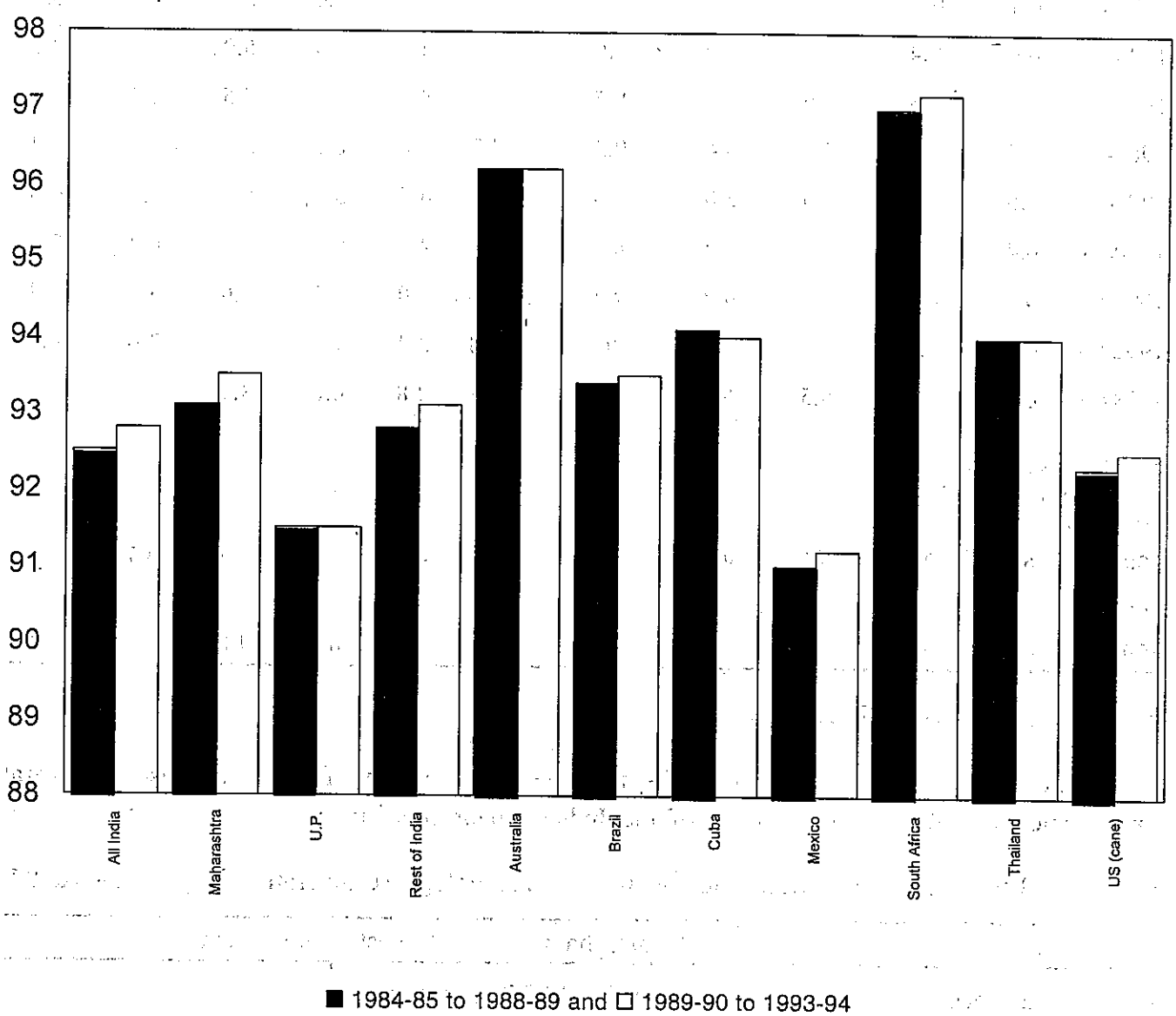


Table 4.8 – Recovery Sucrose Output per Hectare per Year, 1984-85 to 1993-94

(Tonners per hectare per year)

Year	INDIA All India	Mahara-shtra	U.P.	Rest of India	Australia	Brazil	Cuba (Cane)	Mexico	South Africa	Thailand	United States
1984-85	5.9	10.0	4.5	3.3	8.9	4.6	4.4	6.0	5.8	4.4	7.0
1985-86	6.1	10.0	4.7	4.2	8.5	5.2	4.0	6.6	5.1	4.4	6.8
1986-87	6.0	9.4	4.8	4.9	8.6	4.7	4.1	6.3	5.0	4.6	7.2
1987-88	5.8	9.3	4.6	4.5	8.7	4.5	4.3	6.2	5.5	4.4	7.1
1988-89	6.2	9.0	4.8	5.4	9.3	4.7	4.8	6.2	5.7	5.8	7.2
1989-90	6.5	9.5	5.0	5.0	9.6	4.7	4.4	5.9	5.7	4.8	6.6
1990-91	6.4	9.3	5.1	5.2	8.6	4.4	4.2	6.7	5.4	4.8	7.1
1991-92	6.6	8.9	5.3	6.0	7.4	5.0	4.0	6.1	6.0	5.2	6.8
1992-93	6.6	8.6	5.4	6.0	10.4	4.8	3.4	7.5	3.9	3.6	6.7
1993-94	6.7	9.0	5.5	6.2	10.6	5.1	2.8	6.8	3.1	4.4	6.9
5 Years Averages											
1984-85-1988-89	6.0	9.5	4.7	4.5	8.8	4.7	4.3	6.3	5.4	4.7	7.0
1989-90-1993-94	6.6	9.1	5.2	5.7	9.3	4.8	3.7	6.6	4.8	4.6	6.8

4.11 *Bench Marks at World Level*

The following world bench marks may be kept in view for the purpose of overall improvements in the technical status of the Indian Sugar Industry.

Source : Shri M.J. Jadhav, Walchand Institute of Technology (Cooperative Sugar, August 97).

	Area	Country having world's best achievement
•	Sugar recovery	Australia, 14.25% on cane
•	Sugar loss in process	Australia less than 1.3% on cane
•	RME	South Africa, 98.60% (Australia and South Africa-Lowest 96%)
•	Energy consumption	Taiwan, bagasse consumption and saving, 13% each on cane crushed

•	Combined field and	Colombia 1.0 T sugar per hectare factory Productivity per month
•	Cogeneration	Mauritius, Kauai, Reunion and Hawaii-Cogeneration from 26.2 to 55.2% of total national power requirements. Boiler pressure is 80 Kg. cm2g.
•	By product utilization	Brazil, Thailand, Cuba, China, Pakistan
•	Sugarcane yield	Hawaii 250.0 MT.ha.
•	Production cost	
	(a) Field	Indfia, Australia, Thailand (increasing order)
	(b) Factory	Thailand, Australia, India (increasing order)
	(c) Total	Thailand, Australia, India (increasing order)

Sugar recovery :

The Burdekin district of Australia gets sugarcane with as much as 16.0%. Sucrose in cane resulting in average recovery of 14.25% on cane. This is highest in the world. In India, average recovery of sugar is around 10%. The highest recovery so far achieved is 10.30% in 1992-93.

Sugar loss in progress :

In this area also, Australia has record achievement of less than 1.3% on cane. In India, some of the factories have brought down the sugar less upto 1.6% on cane. However, the country-wide average loss is around 2.6% on cane.

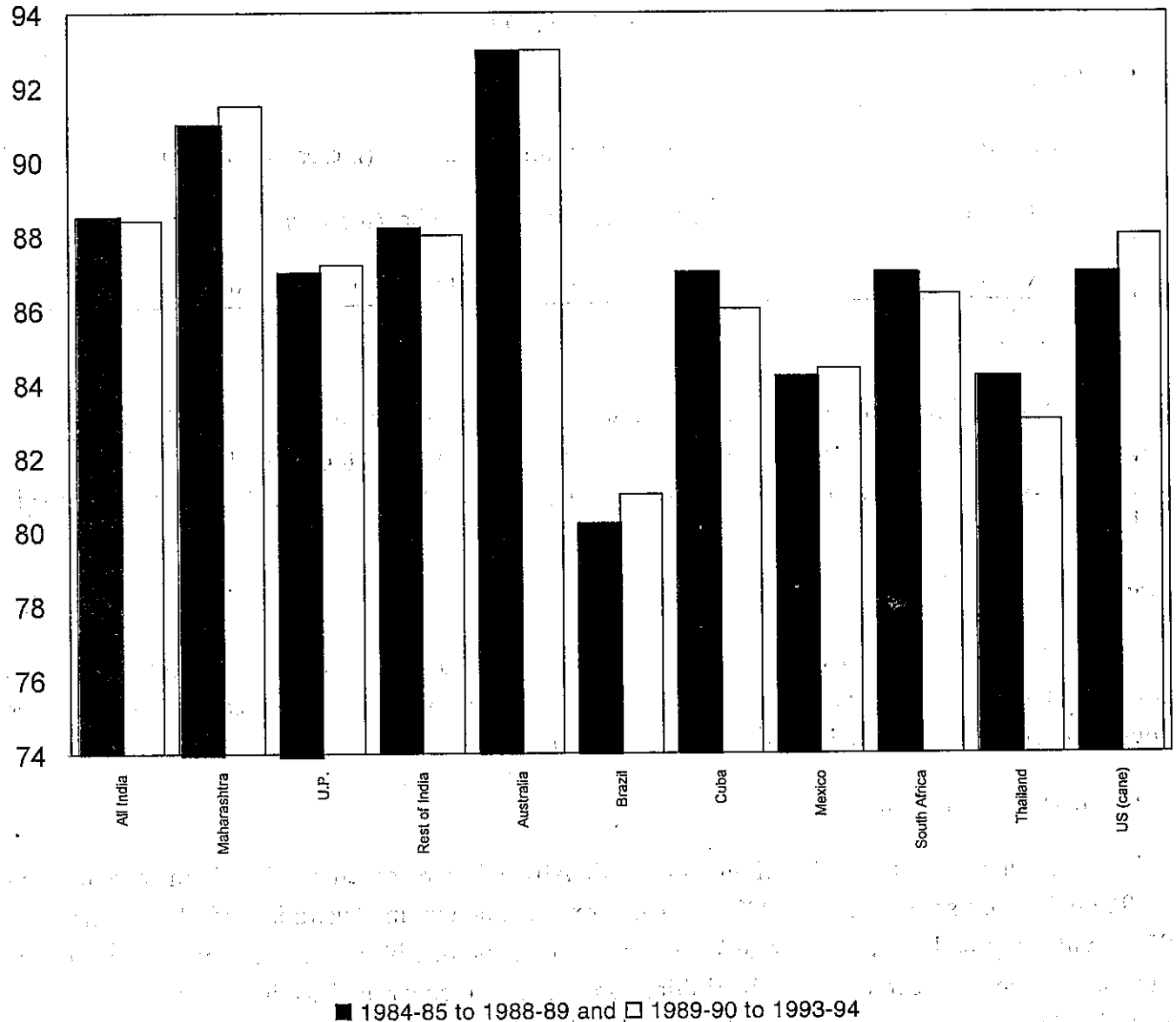
Reduced mill extraction :

The sugar factory at Amatikulu in South Africa has recorded world's highest extraction of 98.60% in crushing season 1992-93. The lowet extraction in Australia and South Africa is 97%. with very high level of imbibition (more than 300% on fibre). But these countries produce raw sugar hence effect of more imbibition on colour of sugar is less important. Also, these factories have high energy consumption levels. The country-wide average RME in India ranges around 93.0% only while a few factories in Maharashtra have recorded RME of 96.5%.

Energy consumption :

As bagasse is basic source of power in sugar factories, the bagasse consumption in % cane can be taken as indicator of energy consumption. In Taiwan, bagasse production is @ 26.0% on

SUCROSE RECOVERY-BOILING HOUSE
AVERAGE 1985-85 – 1988-89 AND 1989-90 – 1993-94



cane, of which only half is consumed and remaining 50% of total bagasse appears as surplus. Indian sugar factories consume about 75% of the bagasse produced and remaining 25% of total bagasse appears as surplus.

Combined field and factory productivity

The consolidation has taken place in Colombian sugar industry in the past 30 years. The industry has shown remarkable improvement in productivity both in field and factory. The combined productivity level is 1.0 T sugar/ha/month. In India, with average sugarcane yield and crop period of 14 months, it comes out to be 0.5 T sugar/ha/month.

Cogeneration :

In Hawaii, sugar factories supply 10% power to national grid. In Kattai, 55.2% of power is supplied by sugar industry. The Sugar factories in Mauritius fulfil 26.3% of the national power requirements presently and country plans to obtain 75% power from sugar factories.

Some sugar factories in the islands of Hawaii and Renunion have installed the most advanced cogeneration plants using 80 kg/cm^2 pressure boilers operating on bagasse.

Indian sugar factories only recently started taking interest in co-generation and today there are over 12 factories exporting surplus power to the grid but it accounts for less than 0.1% of the total power requirement of the country. Some of these co-generating sugar factories are successfully using 60 Kg: cm2 pressure boilers.

By-product utilization :

The Sugar industry is becomming more and more competitive in context of open economic policy. To complete in international market, it is necessary to utilize its by-products fully. In Pakistan, there are 18 bagasse based particle board plants with an aggregate annual production capacity of 2,00,000 tonnes of particle board. In Brazil, more than half of total sugarcane production is being diverted for direct production of alcohol, which is consumed as motor fuel. Cuba utilizes the bagasse efficiently for paper, newsprint and particle board. Thailand used the sugarcane trash efficiently for co-generation.

In India, only molasses is used efficiently for alcohol and alcohol based chemical production. However, the Tamil Nadu Newsprint Ltd. utilizes bagasse for producing upto 1,80,000 tonnes of newsprint and writing paper per annum.

Sugarcane yield :

Hawaii gets average yield of 250 MT of cane per hectare with crop period of 24 months. In India, with average crop period of 14 months, the highest yield has only 71 MT in 1994-95.

Chapter 5

Laws regarding Sugar Industry, Sugar Cane & Sugar Trade

5.1 Industries (Development & regulation) Act, 1951 (Briefly, the IDR Act)

Sugar Industry is covered under the First Schedule to the IDR Act, 1951, which was enacted with the object of providing Central Govt. with the means of implementing the Industrial Policy of the Government. The said Act is applicable to all the industries covered under its First Schedule Sections 11 and 13 provide for the grant of industrial licence by the Central Government for the "establishment of a new unit" and for "effecting substantial expansion of an existing unit" respectively. Section 30 of the Act confers power on the Central Government to make rules for carrying out the purposes of the Act. In exercise of such power, the Central Govt. made the "Registration and Licensing of Industrial Undertaking Rules, 1952" which provide various conditions and procedures with regard to industrial licensing of undertakings.

5.2 Essential Commodities Act, 1955 (briefly, the EC Act)

Sugar is a commodity covered under the Essential Commodities Act, 1955 and is subject to various controls in terms of the provisions of the said Act and the Rules made thereunder. The objective of the EC Act is to control the production, supply, distribution of and trade and commerce in the essential commodity.

The definition of "sugar" occuring in sub-section (e) of Section 2 of the Act, *inter alia*, includes "Khandsari sugar or Bura sugar or crushed sugar or any sugar in crystalline or powdered form". However, all the controls, which are applicable to sugar produced through vacuum pan process by sugar mills, are not enforced in entirety on khandsari sugar at present.

Section 6. of the Act provisions for seizure/confiscation of the commodity by the District Collector. Section 7 deals with penalties for contravention of the provisions of any order made under Section 3 and Section 7A deals with the power to recover certain amounts as arrears of land revenue. Section 10 makes every offence punishable under the Act as cognizable and non-bailable.

5.3 Essential Commodities (Special Provisions) Act, 1981

Taking into consideration the unabated price rise during the years 1979 and 1980, certain special provisions were made for a temporary period of five years for dealing more effecively with persons indulging

in anti-social activities like hoarding and black-marketing and the evil of vicious inflationary prices.

5.3.1 Specific provision with regard to Levy Sugar Price in the EC Act, 1955

Section 3 (3C) of the EC Act makes specific provision with regard to the payment to be made for sugar sold by the producer in compliance of an order made under Section 3(2) (f) of the Act by the Central Government for supply of levy sugar. This Section lays down the guidelines for determination of price payable to the producer for levy sugar supplied by him. Under this sub-section, levy sugar price is required to be fixed by the Central Govt. having regard to :–

(a) the minimum price fixed for sugarcane by the Central Govt;

(b) the manufacturing cost of sugar;

(c) the duty or tax payable thereon; and

(d) the securing of a reasonable return on the capital employed in the business of manufacturing sugar.

It is also provided that different prices may be determined from time to time for different areas or factories or for different kinds of sugar.

Section 3 of the Act confers wide powers on the Central Government to make orders to provide for achieving the primary objective of exercising effective control to check inflationary trend in prices and to ensure equitable distribution of the essential commodity. The important orders issued in exercise of the powers conferred by Section 3 are:

5.3.2. Sugar (Control) Order, 1966

(i) **The Sugar (Control) order, 1966,** provides for power to the Government to regulate production of sugar, restrict sale etc. of sugar by producers, issue directions to producers and dealers, regulate movement of sugar and quality of sugar, call for information from producer or recognised dealer, inspection, entry, search, sampling and seizure of sugar and delegation of powers conferred by the Sugar (Control) Order 1966 to any officer or authority of the Central or State Government.

On the basis of the monthly freesale quota decided by the Government, month-to-month release orders for sale of sugar in the open market are issued under clause 5 of the Sugar (Control) Order, 1966.

in anti-social activities like hoarding and black-marketing and the evil of vicious inflationary prices.

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(d) the securing of a reasonable return on the capital employed in the business of manufacturing sugar.

It is also provided that different prices may be determined from time to time for different areas or factories or for different kinds of sugar.

Section 3 of the Act confers wide powers on the Central Government to make orders to provide for achieving the primary objective of exercising effective control to check inflationary trend in prices and to ensure equitable distribution of the essential commodity. The important orders issued in exercise of the powers conferred by Section 3 are:

5.3.2. Sugar (Control) Order, 1966

(i) **The Sugar (Control) order, 1966,** provides for power to the Government to regulate production of sugar, restrict sale etc. of sugar by producers, issue directions to producers and dealers, regulate movement of sugar and quality of sugar, call for information from producer or recognised dealer, inspection, entry, search, sampling and seizure of sugar and delegation of powers conferred by the Sugar (Control) Order 1966 to any officer or authority of the Central or State Government.

On the basis of the monthly freesale quota decided by the Government, month-to-month release orders for sale of sugar in the open market are issued under clause 5 of the Sugar (Control) Order, 1966.

5.3.3 Synopsis Sugar (Control) Order, 1966

The important provisions contained in the Sugar (Control) Order, 1966 are as under:-

Licensisng

Clause 3 deals with the power to regulate production of sugar through the grant of licence.

Prohibition on sale of sugar

Clause 4 empowers the Central Government to direct that no producer shall sell or agree to sell or otherwise dispose of or deliver or agree to deliver any kind of sugar or remove from the bonded godowns of the factory except under and in accordance with a direction issued in writing by the Central Government.

Freesale release orders

In exercise of the powers conferred by this clause, Notification No-GSR. 345 (F)/Ess-com./Sugar dated 4-6-1979 was issued prescribing the requirement of a written order for sale of sugar by factories. Month-to-month release orders for sale of freesale sugar are, therefore, issued under clause 5 of the Sugar (Control) Order 1966 to satisfy the requirement of "a direction in writing by the Central Government" occurring in Clause 4 of the said Order.

Action under clauses 4 & 5 upheld

In the writ petition (Nos. 1633 & 5433 of 1982) filed by Tirppattur Cooperative Sugar Mills Ltd. in the Madras High Court, challenging the validity of the Notification dated 4-6-1979 issued under Clause 4 of the Sugar (Control) order, 1966 and the Release Order for freesale sugar issued under Clause 5 of the said Order, the Madras High Court upheld the action of the Central Government in its judgment dated 3-8-90 by observing that the impugned order is referable to Section 3 (2) (d) of the Essential Commodities Act 1955 and not Section 3 (2)(f) of the E.C. Act must necessarily involve the corresponding obligation or liability or some person to purchase the commodity.

Permit for transport of sugar

Clause 6 deals with grant of general or special permit for transport of sugar.

Regulaion of quality of sugar

Clause 7 confers the power to regulate the quality of sugar in terms of Indian Sugar Standard Grades and to direct reprocessing of sugar not conforming to such standard grades.

Utilisation of levy sugar

Clause 9 deals with the utilisation of sugar taken delivery of in pursuance of a direction made under Section 3(2) (f) of the Essential Commodities Act and requires the submission of utilisation certificate to

the Chief Director within fifteen days of taking delivery. Levy sugar is covered in the sugar procured by Government under Section 3(2) (f) of the E.C. Act.

Inspection seizure etc.

Clause 11 deals with the power to inspection, entry, search, sumpling, seizure etc.

Delegation of powers

Clause 15 deals with the delegation of powers conferred by the Sugar (Control) Order, 1966 to any officer or authority of the Central State Government.

5.3.4 Sugarcane (Control) Order 1966

(ii) **Sugarcane (Control) Order, 1966,** provides for guidelines regarding fixation of Statutory Minimum Price (SMP) for sugarcane purchased by sugar mills during each sugar season (Clause 3), payment of interest at 15% per annum on amounts due beyond 14 days of delivery of sugarcane at factory gate [Clause 3(3-A)], payment of additional cane price to the growers (Clause 5-A) regulation of distribution and movement of sugarcane (Clause-6), licensing of power crushers and khandsari units and regulation, issue of directions to producers of Khandsari sugar (Clause-8), power to call for information etc. from producers (Clause-9), power to entry, search and seizure (Clause-9-A) and delegation of powers conferred by the Sugar (Control) Order 1966 to any officer or authority of the Central or State Government.

5.3.5 Synopsis Sugarcane (Control) Order, 1966 (As amended on 9-9-1983)

The important provisions contained in this Order are summarised below:-

Criteria for determination of SMP

Clause 3(1) & 3(2) deal with fixation of the Statutory Minimum Price having regard to five criteria, viz.-

(i) cost of production of sugarcane;

(ii) return to grower from alternative crops and the general trend of prices of agricultural commodities;

(iii) availability of sugar to the consumer at a fair price;

(iv) the price at which sugar produced from sugarcane is sold by the producer of sugar; and

(v) the recovery of sugar from sugarcane.

Time stipulation for payment of cane price

Clause 3(3) deals with fixation of 14 days' period for making payment for sugarcane delivered at factory gate or at cane collection centre.

Interest liability on delayed payments

Clause 3(3-A) provides for interest liability on payments delayed beyond 14 days of delivery of sugarcane at 15% per annum.

Unpaid/unclaimed cane price

Clause 3(7) deals with deposits to be made with the District Collector, within three months of close of a sugar year, amounts of cane price unpaid or lying unclaimed with the factory on the last day of the sugar year.

Rate of cane prices

Clause 3A provides for payment of sugarcane price either at the rates of SMP notified by the Central Government or at the "agreed price" (i.e. the price agreed between the producer and the cane grower).

Minimum Price for Khandsari

Clause 4 deals with fixation of minimum price for khandsari sugar at a rate not exceeding the SMP fixed by Central Govt. for cane supplies made to sugar factories in the region, and prohibits sale or purchase of cane at a price lower than that fixed for khandsari sugar producer under this clause.

Additional cane price

Clause 5-A provides for payment of additional cane price in accordance with the formula contained in the Second Schedule to the Sugarcane (Control) Order 1966. This formula (generally referred to as "the Bhargava Formula") is meant to enable the farmer to get a remunerative price for the cane supplied after 1-10-1974, by sharing the profits arising out of excess realisation with the producer sugar factory.

Intimation to producers/growers, regarding addl. cane price

Clause 5-A (2) provides for intimation in writing to the producer of sugar and the cane grower connected with the supply of sugarcane regarding the additional cane price determined.

Appeals against determination of addl. cane price

Clause 5-A(3) deals with appeal against the additional price determination and provides for a period of 30 days from the date of communication in this regard for appeal by the aggreived party, with power to the Government will be final.

Restriction of supply of fixed percentage of cane produced

Clause 5-A(7) deals with restriction on the cane grower to supply not less than 85% of sugarcane agreed to by him, and, if subjected to any penalty for failure to supply 85% of cane, deprives him of the entitlement to additional cane price.

Reservation of cane area

Clause 6 deals with the power of Government to regulate distribution and movement of sugarcane such as fixation of "reserved area" for a sugar factory, fixation of percentage of cane to be supplied by the grower, directing the cane supplier and sugar factory to enter into an agreement, prohibiting or restricting the export of sugarcane from any area without a permit etc.

Licensisng of khandsari units

Clause 7 deals with power to license power crushers, khandsari units and crushers to regulate purchase of sugarcane.

Delegation of powers

Clause 11 deals with the delegation of powers to any authority of the Central/State Government.

5.3.6 Levy Sugar Supply (Control) Order, 1979

(iii) **Levy Sugar Supply (Control) Order, 1979,** provides for powers to issue direction to producer or dealer for supply of levy sugar requisitioned by the Central Government through an order made with reference to Section 3(2)(f) of the E.C. Act, 1955.

Month-to-month release orders for delivery of levy sugar are issued in exercise of the powers conferred by this Order.

5.3.7 Sugar (Packing and Marketing) Order, 1970

(iv) **Sugar (Packing and Marking) Order, 1970,** provides for specifications regarding packing of sugar and markings to be indicated on sugar bags. Unless otherwise permitted by Central Government, sugar is required to the packed in A-twill jute bags conforming to Indian Standard Specifications Sugar meant for the purpose of export and small consumer packs of 5 kg and below, have been exempted from the compulsory use of jute bags.

5.3.7 Sugar Price Determination Order

May sugar mills resort to legal remedly against fixation of sugar price by the Central Government on different aspects. Significantly, the principle of price determination on zonal basis which was challenged, was upheld by the Supreme Court. The Court observed that, apart from the impracticability of fixing prices unitwise in the whole country, the entire object and purpose of controlling would be defeated by the adoption of such a sysem. Unitwise fixation and payment on that basis would mean perpetuating inefficiency and mis-management and depriving partial control policy of the incentives for economy and efficiency inherent in it.

5.3.9 Malaprabha Case

A challenge to the methodology adopted for fixation of price of levy sugar procured by the Central Government through an order made

with reference to Section 3(2)(f) of the E.C. Act, 1955 during the sugar seasons 1974-75 to 1979-80, came up before the Supreme Court of India in the case of Malaprabha Cooperative Sugar factory in Civil Appeals 122-123 of 1981 and a batch of similar cases. The Supreme Court directed the Government to issue amended notifications, taking into account the liability of the manufacturers under Clause 5-A of the Sugarcane (Control) Order, 1966 as regards cane price and to refix the price of levy sugar having regard to the factors mentioned in Section 3(3C) of the E.C. Act, 1955. The Central Government filed Review petitions, seeking clarifications and directions regarding inclusion of additional cane price payable under Clause 5-A to the SMP while computing the element of cost for the purpose of fixation of levy sugar price. The same was discussed by the Supreme Court. However, while issuing Notification dated 22-2-1995 refixing levy sugar prices for 1974-75 to 1979-80, the Government did not take into consideration the additional cane price liability under Clause 5-A of the Sugarcane (Control Order), 1960. An application was moved by ISMA in the Supreme Court for further directions. The Supreme Court, vide its judgment dated 28-1-1997, held that the determination of SMP and the fixation of levy sugar price, being inter-connected activities, should be read as a whole and not separately. The Court directed the Central Government to take into account the liability of the manufacturer under Clause 5A of the Sugarcane (Control) Order, 1966, while refixing the levy sugar price, and to issue amendment notifications.

5.3.10 State Legislation relating to enforcement payment of cane price

There are various State legislations regarding enforcement of payment of sugarcane price to growers. In Uttar Pradesh, the U.P. Cane (Regulation of Supply and Purchase) Act, 1953, contains provisions for tagging a percentage of advances given by banks of payment of cane price. Besides, the said Act also provides recovery of arrears of cane price, together with interest thereon, by the Collector, on the basis of recovery certificate issued by the Cane Commissioner, as if it were an arrear of land revenue. Similar provisions also exist in State legislations of Madhya Pradesh, Andhra Pradesh & Bihar. State legislations of Punjab, Bihar and Tamil Nadu contain provisions for penalties for contravention which include fines and imprisonment. Statement giving a short summary of such State legislations is at Annexure 5.1

5.4 Sugar Export Promotion Act

The Sugar Export Promotion Act, which casts an obligation on all sugar mills in the country to export, has been repealed by an Ordinance which, however, has not been subsequently converted into an Act within

the stipulated time. With the de-canalisation of exports, it is no longer mandatory for all manufacturers of sugar to export. Export can be made voluntarily. But, resorting to export of sugar, would not exempt any sugar mill either from its obligation to supply levy sugar which is requisitioned by the Govt. in terms of Section 3(2) (f) of the E.C. Act 1955, or to effect sale of sugar in open market in compliance of the month-to-month release orders issued by the Government.

5.5.1 Sick Industrial Companies (Special Provosions Act, 1985)

The Sick Industrial Companies (Special Provisions) Act, 1985 was enacted to make, in public interest, special provisions with a view to securing the timely detection of sick and potentially sick companies owning industrial undertakings and the speedy determination by the Board of Industrial and Financial Reconstruction (briefly, BIFR) of the preventive, ameleorative, remedial and other measures.

5.5.2 BIFR & AAIFR

The BIFR is established under section 4 of the Act and the Appellate Authority for Industrial and Financial Reconstruction (AAIFR) is constituted under section 5 of the Act. Every proceeding before the BIFR or the AAIFR shall be deemed to be a judicial proceeding within the meaning of sections 193 and 228 and for the purposes of section 196 of the Indian Penel Code. (Section-11)

5.5.3 References Inquiries & Schemes

Where an industrial company has become sick, a reference to BIFR shall be made by the Board of Directors of the company within sixty days from the date of finalisation of the duly audited accounts of the company for the relevant financial year. The Central Govt. or the Reserve Bank of India or a State Government or a public financial institution or a State level institution or a scheduled bank may also make reference to the BIFR if it has sufficient reasons to believe the sickness of the industrial company. (Section-15)

The BIFR shall complete inquiry either itself or through an operating agency, appointed through an order, as expeditiously as possible and make endeavour to complete the inquiry within sixty days from commencement of the inquiry. The Board shall appoint one or more persons as Special Directors of the company for safeguarding the interests of the Company. (Section 16). On completion of the inquiry the Board shall decide by an order in writing whether it is practicable for the company to make its networth positive within a reasonable time. If the Board's decision is in the negative, it may, by an order in writing direct any operating agency to prepare a scheme providing for suitable measures. (Section-17)

The operating agency shall prepare within ninety days from the date of the Board's order under section 17 of the Act, a scheme providing mainly for-

(a) re-construction, revival or rehabilitation;

(b) change in or take over of management;

(c) amalgamation with any other company;

(d) sale or lease of a part or whole of the sick company.

The Board is empowered to sanction the Scheme affording opportunity to all concerned persons, and to review the sanctioned scheme or make modifications by an order in writing. The sanction accorded by the Board shall be admitted as evidence in all legal proceedings. (Section 18). Section 19 of the Act provides for appeal against an order to the AAIFR within forty-five days from the date on which a copy of the order is issued to the aggrieved person (Sec. 25). Section 29 to 34 of the Act deal with taking custody of property etc. of the sick company, offences and penal provisions for violation, false statement/false evidence to the BIFR or AAIFR, which include imprisonment and fine.

5.6.1 Sugar Cess Act, 1982 & DF Act, 1982

The Sugar Cess Act 1982 was enacted to provide for the imposition of a cess on sugar for the development of sugar industry and for matters connected therewith. The Act empowers the Central Government to levy the cess, by way of a duty of excise, on sugar which will help to generate funds for supplementing financial assistance for rehabilitation and modernisation of sugar factories and for development of sugarcane and research activities connected therewith. The Sugar Cess Rules, 1982 (which were made under the Act) provide for the manner of accounting reports and returns to be furnished by sugar factories, maintenance of accounts etc. An amount equivalent to the proceeds of the duty of excise levied and collected under the Act, reduced by the cost of collection as determined by the Central Government, shall be credited to the Sugar Development Fund formed under Section 3 of the Sugar Development Act, 1982.

5.6.2

The object of the Sugar Development Fund Act, 1982 (briefly, the SDF Act) in the formation of the Sugar Development Fund to be applied for the purpose of rendering financial assistance through loans

at concessional rates for rehabilitation and modernisation of sugar factories as well as for sugarcane development and for encouraging research aimed at development of sugar industry by making grant. The Fund shall also be applied for defraying expenditure for the purpose of building up and maintenance of buffer stock of sugar with a view to stabilising price of sugar.

The Sugar Development Fund Rules, 1983 were made in exercise of the powers conferred by Section 9 of the SDF Act, 1982, to provide for (a) the manner in which any loans or grants out of the Fund and the terms and conditions thereof; (b) the manner and form in which applications are to be made; (c) the composition of the Committee and the procedure to be followed by it in the discharge of its functions and (d) the form in which and the period within which statistical and other information may be furnished by sugar factories.

From 1st November 1982, the amount of cess payable by sugar factories is Rs. 14/- per quintal of sugar.

5.7 Levy Sugar Price Equalisation Fund, Act 1976 (Amended upto 1984)

The Levy Sugar Price Equalisation Fund Act 1976 (briefly, the LSPEF Act) was enacted to provide for the establishment, in the public interest, of a Fund to ensure that the price of levy sugar may be uniform throughout India and for matters connected therewith or incidental thereto.

5.7.1

The background facts leading to the enactment of this legislation are as follows:-

Central Government requistions "levy sugar" under Section 3(2) (f) of the Essential Commodities Act, 1955. The concept of levy sugar came into being from the sugar season 1967-68 onwards, in terms of Section 3(3C) of the EC Act 1955, which was inserted in that Act in 1967, with the introduction of dual-pricing mechanism (partial control). The policy of partial control continued except for two brief spells of de-control from 25-5-71 to 30-6-72 and from 16-8-78 to 16-12-79. The prices were fixed for levy sugar by the Central Government having regard to the four criteria laid down in Section 3(3c) of the EC Act 1955. The levy price fixation made by the Govt. from season to season became a subject of challenge by many sugar producers in various High Courts as well as in the Supreme Court of India. The courts granted relief in a majority of cases in the form of higher interim prices subject

to the condition of the differential prices being kept in separate bank accounts or by furnishing bank guarantees. In 1972, the Supreme Court upheld the fixation of levy sugar prices made by the Government in respect of the season 1971-72 while finally disposing of 13 writ petitions through its judgement dated 6-11-1972. The lead case was M/S Anakapalle Coop. Society vs. Union of India (AIR 1973 SC 734). A question, thus, arose as to how the excess realisation, accrued to the sugar factories through the sale of sugar at higher prices during the pendency of the writ petitions, was to be disposed of, as the money belonged to a large body of consumers to whom the incidence of higher interim prices had been passed.

Even while the question of enactment of a suitable legislation to provide for dealing with this money was under consideration, on the basis of the advice of the then Solicitor General of India, the Union Cabinet took a decision, on the sugar policy for the season 1972-73, to maintain a uniform retail issue price of levy sugar throughout the country. A detailed Scheme for pooling of the ex-factory prices of levy sugar was worked out in October 1972 to achieve the object of equalisation of levy sugar price. Under this Scheme, the Food Corporation of India (briefly, FCI) was required to operate a separate fund called the "Sugar Price Equalisation Fund" (SPEF), to which the price differential of low-cost zones were credited and extra payments involved in levy sugar distribution in high-cost areas were debited. The intention of the Government was that the balance in the "Fund" should never be allowed to become negative by reviewing the retail issue price of levy sugar from time and, in the even of a sizeable credit balance in the Fund building up at any time, the same could be used for the benefit of consumers in general, by lowering the uniform retail issue price of levy sugar for the whole country. This fund remained "Non-statutory" as it had no legal basis. Under the implementation of this Scheme, the incidence of higher interim levy sugar prices derived by the producers had not been passed over to the ultimate consumers and had been paid by FCI even in respect of levy sugar lifted by various other nominees of the Central/State Government.

It was felt that it would be better to distribute the money in the Fund to the consumers through reduction of uniform retail issue price of levy sugar rather than allowing the money to remain with the factories who are not entitiled to it.

5.7.2 The LSPEF Act 1976 came into force w.e.f. 1-4-1976, to facilitate the implementation of the judgements of the Supreme Court in the Anakapalle & Nawabganj sugar factories cases and to recover the excess realisation amount along with accrued interest from the concerned sugar factories.

The LSPEF Act provides for establishment of a fund called the Levy Sugar Price Equalisation Fund (briefly, the LSPEF), into which shall be created (a) the amounts representing all excess realisations made by the producers either before or after the commencement of the Act, and (b) the amounts of loans advanced or grants made, if any, by the Central Government for carrying out the objects of the Fund. The Fund shall be administered by the Central Government (Section 3). Moneys remaining unclaimed after a period of six months from the date on which they are credited shall vest in the Central Government and shall be utilised, having regard to the interests of consumers of levy sugar as a class and the need to ensure that the retail issue price of levy sugar in uniform throughout the country (Section 8). The LSPEF Act also empowers the Central Government to recover excess realisations made by sugar factories as "Arrears of Land Revenue" (Section 11). Penal provisions, prescribing imprisionment or fine or both, in respect of defaulting sugar mills in the matter of crediting excess realisations are also contained in the Act (Section 13). Section 16 of the Act provides for power to make rules. In exercise of such power, the Levy Sugar Price Equalisation Fund Rules, 1977 were made, to provide for the manner of (i) crediting moneys to the Fund (ii) accounting and transactions of the Fund (iii) inviting applications from buyers for refund, (iv) utilisation of the Fund by the Central Government, etc. besides prescription of forms for various purposes in terms of the LSPEF Act.

5.7.3 The Act was amended in 1984 to provide for certain modifications in the principal Act, with a view to obviating litigations on the subject in the light of the experience gained during the administration of the LSPEF Act, 1976.

There has been no challenge in courts of law after the amendment of 1984.

5.8 Sugar Trade

Clause 5 of the Sugar(Control) Order, 1966 empowers the Central Government to issue directions to sugar producers or recognised dealers, from time to time, regarding production, maintenance of stock, storage, sale, grading, weighment, disposal etc. In exercise of such power, Central Government issues directions through notified orders-

(a) for regulating sale by sugar factories of a fixed percentage of each month, within a specified period, i.e., weekly/fortnightly as is deemed necessary;

(b) for fixing specific stock-holding limits on sugar dealers; and

(c) for imposing restriction on khandsari units regarding declaration of stocks and sale of stocks within specified periods.

Chapter 6

Status of Khandsari & Gur Sector

KHANDSARI SECTOR

6.1.1 *General*

Khandsari provides outlet for disposal of cane to cane growers in areas where sugar mills have not been installed or have inadequate capacity, and provides seasonal employment to a large proportion of rural population. It forms part of organised small/intermediate scale sector though some units in the unorganised cottage industry sector also produce khandsari alongside gur manufacturing activity.

6.1.2 National Council of Applied Economic Research (NCAER) conducted a field study of khandsari and gur units during 1994-95. The data in this chapter are based primarily on the report of this study, unless specifically mentioned otherwise.

6.1.3 Almost all the units have installed horizontal crushers, which are more efficient in terms of sharply cutting down losses in juice extraction. On the whole, 37% of the units have three roller sets, 44% operate with six roller sets and 17% operate with nine roller sets and about 12% operate 12 roller sets. Economics of production primarily depends on the number of roller sets in the sense that units with three roller sets can extract 50% to 69% juice, six roller sets can extract 70% of juice, nine roller sets 75% and twelve roller sets 80% of juice.

6.1.4 *Crushing capacity*

About 43% of the estimated khandsari units operate with cane crushing capacity between 50-100 TCD, 26% with over 100 TCD. Rest of the units operate with 50 or less TCD. Average crushing capacities of khandsari units in 1994-95 in the four States was as under -

Table 6.1 – Statewise average crushing capacity

State	Average crushing capacity (tonnes/day)
UP	81
Haryana	58
AP	174
Karnataka	146

Average capacity of tropical region States is higher than the sub - tropical region States.

6.1.5 *Distance from Sugar Mills*

Table 6.2 – Distribution of Khandsari units by distance slabs from sugar factory (94-95 season)

(% of units)

State	Distance in Kms				
	Upto 10	11-15	16-20	More than 20	All
UP	14.3	24.4	26.7	34.6	100
Haryana	2.9	8.8	23.5	64.8	100
AP	-	-	-	100	100
Karnataka	-	-	-	100	100
Overall (4 States)	(13.3)	(22.8)	(25.2)	(38.7)	(100)

In tropical States of AP and Karnataka, khandsari units are located at least 21 kms away from the nearest sugar mill, whereas in sub - tropical State of UP, nearly 40% of the units are functioning within 15 km distance from the nearest sugar mill.

Table 6.3

6.1.6 **Duration of crushing period (1994-95 Season)**

State	Duration of crushing (in weeks)
UP	23
Haryana	21
AP	15
Karnataka	17

Duration of crushing period for khandsari is linked with annual crushing capacity of sugar mills in each State vis-a-vis total production of cane in that State. Higher the quantum of cane crushed by sugar mills, shorter is the duration of cane crushing of khandsari units. Average duration of crushing of khandsari units in the tropical States are much lower than the sub - tropical States.

Table 6.4

6.1.7 **Share of cane crushed by khandsari units (1994-95)**

(% of cane)

State	Total cane production	Cane crushed by khandsari units (Lac Tonnes)	Crushed by khandsari units
UP	1099.00	152.00	13.9
Haryana	70.00	1.71	2.4
AP	160.00	7.38	4.6
Karnataka	303.00	5.12	1.7
Overall (4 States)	1632.00	167.00	8.4

Crushing of cane by khandsari units in the four States accounted for 6.2% of India's cane production in 1994-95. Khandsari units in UP alone accounted for about 5.6%. At the State level, khandsari unit's share was 13.9% of cane output in UP in 1994-95. Units in Karnataka, Haryana and AP processed about 1.7% to 4.6% of the respective State's total output for producing khandsari.

Table 6.5

6.1.8 **Cost structure of khandsari sugar production in selected States (1994-95)**

(Figures in percentage)

State	Raw Material	Salary & wages	Fuel/ Energy	Taxes	Repairs & Maint. on borrowing	Int.	Marketing	Misc.	Total
UP	85.1	5.6	4.3	1.5	0.8	0.5	1.2	1.0	100
Haryana	84.7	5.8	4.0	0.4	0.9	0.1	1.1	3.0	100
AP	84.4	7.6	4.4	1.4	1.3	0.3	-	0.6	100
Karnataka	83.8	5.8	2.9	2.3	1.0	2.2	0.9	1.1	100
Overall (All 4 States)	85.0	5.8	4.2	1.5	0.9	0.5	1.0	1.1	100

The table reveals that cost of raw-materials uniformally accounts for more than 80% of the total cost of production of khandsari sugar while other elements of costs form negligible percentage of total cost. Among the items constituting raw material cost sugarcane accounts for about 98% and other inputs put together constitute about 2%. Usage of sulphur and lime various widely among the four States, with Southern States, in general, using more of lime and sulphur. As far as fuel/energy is concerned, in case of UP/Haryana (sub-tropical region), frequent disruptions in electricity supply lead to excessive usage of diesel energy. In Southern States (tropical region), electricity supply cuts are pre-notified, enabling re-scheduling of production process, which accounts for use of electricity as fuel.

6.1.9 *Employment pattern*

Total persons employed in all four States studied were 82,000. Out of these less than 8,000 were regular employees & the rest were daily wagers. Women employment in States other than Karnataka is negligible. In Karnataka, as much as 38% of the workforce comprised females. By and large, employment is dominated by socially and economically disadvantaged groups.

Table 6.6 – Estimated employment in khandsari units (1994-95)

State	Number of persons/day									
	Regular			Daily Wagers			Total			
	M	F	Total	M	F	Total	M	F	Total	
UP	6948	344	7292	62929	5121	68050	69877	5465	75342	(92.2)
Haryana	138	–	138	1746	107	1853	1884	107	1991	(2.4)
AP	299	2	301	1470	–	1470	1769	2	1771	(2.2)
Karnataka	104	3	107	1509	972	2481	1613	975	2588	(3.2)
Total	7489	349	7838	6765	6200	73854	75143	6549	81692	
			(9.6%)			(90.4%)	(92%)	(8%)	(100%)	

Figures in brakets indicate percentage, M and F indicate Male and Female respectively

6.1.10 *Economics of production*

Table 6.7 – Output/input ratios in Khandsari Sector

(1994-95)

State	Total input cost	Value of output		Total	Ratio
		Main products	By-products		
		(Rs/Crores)			
UP	1079.05	1023.17	178.47	1201.64	1.1136
Haryana	11.73	12.73	1.93	14.66	1.2319
AP	47.64	47.95	6.06	54.01	1.1337
Karnataka	37.95	41.32	3.75	45.07	1.1877
Total (4 States)	1176.37	1125.17	190.21	1315.38	1.1691

Highest return is recorded by units in Haryana (23% approx). In UP, the return is the lowest (about 11%). This may be the reason for sharp fall in the number of khandsari units in UP.

Table 6.8

6.1.11 **Investment in fixed assets by khandsari units (94-95)**

Value(Rs/lacs)

State	Assets					All
	Land	Bldg	P&M	Transport	Others	
UP	6.32	3.42	8.93	0.10	0.91	19.68
Haryana	3.99	2.22	8.37	0.35	0.01	14.94
AP	1.85	1.01	10.25	0.71	0.03	13.85
Karnataka	7.19	19.43	53.82	11.58	2.54	94.56
Overall Average Investment per unit (4 States)	6.15	3.55	9.58	1.12	0.06	20.46

The estimated average per unit investment in the khandsari units in the four States is about Rs. 20 lacs of which land and building constitute 47.4%, plant and machinery 46.8% and transport and equipment 5.5%.

6.1.12 Product composition of khandsari units in UP and Haryana comprises khandsari and a small proportion of gur as main products. By-products mainly comprise molasses, bagasse and press mud. Bagasse is used as fuel and press mud is given to cane growers free of cost. Therefore, output of by-products in terms of value pertains to molasses alone. Table below gives the statewise total output of main products and by-products in khandsari sector (94-95).

Table 6.9 – Output of Main product & by products

State	Output ('000 Tonnes)		Value (Rs/Crores)		Total
	Main products	By products	Main products	By products	
UP	1140.03 (92.4)	556.86 (94.2)	1023.00	178.00	1201.00 (91.4)
Haryana	12.34 (1.0)	5.61 (1.0)	12.73	1.93	14.66 (1.1)
AP	45.84 (3.7)	17.64 (3.0)	47.94	6.06	54.00 (4.1)
Karnataka	36.06 (2.9)	10.75 (1.8)	41.32	3.75	45.07 (3.4)
Total 4 States	1234.27 (100)	590.86 (100)	1125.00 (85.5)	190.00 (14.5)	1315.00 (100)

Value of 1.23 million tonnes of khandsari/gur works out to Rs. 1315 crores at the then prevailing prices. Molasses to the extent of 59 million tonnes valued at Rs. 190 crores. Among the States, UP alone contributed over 91% of the total production (both in terms of quantity and value). Thus, evidently khandsari production is of critical improtance for the sugarcane economy of UP alone.

6.1.13 *Production costs of khandsari units*

Table below gives the production cost per tonne of output by units manufacturing khandsari only, units manufacturing gur only and units manufacturing khandsari as well as gur (in 1994-95).

Table 6.10 – Cost of Production Per Tonne

State	Total output (000 tonnes)	Total input cost (Rs/lacs)	Cost per tonne (Rs)
I. Units manufacturing only khandsari			
UP	806.11	85193.71	10568
Haryana	6.40	733.56	11462
AP	45.84	4763.57	10392
Karnataka	36.06	3795.07	10524
Total	894.41	94485.91	10564
II. Units manufacturing only gur			
UP	193.65	12692.30	6554
Haryana	5.02	386.16	7692
Total	198.67	13078.46	6583
III. Units manufacturing both khandsari and gur			
UP	140.27	10018.00	7142
Haryana	0.92	53.56	5822
Total	141.19	10071.56	7133

Cost of production in units exclusively producing khandsari turns out to be the lowest in AP (Rs. 10392 per tonne) which is closely followed by those in Karnataka and UP with per tonne cost of Rs. 10524/- and Rs. 10568/- respectively. In case of Haryana, cost of production of units producing khandsari sugar turned out be highest.

6.1.14 *Recovery rates*

Table below gives the recovery rates realised in the khandsari sector as a whole (ie, combined output of khandsari and gur) during 1994-95 season in the four selected States.

Table 6.11 – Recovery Rates

STATE	CANE CRUSHED (000 TONNES)	TOTAL OUTPUT (000 TONNES)	AVERAGE RECOVERY (%)
UP	15241.70	1140.03	7.48
HARYANA	170.92	12.34	7.22
AP	737.92	45.84	6.21
KARNATAKA	511.88	36.06	7.04
TOTAL (ALL 4 STATES)	16662.24	1234.27	7.41

TABLE 6.12 – TABLE SHOWING RECOVERY RATES BY TYPE OF KHANDSARI UNITS (1994-95)

(FIGURES IN PERCENTAGE)

STATE	ONLY KHANDSARI UNITS	ONLY GUR UNITS	BOTH
UP	6.64	10.97	10.46
HARYANA	5.57	10.42	11.79
AP	6.21	-	-
KARNATAKA	7.04	-	-
TOTAL (4 STATES)	6.62	10.95	10.46

Among the States producing khandsari, Karnataka realised a high recovery rate of over 7%, followed by UP and Haryana. Apart from technological factors, duration of crushing period for which the units operate, also influences recovery rates. Regarding duration of crushing period, in general the khandsari units in the Southern States operate for a shorter duration as compared to those in UP vide Table 6.3. Regarding units producing both khandsari and gur put together, UP based units were more efficient in recovery rates than compared to Haryana.

6.1.15 *Payment pattern of khandsari units*

Payment terms offered to cane suppliers in order to attract cane for khandsari sector are given in the following table. Details relate to sugar season 1994-95. However, khandsari units are under no obligation to pay SMP to the growers, and except in period of cane scarcity, the price paid by them is generally lower than that paid by sugar mills.

Table 6.13 – Cane Payment pattern (94-95).

(%) of units)

State	Payment offered				
	Immediate	Within a week	Within a fortnight	Within a month	All
UP	56.9	33.9	4.8	4.4	100
Haryana	58.8	32.4	5.9	2.9	100
AP	13.1	15.2	65.2	6.5	100
Karnataka	–	16.7	33.3	50.0	100
OVERALL (4 States)	54.6	32.9	7.5	5.0	100

The above reveals that about 57% to 59% of khandsari units in UP and Haryana, make payments for cane supplied almost immediately after reciept of cane. Further 32% to 34% of the units offer payment within a week of receiving delivery. None of the khandsari units hold dues beyond a month in the States of UP and Haryana. In South also, payment for cane supplies is cleared maximum within a month, and some of the units within two weeks of cane supplies. Besides, incentives in the form of advances for seeds, advance payment for cane purchase contracts, interest-free credit, free offer of press mud etc., are offered by units to cane growers for attracting cane supplies. However, khandsari units are under no obligation to pay S.M.P. to the growers and except in periods of cane scarcity, the price paid by them is generally lower than that paid by sugar mills.

6.2 *Gur Sector*

6.2.1 *Salient features*

Gur/jaggery manufacturing activity is generally undertaken in the unorganised cottage industry sector. In the NCAER study on which the information in this chapter is mainly based,

field surveys were organised at the end of 1994-95 crushing season, when the gur units run by the farmers themselves for making gur out of their own sugarcane, had generally stopped functioning. Thus NCAER figures reflect a larger proportion of commercial units in the sample than would be in the total number of gur producing units. The information derived from the study thus relates primarily to semi-commercial units (where part of the cane is supplied from the farmer's own field and part is purchased from other farmers) and commercial gur manufacturing units. Based on the study of 1127 sample units spread over five States (UP, Haryana, AP, Karnataka and TN), the following position was revealed for the year 1994-95.

Table 6.14

STATE	NATURE OF PRODUCTION ACTIVITY OF GUR UNITS (94-95)			
	Gur	Khandsari	Gur & Khandsari	(Numbers)
UP	580	6	25	611
	(94.9)	(1.0)	(4.1)	(100)
Haryana	161	-	-	161
	(100)			(100)
AP	92	2	2	95
	(96.8)	(2.1)	(1.1)	(100)
Karnataka	115	-	-	115
	(100)			(100)
TN	144	1	-	145
	(99.3)	(0.7)		(100)
Total	1092	9	26	1127
(5 States)	(96.9)	(0.8)	2.3	(100)

(Figures in brackets indicate percentage to totals).

Thus 97% of Gur units manafucature only Gur. UP accounts for largest no. of units.

6.2.2 Units of UP and Haryana use vegetable clarificants for cane juice classification (non-sulphitation). About 40 to 55 per cent of the sample units in tropical region States of AP, Karnataka and TN adopt sulphitation process for clarification purposes. About 19% of the units in Karnataka use sulphitation as well as non-sulphitation methods. Horizontal crushers were extensively used in Karnataka and TN, while in AP, about 2/3 of the units use vertical crushers as well. In UP, vertical crushers were used to the maximum and in Haryana, both horizontal and vertical crushers were used. Location of units with respect to the nearest sugar mill has a direct bearing on the availability of cane to sugar mills.

Table 6.15

6.2.3 **Location of sample gur units by distance slabs from sugar factory**

(1994-95)

(% of units)

STATE	DISTANCE SLAB IN KMS					
	Upto 10	11-15	16-20	21-30	Above 30	All
UP	11.0	21.1	20.1	47.8	-	100
Haryana	6.6	10.4	26.0	57.0	-	100
AP	11.6	5.3	12.6	70.5	-	100
Karnataka	40.7	19.6	2.5	37.2	-	100
TN	24.1	20.0	8.3	47.6	-	100

The table reveals that nearly 50% of the units are located within 20 km radius of the nearest sugar mill in the Northern States of UP and Haryana. In Tamil Nadu and Karnataka, as many as 44% and 60% of the units respectively, are in operation within 15 kms of the nearest sugar factory. Only in AP, maximum number of units operate on the outer fringe of the reserved areas of nearest sugar factories. Presence of a good number of gur making units within 20 km radius of a sugar mill indicates difficulties faced by sugarcane growers to sell their cane to factories in these States.

6.2.4 *Crushing period*

Sugarcane crushing for production of all sweeteners is primarily a seasonal activity. The factors that directly influence and affect the duration of cane crushing period are quantum of cane output, its availability and quality, cane to gur price ratio, relative prices of the three sweeteners etc. By and large, the cane crushing season in the sub-tropical region begins in the harvesting of early maturing varieties in the month of October and continues till the end of April. In surplus production periods, it gets extended until May end or early June.In the tropical states, in some areas, year-round cane crushing takes place, particularly in Tamil Nadu and parts of Karnataka. In these areas, crushing season comes to an end with the onset of monsoon.

Table 6.16 – Data on duration of cane crushing period of gur units (94-95)

(% of units)

STATE	DURATION (IN WEEKS)					
	Upto 15	16-20	21-25	26-30	Over 30	All
Uttar Pradesh	4.1	16.7	29.8	38.1	11.3	100
Haryana	11.2	32.3	42.2	13.7	0.6	100
Andhra Pradesh	85.3	2.1	2.0	9.5	1.1	100
Karnataka	48.7	6.1	9.6	19.1	16.5	100
Tamil Nadu	68.5	8.3	5.5	2.8	17.9	100

In Southern (tropical region), a very high proportion of gur units have operated for less than 15 weeks. It appears that about 20% units in Tamil Nadu and 35% in Karnataka may have produced gur on commercial scale, while the rest may have done so either at the farm level or small scale (household level). Average cane crushing period varies between five months and six months in UP and Haryana cane crushing period varies between five months and six months in UP and Haryana (sub-tropical), while in the tropical region States of AP, TN and Karnataka, it varies widely from three to five months as shown below:-

Table 6.17 – Average Duration of Cane Crushing of Gur Units During 1994-95

STATE	AVERAGE DURATION OF CANE CRUSHING (IN WEEKS)
UP	24.8
Haryana	20.7
AP	13.1
Karnataka	20.3
Tamil Nadu	16.4

6.2.5 **Statewise total quantity of cane crushed by type of gur units (94-95)**

Table 6.18

State	Qty. Crushed ('000 Tonnes)
UP	757.66
Haryana	207.81
Andhra Pradesh	17.66
Karnataka	113.39
Tamil Nadu	103.36
Overall (5 States)	1199.78

(Figures in brackets indicate percentages)

The above table reveals that during 1994-95 season, gur units purchased and crushed 1.2 million tonnes of cane.

6.2.6 *Cost structure*

Three major inputs viz., raw-materials, wages & salaries and fuel together account for more 95% of the total cost of production, of which raw-material itself is over 81%, wages & salaries 5% to 15% and fuel cost from 2% to 4%. Other elements of cost are negligible.

Table 6.19 – Cost structure of gur production in selected States (94-95)

(per cent of cost)

State	Raw-Material	Sal. & Wages	Fuel	Repairs & Maintenance	Depn.	Others	Total
UP	87.0	5.3	4.3	1.0	0.9	1.5	100
Haryana	86.1	7.5	4.1	0.7	0.5	1.1	100
AP	85.0	10.4	3.1	0.9	-	0.6	100
Karnataka	84.8	9.7	2.3	0.7	1.1	1.4	100
Tamil Nadu	80.8	15.2	1.7	0.6	0.9	0.7	100

Raw materials used in the manufacture of gur consist of sugarcane as the main input. Sulphur, lime and other inputs are used in small quantities as clarificants. The cost of sugarcane alone constitutes between 95% and 98% of the total raw-material cost. Electricity and diesel contributed more than 74% of the total fuel costs.

6.2.7 *Employment position*

Gur manufacturing units operate as small-scale units by employing workers on seasonal contract and/or on daily wages during crushing seasons. On the whole, the average daily employment in the gur manufacturing sector works out to about ten persons per unit which comprises one regular employee for the whole season and nine daily wage workers.

Table 6.20 – Average per unit daily employment in gur units (94-95)

State	Regular			Daily wages			All		
	M	F	Total	M	F	Total	M	F	Total
UP	1.52	0.04	1.56	8.14	0.29	8.43	9.66	0.33	9.99
Haryana	1.37	-	1.37	11.06	0.03	11.09	12.43	0.03	12.46
AP	0.60	0.07	0.67	5.23	2.28	7.51	5.83	2.35	8.18
Karnataka	0.12	-	0.12	8.02	3.19	11.21	8.14	3.19	11.33
Tamil Nadu	0.44	-	0.44	6.09	1.91	8.00	6.53	1.91	8.44
All (5 States)	1.14	0.03	1.17	8.03	0.93	8.96	9.17	0.96	10.13

(M stands for male, F stands for female)

Women labour accounted for about 10% of the total labour (in all States taken together).

Table 6.21 – Table showing women participation in cane gur manufacturing activity (94-95)

(per cent of workers)

State	Male	Female	All
UP	96.7	3.3	100
Haryana	99.8	0.2	100
AP	71.3	28.7	100
Karnataka	71.8	28.2	100
Tamil Nadu	77.4	22.6	100
Overall	90.5	9.5	100

6.2.8 *Pattern of investment*

The overall average per unit investment in the gur manufacturing units was estimated to be Rs. 1.74 lacs, of which land & building contributed Rs. 0.98 lac, P & M Rs. 0.60 lac and transport equipment 0.15 lac.

Table 6.22 – Table showing average per unit investment in fixed assets by gur units (94-95)

(Rs/lakh/unit)

State	Land	Building	P & M	Transport Equipment	Others	Total
UP	0.73	0.20	0.58	0.10	0.01	1.62
Haryana	1.7	0.40	1.09	0.06	negligible	3.26
AP	0.11	0.02	0.26	0.18	0.04	3.26
Karnataka	0.88	0.46	0.58	0.50	0.04	2.44
TN	0.09	0.09	0.38	0.18	0.02	0.76
Overall (5 States)	0.75	0.23	0.60	0.15	0.02	1.74

6.2.9 *Production costs in gur units*

Table 6.23 – Table showing per tonne cost of production of gur units (94-95)

(Rs/tonne)

State	Inputs						
	Raw Material	Sal. & Wages	Fuel	Repairs & Maint	Depn	Other	All
UP	5429	329	269	60	-	150	6237
Haryana	5834	509	278	48	34	74	6777
AP	4426	542	162	48	-	27	5205
Karnataka	5256	598	144	46	69	87	6200
Tamil Nadu	3583	675	79	27	42	31	4437
Overall (5 States)							5771

The reasons for higher per tonne costs of gur production in UP and Haryana as compared to Andhra Pradesh and Tamil Nadu are high raw-material and fuel costs.

6.2.10 *Recovery rates*

Recovery rate of gur is directly related to the quantity of cane crushed and proportion of juice extracted.

Table 6.24 – Table showing the statewise recovery rates for gur units (1994-95)

State	Cane Crushed ('000 tonnes)	Production ('000 tonnes)			Recovery rate %
		Gur	Khandsari	Total	
UP	757.66	86.23	3.64	89.87	11.38 (11.86)
Haryana	207.81	23.52	-	23.52	11.32
AP	17.66	2.36	-	2.36	13.34
Karnataka	113.39	11.64		11.64	10.26
Tamil Nadu	103.26	10.70		10.70	10.36
Overall (5 States)	1199.78	134.45	3.64	138.09	11.18 (11.51)

The above reveals that recovery rates achieved by units in AP were the highest amoung all gur units. Among the other States, recovery rates of gur units in UP and Haryana were generally higher than the gur units based in TN and Karnataka with Karnataka units registering the lowest recovery rates.

6.2.11 *Output/Input ratios*

Table 6.25 – Table below presents output/input ratios by type of gur units-

(for 1994-95)

Output/input ratios of gur units

State	Output/Input Ratios			
	Non Commercial	Commercial	Semi Commercial	All
UP	1.07	1.10	1.15	1.08
Haryana	1.27	1.10	1.22	1.12
AP	1.27	1.17	1.10	1.16
Karnataka	1.19	1.16	1.36	1.21
Tamil Nadu	1.15	1.30	–	1.28
Overall (5 States)	1.12	1.13	1.17	1.11

From the table it will be observed that 21% to 28% returns were earned by units in Karnataka and Tamil Nadu, and about 12% to 16% in Haryana and Andhra Pradesh. In UP, the return was just about 8%, which would not have covered their conversion costs fully. Only gur units in Karnataka and Tamil Nadu seem to have gained in real terms from gur producing activity during 1994-95.

6.2.12 *Marketing of gur*

During storage of gur, it loses its lustre and becomes soft leading to quality deterioration due to poor shelf-life. Therefore, gur produceres are obliged to market it soon after its production. There are no restrictions on marketing of gur.

Table 6.26 – Table showing the gur marketing pattern by cane gur manufacturing units (94-95)

(Percentage of gur output sold)

State	Local traders	Mandi	Traders outside State	Exports to other countries	Others	All
Sub-Tropical Region	14.4	42.1	42.8	0.2	0.5	100
UP	14.6	40.1	44.1	0.2	1.0	100
Haryana	13.5	48.5	38.0	-	-	100
Tropical Region	21.5	63.7	14.8	-	-	100
AP	52.4	21.6	26.0	-	-	100
Karnataka	29.6	49.3	20.8	-	0.03	100
TN	0.2	83.7	16.1	-	-	100
Overall (5 States)	16.3	46.4	36.8	0.1	0.4	100

Table indicates that only 46.4% of the total quantum of gur output was sold in the mandis by the producers and local traders accounted for 16.3%, 36.8% of it was sold to traders outside the States. Exports form very negligible portion.

Based on the permitted norms of cane crushed applied to residual cane quantity (not used for any other activity), about 92,000 gur units operated during 1994-95 in the five States, out of which 42% existed in UP alone. Total production of gur in five States worked out to 138 thousand tonnes valued at Rs. 97.5 crores.

6.2.13 *Utilisation of Sugarcane for different purposes*

Table 6.27 gives yearwise usage of sugarcane for production of white sugar, seed, feed & chewing and Gur/Khandsari sugar. The percentage used for seed, feed & chewing has been assumed to be more or less constant. The table shows that the sugarcane used for production of Khandsari/Gur sugar has come down to 34.5% in 94-95 from 54.8% in 1980-81. During the years of fall in production of sugarcane viz, in 83-84, 84-85, and 93-94, it is observed that percentage of sugarcane used for Khandsari/Gur sugar had increased

while share of cane used for white sugar declined. The same tendency has been noticed in respect of the States predominantly producing Khandsari and Gur viz., UP, Karnataka and Tamil Nadu. (Table No 6.28) refers.

Table 6.27 – Utilisation of sugarcane for different purposes

Year	Prodn. of Sugarcane ('000 Tonnes)	Cane used for ('000 Tonnes)			Utilisation for % Sugarcane production ustilised for		
		Prodn of White Sugar	Seed Feed & Chew-ing etc.	Gur & Khand-sari	White Sugar	Seed Feed Chew-ing etc.	Gur & Khand-sari
1980-81	154,248	51,627	18,201	84,475	33.5	11.8	54.8
1981-82	186,358	87,342	21,787	77,211	46.9	11.7	41.4
1982-83	189,505	82,697	22,304	84,533	43,6	11.8	44.6
1983-84	174,076	59,024	20,803	94,283	33.9	11.9	54.2
1984-85	170,319	60,090	20,115	90,155	35.3	11.8	52.9
1985-86	170,648	68,566	20,205	81,883	40.2	11.8	48.0
1986-87	186,090	85,202	22,242	78,664	45.8	12.0	42.3
1987-88	196,737	93,933	23,562	82,477	47.8	12.0	41.9
1988-89	203,037	85,647	24,114	93,264	42.2	11.9	45.9
1989-90	225,569	111,158	26,718	87,735	49.3	11.8	38.9
1990-91	241,046	122,338	28,555	90,207	50.8	11.9	37.4
1991-92	253,995	133,950	26,629	93,367	53.7	11.8	36.8
1992-93	228,033	103,008	27,098	97,964	45.2	11.9	42.9
1993-94	229,659	98,338	26,974	104,347	42.8	11.8	45.4
1994-95	275,540	147,643	32,662	95,235	53.6	11.9	34.5
1995-96	282,895	174,708	33,185	75,002	61.8	11.7	26.5

Source:- Coop. Sugar (Nov. 1997)

Table 6.28 – Statement showing the percentage of sugarcane used for sugar, Khandsari & Gur U.P., Karnataka & Tamil Nadu

Year	% of cane used for Sugar		
	UP	Karnataka	Tamil Nadu
85-86	23.6	35.2	42.4
86-87	32.0	40.6	39.4
87-88	32.2	41.9	41.0
88-89	22.4	35.7	41.8
89-90	34.2	43.5	40.8
90-91	31.6	43.8	55.4
91-92	35.8	40.7	54.4
92-93	28.7	35.5	45.0
93-94	27.9	29.8	46.6
94-95	34.8	35.9	58.7
95-96	41.9	51.7	56.1

% Used for Production of Khandsari/Gur

Year	UP	Karnataka	Tamil Nadu
85-86	64.5	52.9	45.7
86-87	56.0	47.4	48.6
87-88	55.8	46.1	47.0
88-89	60.6	52.3	46.2
89-90	53.9	44.6	47.3
90-91	56.5	44.3	32.7
91-92	48.5	44.2	30.3
92-93	59.4	52.6	43.1
93-94	60.2	58.3	41.5
94-95	53.2	52.2	29.4
95-96	46.2	36.4	32.0

(Source:- Sugar Directorate)

6.3 *Nutritional Value of Sugar & Gur*

A statement showing the nutritional value of sugar & gur is as Table 6.30. It will be seen that jaggery (Gur) is nutritionally superior to sugar and it has larger percentage of protein, calcium, phosphorus and iron.

Table 6.29 Nutritive Value of Sugar & Gur

Name of the foodstuff	Moisture g.	Protein (Nx6.25) g.	Fat g.	Minerals g.	Fibre g.	Carbohydrates g.	Energy kcal.	Calcium mg.	Phosphorus mg.	Iron mg.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sugars										
Sugar cane	0.4	0.1	0	0.1	-	99.4	398	12	1	0.155
Jaggery (cane)	3.9	0.4	0.1	0.6	-	95.0	383	80	40	2.64

Source: Nutritive Value of Indian Foods
by
C. Gopalan, B.V. Rama Sastri &
S.C. Bala Subramanian
Revised and updated by
B.S. Narasinga Rao, Y.G. Deosthale and K.C. Pant.
of
National Institute of Nutrition
ICMR, Hyderabad.

6.4 To sum up, khandsari industry is mainly concentrated in U.P. About 40% of the units operate with cane crushed capacity between 50-100 TCD, 26% over 100 TCD and rest of the units with capacity of 50 TCD or less. Almost all the units have installed horizontal crushers which are more efficient in terms of cutting down losses in juice extraction. About 37% of the units have 3 roller sets which extract 50% to 69%, 44% operate 6 roller sets which can extract 70% of juice, 17% operate with 9 roller sets which can extract 75% of juice and 12% operate with 12 roller sets which can extract 80% of juice. In the States of Andhra Pradesh and Karnataka, all the khandsari units are located at a distance of more than 20 kms from the sugar factory, while in U.P., nearly 40% of the units are functioning within 15 kms and about 65% within 20 kms of the sugar mill. The khandsari units crushed about 14% of the cane in U.P., which accounts for about 6% of India's total cane production. Average investment in fixed assests by khandsari units was about Rs. 20 lakhs. The sugar recovery was about 7.4%. About

60% of khandsari units in U.P. make payment for cane supply almost immediately after receipt of cane, another 32-34 per cent offer payment within a week of receiving delivery and all make payment within a month. Khandsari units are, however, under no obligation to Pay SMP to the growers and except in period of cane scarcity, the price paid by them is generally lower than that paid by sugar mill. Return on total input cost was only 11% in U.P. and 13% in A.P. That may be the reason for steep fall in the no. of khandsari units in both the States.

6.4.1 Gur/jaggery manufacturing activity is primarily confined to the unorganised cottage industry sector. 97% gur units manufacture only gur and only 3% manufacture khandsari as well. U.P. accounts for the largest number of units. Nearly 50% of the units are located within 20 kms radius of the nearest sugar mill in the States of U.P. and Haryana. In Tamil Nadu and Karnataka, as many as 44% and 60% of the units respectively are in operation within 15 kms of the nearest sugar factory. However, in Andhra Pradesh, more than 70% per cent of the units are located beyond 20 kms of the sugar factory. The overall average investment in the gur manufacturing units was about Rs. 1.74 lakhs. Recovery rate of gur units was about 11%. The units in Andhra Pradesh gave the highest recovery of over 13%. The return in U.P. was only 8% which would not have covered even their conversion cost fully. Only gur units in Karnataka and Tamil Nadu gained in real terms from gur producing activity. The above conclusion, however, pertain primarily to commercial and semi commercial gur manufacturing units. Bulk of the gur is marketed through the mandies and local traders. About 36% was sold to traders outside the state.

6.4.2 The sugarcane used for production of khandsari and gur has come down to about 34% in 1994-95 from 55% in 1980-81. During the years of fall in cane production, the percentage of sugarcane used for khandsari and gur increases, while in years of increase in production of sugarcane, its percentage decreases. Information regarding sugarcane used for production of Khandsari and gur is, however, not independently collected but is derived by deducting the sugarcane used for production of sugar and estimate of its use for seed and chewing from the estimated total cane production.

Chapter 7

Consumption Trends

7.1 The average level of consumption of sugar in India during the last five years (i.e., from 1991-92 to 1995-96) was around 119 lakh tonnes. The position with regard to sugar production, availability, internal consumption, export and carry over stocks during the last five years was as under :-

Table 7.1 – Consumption of sugar during 1991-92 to 1995-96

(in lakh tonnes)

Sl.No.	Particulars	1991-92	1992-93	1993-94	1994-95	1995-96
1	Carry-over stocks at the beginning of the season (i.e., as on 1st October)	33.03	49.06	31.13	21.93	54.95
2	Production during the season	134.11	106.09	98.24	146.43	164.29
3	Imports	Nil	Nil	4.60	6.74	0.42
4	TOTAL	167.14	155.15	133.97	175.10	219.66
5	Export	5.83	3.97	0.75	0.41	8.87
6	Internal consumption	112.25	120.05	111.29*	119.74**	130.01***

* includes one lakh tonne of imported sugar.

** includes 8.77 lakh tonnes of imported sugar.

*** includes 1.99 lakh tonnes of imported sugar.

(Source : Directorate of Sugar)

7.2 There has been a progressive increase in the internal consumption of sugar, except during 1993-94, due to steep fall in production during that year. The percentage variation of consumption over the previous year from the season 1984-85 to 1995-96 was as under:-

Table 7.2 – Percentage increase in consumption from 1984-85 to 1995-96

Sugar Year	Internal consumption (in lakh tonnes)	% age variation over the previous year
1984-85	78.90	(+) 4.2
1985-86	83.53	(+) 5.9
1986-87	87.75	(+) 5.1
1987-88	93.33	(+) 6.4
1988-89	99.19	(+) 6.3
1989-90	102.83	(+) 8.7
1990-91	107.15	(+) 4.2
1991-92	112.25	(+) 4.8
1992-93	120.05	(+) 6.9
1993-94	111.29 *	(-) 7.3
1994-95	119.74 *	(+) 7.6
1995-96	130.01	(+) 8.6

(*excluding sugar imported by private parties under the O.G.L)
(Source: Directorate of Sugar)

Consumption has, thus, increased by 64.78 per cent during the period from 1984-85 to 1995-96, ie, at 4.31% p.a. compounded during these 11 years period.

7.3 Statement showing the value of consumption of sugar and total expenditure per person for a period of 30 days for each Monthly Per Capita Expenditure class in rural and urban areas in India during 1987-88 and 1993-94 on the basis of surveys by National Sample Survey Organisation is at Annexure 7.1. It is observed that the per capita expenditure on sugar has increased both in rural and urban areas during the period from 1987-88 to 1993-94. While per capita monthly expenditure on sugar in rural areas during 1987-88 was Rs. 3.10, it rose to Rs. 8.57 during 1993-94. Similarly, in urban areas, per capita monthly

expenditure on sugar increased from Rs. 5.29 in 1987-88 to Rs. 10.91 in 1993-94. A large part of this increase is, however, explained by increase in price. In real terms, the per capita consumption of sugar increased during the period only from 12 kgs. to 12.4 kgs. per capita per annum. The statement at Annexure 7.3 also shows that per capita expenditure on sugar increases steadily both in rural and urban areas as incomes increase. The per capita consumption of sugar is thus larger in the higher income group. Further, the per capita expenditure on sugar in urban areas has been higher than that of rural areas during all these years. Growth in incomes and urbanisation is, therefore, likely to lead to increase in consumption of sugar.

7.4 Comparative figures of percentage consumption expenditure on sugar to total monthly per capita expenditure for different NSS rounds for rural and urban areas are in Annexure 7.2. It will be seen that the expenditure on sugar constitutes less than 2.5% of average household's total consumption expenditure in urban areas and about 3% in rural areas.

7.5 Statement showing the percentage distribution of monthly per capita expenditure (MPCE) by 18 groups of consumption items over different NSS Rounds from 1972-73 to 1993-94, contained in Report No. 402 published on 7th May 1996 by the NSSO, is at Annexure 7.3. This indicates the trends in the consumption pattern at all-India level, over the last two decades. It is observed that there is a fall in the share of 'sugar' by 0.7% (from 3.8% to 3.1%) in rural areas and of 1.2% (from 3.6% to 2.4%) in urban areas from the level of 1972-73. The overall rise in the MPCE over the period from 1972-73 to 1993-94, was a little higher than the rise in consumer prices. In real terms, the rise in MPCE works out to approximately 22.5% for rural and 17.2% for urban areas between 1972-73 to 1993-94. This shows that with increase in incomes, the percentage of expenditure on sugar to per capita expenditure has tended to fall both in rural and urban areas. Since the per capita consumption of sugar during this period has increased as per Annexure 7.4, the fall in percentage expenditure on sugar has presumably been due to relatively lower increase in sugar prices as compared to increase in general price index.

7.6 Per capita consumption of sugar, gur and khandsari from 1960-61 to 1995-96 is indicated in Annexure 7.4. It will be seen that while per capita consumption of sugar has increased during this period from about 5 kg to 13 kg per annum, consumption of gur and khandsari has fallen from about 15 kg to 11 kg per annum. This trend is likely to continue with growing incomes and urbanisation.

7.7 Statement showing the world sugar situation, incorporating the per capita consumption of sugar during the years 1990 to 1995 is at Annexure 7.5. The comparative figures of world per capita consumption of sugar and India's per capita consumption of sugar, gur and khandsari for the years 1990 to 1995 are as under :-

Table 7.3 – Annual per capita consumption (kgs.)

YEAR	WORLD (Sugar)		INDIA		
	Raw value	White sugar*	White sugar	Gur & Khandsari	Total
1990	20.6	19.07	12.6	10.7	23.3
1991	20.4	18.88	12.9	10.8	23.7
1992	20.7	19.16	13.6	11.1	24.7
1993	20.3	18.79	12.4	11.7	24.1
1994	20.3	18.79	13.0	12.0	25.0
1995	20.1	18.60	13.7	9.1	22.8

* Conversion factor : 1 metric ton raw value = 0.92556 metric ton (white sugar)

\# For India, sugar seasons 1990-91 to 1995-96.

(Source: ISO Year Book 1995 & Directorate of Sugar)

It is observed that the per capita annual world sugar consumption of sugar has been higher than that of sugar alone in India. If alternative sweeteners such as gur and khandsari are also taken into account, the total per capita consumption in India of all the three sweeteners put together is higher than the per capita world consumption (in terms of white sugar).

7.8 To sum up, the per capita consumption of sweeteners in India is higher than the world average. However, the consumption of white sugar is much lower. While the consumption of mill sugar has been increasing, the consumption of gur and khandsari is on the decline. The per capita consumption of sugar is higher in the higher income groups than in the lower income groups and in urban areas as compared to rural areas. With growth in income and greater urbanisation, the consumption of mill sugar is thus likely to continue to increase, while the consumption of gur and khandsari is likely to come down. As percentage of total monthly expenditure, expenditure in higher income groups is less than in lower income groups and less in urban areas than in rural areas. With growth in income, the percentage of expenditure on consumption of sugar to monthly per capita expenditure has been falling both in rural areas and in urban areas and is at present less than 2.5% in urban areas and about 3% in rural areas.

7.9 Planning Commission has projected the annual growth data of population during 9th Plan (1997-98 to 2001-2002) as 1.7 per cent. The Commission has indicated elasticity of consumption expenditure with reference to GDP as 0.8825 and elasticity of per capita consumption of sugar group (including gur and khandsari) with reference to consumption expenditure as 0.87. Based on these assumptions, the Task Force for sugar industry for the 9th Plan has estimated the total consumption and per capita expenditure on alternative consumption of GDP growth rate of 6% per annum and 7% per annum as under :-

Table 7.4 – Estimated total and per capita consumption of sugar during 9th Plan period

Plan period	Population as on 1st March, 1991 census basis (million)	Population as on 1st October, 1991census basis (million)	Estimated internal consumption (lakh tonnes)	Projected percapita consumption consumption (kg/annum)
Annual Plan				
1991-92	846	854	114.66	13.43
8th Plan				
1996-97		929	139.00	14.96
9th Plan				
GDP - 6%				
Population Growth Rate 1.7%				
1997-1998		945	145.71	15.42
1998-1999		961	152.75	15.89
1999-2000		977	160.13	16.39
2000-2001		994	167.86	16.89
2001-2002		1,011	175.97	17.41
2002-2003		1,028	184.47	17.94
2003-2004		1,045	193.38	18.51
2004-2005		1,063	202.72	19.07
2005-2006		1,081	212.51	19.66
2006-2007		1,099	222.77	20.27
GDP - 7%				
Population Growth Rate 1.7%				
1997-1998		945	146.78	15.53
1998-1999		961	155.00	16.13
1999-2000		977	163.68	16.75
2000-2001		994	172.85	17.39
2001-2002		1,011	182.53	18.05
2002-2003		1,028	192.75	18.75
2003-2004		1,045	203.54	19.48
2004-2005		1,063	214.94	20.22
2005-2006		1,081	226.96	21.00
2006-2007		1,099	239.69	21.81

Source : Report of Task Force constituted to formulate development programme for Sugar Industry for the 9th Five Year Plan.

Chapter 8

Prices of Sugar, Khandsari & Gur

8.1 Wholesale Prices

8.1.1 Wholesale prices of sugar in the four principal markets of the country viz, Delhi, Bombay, Calcutta & Chennai, during the season 1991-92 to 1996-97 (upto July 97)* ranged as under:-

Table 8.1 – Range of Wholesale prices of Sugar in Delhi, Bombay, Calcutta & Chennai

Sugar Season	Range of wholesale price of sugar (Rs. per quintal)
1991-92	763-1030
1992-93	863-1190
1993-94	1038-1630
1994-95	1010-1460
1995-96	1138-1510
1996-97	1200-1550

*Source: Directorate of Sugar, Govt. of India

This indicates a progressively increasing trend over the years. Statement showing the monthwise range of wholesale prices of sugar in the four principal markets of the country during the last six sugar seasons is at Annexure-8.1

8.1.2 The weightage of "sugar" in the wholesale Price Indices (briefly, the WPI), compiled with reference to 1981-82 as the base year with the index figure of 100, is 2.013, that of Gur 1.746 and of Khandsari 0.3000.

8.1.3 Statement showing the comparative figures of WPI in respect of Sugar Gur, Khandsari, Agricultural commodities, Food articles and All commodities during the years 1985-86, and 1990-91 to 1995-96 is at Table 8.2

Table-8.2 – Movement in wholesale price Indices-Sugar vis-a-vis other commodities

Financial Year	Wholesale Price Indices [Base Year 1981-82=100]					
	Sugar	Agricul-tural Comm-odities	Food Articles	All Comm-odities	Gur	Khands-ari
1981-82	100	100	100	100	100	100
1985-86	114.8	129.1	134.1	125.4	119.7	99.7
1990-91	141.9	198.3	200.6	182.7	166.3	141.2
1991-92	156.7	236.7	241.7	207.8	166.6	145.2
1992-93	177.5	255.6	271.0	228.7	187 0	152.6
1993-94	207.2	271.2	284.4	247.8	279.7	192.9
1994-95	230.5	307.7	312.7	274.7	297.1	228.6
1995-96	225.5	330.5	335.7	295.8	269.3	222.6

Source: Office of the Economic Adviser, Ministry of Industry

It will be seen that over the 15 years period 1981-82 to 1995-96 increase in wholesale price of sugar has been substantially lower at 125% than that for agricultural commodities (230%) food articles (236%) and for all commodities (196%). Increase in Gur price (169%) has been somewhat higher than sugar while Khandsari prices have increased by almost the same extent (123%).

8.2 Retail Prices

8.2.1 The ranges of retail prices in the four principal markets of the country viz, Delhi, Calcutta, Bombay and Chennai, during the sugar seasons 1991-92 to 1996-97 were as under:

Table 8.3 – Range of Retail Prices in Delhi, Calcutta, Bombay & Chennai

Sugar season	Range of retail prices of sugar (Rs. per kg)
1991-92	7.90-11.25
1992-93	9.00-12.75
1993-94	10.70-17.30
1994-95	10.70-15.00
1995-96	11.80-15.80
1996-97	12.70-16.50

Source: Directorate of Sugar, Govt. of India

The figures tabulated above indicate an increasing trend in the retail prices of sugar over the years. Statement showing the monthwise range of retail prices of sugar in the four principal markets of the country during the sugar seasons 1991-92 to 1996-97 is at Annexure 8.2

8.2.2 The weightage of sugar in the All India Consumer Price Index with base year 1982=100, is 2.24.

8.2.3 Two statements incorporating the All India Consumer Price Index from the calendar year 1991 to 1996 and the Retail Price Index of 'sugar' for the corresponding period, based on the All India Consumer Price Index are at Annexure 8.3 and 8.4. As indicated in the statement, the retail price indices of "sugar" had been lesser than the All India Consumer Price indices(General). The average retail price of sugar had increased by 186% during the period from 1982 to June 1997 as against 252% rise in general Consumer Price Index during this period.

Chapter 9

Development Of Sugar Industry in Other Cane Sugar Producing Countries

9.1 Sugar is most widely produced agricultural Commodity. Presently there are over 100 countries producing sugar. The desire to achieve self-sufficiency has led to an upsurge in the production of sugar. As a result the production of sugar increased from a level of 51.22 million tonnes during 1962 to 124.19 million tonnes during 1996 (Table 9.1) The principal 15 cane sugar producing countries are: Argentina, Australia, Brazil, China, Columbia, Cuba, India, Indonesia, Mauritius, Mexico, Pakistan, Philippines, South Africa, Thailand and United States. The share of these 15 countries in the total production of cane sugar during 1996 was about 85 per cent.

Table 9.1 World Production and Prices of Raw Sugar

('000 tonnes raw value)

Year	Production ('000 tonne)	ISA-Daily Price (US cent/lb)
1962	51,227	2.83
1966	62,741	1.81
1971	71,975	4.50
1972	73,735	7.27
1973	75,789	9.45
1974	76,397	29.66
1975	78,846	20.37
1976	82,400	11.51
1977	90,350	8.10
1978	90,832	7.81
1979	89,342	9.65
1980	84,489	28.69
1981	92,764	16.83
1982	102,004	8.35
1983	96,971	8.49
1984	99,219	5.20

Year	Production ('000 tonne)	ISA-Daily Price (US cent/lb)
1985	98,365	4.06
1986	100,018	6.04
1987	103,528	6.75
1988	104,591	10.20
1989	107,183	12.82
1990	110,650	12.55
1991	112,046	8.97
1992	117,432	9.06
1993	111,424	10.02
1994	109,589	12.11
1995	117,331	13.28
1996	124,194	11.96

ISA=International Sugar Agreement

Source: Sugar Year Book (Various Issues), International Sugar Organisation, London

9.2 World production of sugar that expanded by 51 million tonnes between 1962 and 1982, increased by over 27 million tonnes between 1983 and 1996. The output of sugar between 1971 and 1982 increased at an annual compound growth rate of 2.82 percent, and between 1983 and 1996 at the rate of 1.70 percent per annum. Over the long term, the production of sugar between 1971 and 1996 increased at an annual compound growth rate of 2.01 percent.

9.3 World prices of sugar (International Sugar Agreement Daily Price) from 1962 to 1996 are also indicated in Table 9.1. The phenomenal increase in world sugar prices that occurred in 1974, provided the incentive for many countries to expand production in order to capitalise on buyout market conditions or to intensify their drive for self-sufficiency. Good weather conditions and a series of good crops in some of the major producing countries also helped to stimulate sugar production. By 1978, the world market developed the problem of over-production and falling prices. Producers responded by cutting production and as a result shortages began to appear by 1980. This caused prices to rise sharply and set off another bout of expansion which culminated in 1982 record crop.

9.4 World sugar production follows a cyclic pattern. After the peak production of 90.35 million and 90.83 million tonnes during 1977 and 1978 respectively, the production fell in the subsequent 2 years due to fall in prices during 1977, 78 and 79. The prices firmed up in 1980 which lead to

increase in production during 1981 followed by a high production of 102 million tonnes during 1982. The fall in prices in 1982 was followed by lower production in 1983. The production thereafter increased steadily to reach a new high of 117.43 million tonnes during 1992. World production thereafter suffered a setback due to low prices during 1991 and 1992 and touched a level of 109.59 million tonnes in 1994. It again increased to touch a new peak of 124.19 million tonnes during 1996 following recovery in prices during 1994 and 1995.

9.5 The causes for each production peak can be generally traced to conditions inherent in the preceding period of low prices which induces contraction in output and creates shortage in the market. These in turn put pressure on prices which induces expansion and new investment leading to over production and another period of low prices and process of contraction.

9.6 Apart from the effect of changes in prices, the cyclic pattern of world cane sugar production is largely influenced by the production pattern of cane sugar in India. An analysis of variations in world cane sugar production and world total excluding India during the period 1986 to 1996 is presented in Table 9.2. It would be seen that variations in output in both ways has been much steeper in India vis-a-vis rest of the world excluding India. The observed variations in the output of Indian cane sugar appears to have significant influence on the variations of total world output.

Table 9.2 – Variation in Production of Cane Sugar

Year	Production of Canesugar (in lakh tonnes)			% Variation in production of canesugar over previous year		
	World	India	World minus India	World	India	World minus India
1986	628.67	75.94	552.73	-	-	-
1987	654.92	92.15	562.77	4.2	21.3	1.8
1988	667.27	102.07	565.20	1.9	10.8	0.4
1989	674.40	99.12	575.20	1.1	(-) 2.9	1.8
1990	700.21	120.68	579.53	3.8	21.8	0.7
1991	743.50	131.12	612.38	6.2	5.7	5.7
1992	787.12	138.73	648.39	5.9	5.8	5.9
1993	717.08	117.50	599.58	(-) 8.9	(-) 15.3	(-) 7.5
1994	746.38	117.45	628.93	4.1	(-) 0.1	4.9
1995	811.91	153.37	658.54	8.8	30.6	4.7
1996	875.99	170.58	705.41	7.9	11.2	7.1

9.7 It may be seen from Annexure 9.1 that the pattern of cane sugar production is dominated by 8 large producers viz Australia, Brazil, China, Cuba, India, Mexico, Thailand and USA. In 1996 these 8 countries produced 614.26 million tonnes of cane sugar representing about 70% of total world cane sugar production of 876 million tonnes. Out of these India and Brazil are the largest producers. In 1996, these 2 countries put together produced 318 million tonnes representing about 36% of total world sugar production.

9.8 Between 1976 and 1983 (Annexure 9.1), cane sugar as a proportion of world output of sugar increased from 61.5 percent during 1981 to a high of 70.5 percent during 1996. In absolute terms, the world production of cane sugar increased from 51.17 during 1976 to a high of 87.60 million tonnes during 1996. This amounted to an increase of 36.43 million tonnes. During the same period, the total output of sugar went up from 82.40 to 124.19 million tonnes, i.e., by 41.79 million tonnes. In other words, in total increase in world production of sugar, almost 87 per cent was contributed by output of cane sugar.

9.9 Raw Sugar now accounts for about 55% of international trade and white sugar for about 45%. The growth in the share of raw sugar is likely to continue with new refineries and rising demand in the red sea and Presian Gulf region and Indonesia.

9.10 Compared with the extreme volatilety experienced in the 1970s, world sugar prices have maintained a relative stability over the last 15 years since 1982. Greater market participation of developing countries which demonstrate a greater price elasticity of demand, introduction of market economy in States of erstwhile Soviet Union which has made consumption demand more price sensitive under a centrally planned system and improved information flows are some of the factors while have helped to reduce price instability.

9.11 A perusal of the figures of production of 15 major sugar producing countries in Annexure 9.1 shows that, subject to inter year variations, the production of sugar has shown a rising trend in Australia, Brazil, China, Colombia, India, Indonesia, Mexico, Pakistan, Thailand and USA. In Australia, production increased from 3.4 million tonnes in 1976 to 5.6 million tonnes in 1996 representing an increase of 6.5%. In Brazil it increased during this period from 7.2 million tonnes to 14.72 million tonnes - an increase of 102%. In China, it increased from 1.35 million tonnes in 1976 to 5.6 million tonnes in 1996, increase of 316%. In Colombia, it increased from 0.9 million tonnes to 2.2 million tonnes - an increase of 144% from 1976 to 1996. In India, it increased from 5 million tonnes in 1976 to 17 million tonnes during 1996 showing an increase of 240% during this period. In Indonesia, it increased from 1.1 million tonnes to 2.1 million tonnes from 1976 to 1996 - an increase of 91%. In Mexico it increased from 2.7 million tonnes to 4.8 million tonnes - an increase of 78 % during this period. In Pakistan, it increased from 0.65 million tonnes to 2.33 million tonnes - an increase of 258% during this period. In Thailand, it increased from 1.76 million tonnes in 1976 to 6.15 million tonnes in 1996 representing an

increase of 249%. In USA it increased from 2.8 million tonnes in 1976 to 3.0 million tonnes in 1996 - registering an increase of 8%.

9.12 In Argentina the production fell from a level of 1.56 million tonnes in 1976 to 1.39 million tonnes in 1996. In Cuba, it increased from 6.15 million tonnes in 1976 to 8.44 million tonnes in 1990 but thereafter it fell sharply to 3.26 million tonnes in 1995 and recovered to 4.4 million tonnes in 1996. The steep fall in production after 1990 was presumably due to loss of assured export market to Soviet Union on its disintegration. In Mauritius production has remained stagnant between 0.5 and 0.7 million tonnes. In Philippines it fell from about 3 million tonnes in 1976 to 1.9 million tonnes in 1996. In South Africa, it rose from 2.1 million tonnes in 1976 to 2.5 million tonnes in 1991 but subsequently fell to 1.3 million tonnes in 1993 and later recovered to 2.5 million tonnes in 1996.

9.13 It would appear from the Annexure 9.2 that yields have improved in all countries, but these have been achieved, in part, through changes in the geographical distribution of the cane area. The pattern of sugar cane development during the period 1962-66 to 1995 as well as that of cane sugar production in some of the major producing countries during the period 1976 to 1996 is given below (arranged in order of production of cane sugar during 1996). All figures in this section and in Annexure 9.1 and 9.2 are on Calendar year basis and sugar production is in term of raw value (100 tonnes of white sugar is equal to = 108 tonnes of raw sugar).

9.14 *India*

9.14.1 In India the production of sugarcane recorded an increase from a level of 109 million tonnes during 1962/66 to 259 million tonnes during 1995; due to increase in area under the crop from 2.45 to 3.75 million hectares and improvement in productivity from 44 to 69 tonnes per hectare during the period. Though the average unit yield as a consequence of various measures initiated by the Government and sugar mills in their catchment area made noteworthy increase, yet it remained far below the average unit yield of, Australia, Colombia, Mauritius and United States. Yet the yields of cane compare reasonably well with yield in other cane producing countries, and have increased steadily during the period under review.

9.14.2 India has made spectacular progress in the production of cane sugar. It has moved from a position of third largest producer, following Brazil and Cuba, during 1976 to number one position, followed by Brazil and Thailand during 1996. In quantitative terms, the output increased from a level of 61.51 lakh tonnes during 1976 to 138.73 lakh tonnes during 1992. The output of sugar that declined during the following two years due to shrinkage both in area and production of sugarcane recovered to 153.37 lakh tonnes during 1995 and touched a peak level of 170.58 lakh tonnes during 1996. India's share in total world output of cane sugar however, improved from 9.84 per cent during 1976 to 19.47 per cent during 1996.

9.15 *Brazil*

9.15.1 The production of sugarcane increased from a level of 66 million tonnes during 1962/66 to 154 million tonnes during 1981 and made the country the largest producer of sugarcane in the world. The production of cane in Brazil during 1995 was estimated at 302 million tonnes as against India's output of 259 million tonnes. During this period the area under the crop rose from 1.51 to 4.54 million hectares and yield improved from 43 to 68 tonnes per hectares. It is impossible to consider Brazil's sugar industry in islolation from the Pralcool programme, which was established in 1975 to promote the use of fuel alcohol (produced directly from sugarcane) as a subsititute gasoline. This programme has had a considerable impact on the size, structure and costs of sugar industry. This is true particularly of the country's centre/South cane growing region, which is centred around the state of Sao Paulo, where cane production has increased enormously since the launch of the programme.

9.15.2 The country with a production of 72.36 lakh tonnes during 1976 was the largest producer of cane sugar in the world. The production of Brazil increased to a level of 147.17 lakh tonnes during 1996. Despite being largest producer of sugarcane, it became second largest producer of cane sugar following India. The share of the country in total world output of cane sugar during the period improved from 14.4 in 1976 to 16.80 in 1996.

9.16 *Thailand*

9.16.1 The output of sugarcane in Thailand made impressive increases from 4.28 million tonnes during 1962-66 to 50.60 million tonnes during 1995 due to increase in area from 0.14 to 0.92 million hectare and improvement in yield from 32 to 55 tonnes per hectare during the same period. In Thailand, rising cane yields are explained primarily by the rapid expansion in the cane area in the country's Northeast region, where cane yields are slightly higher than those in the rest of the country. To encourage the output, the government countinues to supply subsidised fertilizer to farmer. This apart, it is common practice among factories to offer growers incentives over and above the official cane price in order to secure additional cane.

9.16.2 During 1976, Thailand with a production of 17.57 lakh tonnes contributed 3.43 per cent in total world output. During 1996, with a output of 61.54 lakh tonnes it contributed 7.03 per cent in total world production to become third largest producer of cane sugar. About 70% of its production is exported.

9.17 *Australia*

9.17.1 The production of sugarcane increased from 13 million tonnes during 1962-66 to 33 million tonnes during 1995. During the same period, area under the crop increased from 0.18 to 0.37 million hectare and per hectare yield from 73 to 92 tonnes. The gains in yield have been

achieved partly through change in the geographical distribution of the cane, rather than through underlying improvements in cane yields. A large proportion of new cane land that has been brought into production since 1989 has been in the irrigated Burdekin region, where cane yields exceeds those achieved in the country's other cane growing regions. One of the key reforms introduced in the Industry Act of 1991 was the requirement that the assigned area should be increased by a minimum 2.5 per cent per annum through until 1995. This formalised a programme for expansion. Between 1989 and 1996, the assigned area in Queensland increased by 33 per cent.

9.17.2 During 1976 Australia produced 33.95 lakh tonnes of cane sugar which happened to be 6.64 per cent of total output. The production though touched a level of 56.18 lakh tonnes during 1996, but its contribution in total world production declined to 6.41 per cent. During 1996, Australia was the fourth largest producer of cane sugar. Currently about 85% of its production is exported.

9.18 *China*

9.18.1 In China, the production of sugarcane increased from a level of 19 million tonnes during 1962-66 to a level of 71 million tonnes during 1995, due to expansion in area under the crop from 0.36 to 1.19 million hectares and improvement in unit yield from 53 to 60 tonnes per hectare during the period.

9.18.2 China with a production of 13.50 lakh tonnes of cane sugar and accounting for 2.64 per cent of total world output occupied the 11th position in production of cane sugar during 1976. The country made all efforts to increase the output with a view to become self-sufficient in the commodity. By the year 1996, the country became fifth largest producer of cane sugar with output of 56.11 lakh tonnes, which was 6.40 per cent of total world production of cane sugar.

9.19 *Mexico*

9.19.1 The production of sugarcane in Mexico during 1962-66 was estimated at 23 million tonnes. After touching a high level of 42.88 million tonnes during 1993, the output declined in the subsequent years and was estimated at 41.14 million tonnes during 1995.

9.19.2 Mexico with a production of 27.10 lakh tonnes of cane sugar contributed 5.30 per cent of total output during 1976. The production after touching a level of 40.68 lakh tonnes during 1986 declined in the following years to touch a low of 34.86 lakh tonnes during 1990. After this, there was a recovery in output level, which touched a peak level of 47.84 lakh tonnes during 1996. At this level, the country was the sixth largest producer of cane sugar and countributed 5.46 per cent in total world production of cane sugar.

9.20 *Cuba*

9.20.1 The production of sugarcane during 1962-66 was estimated at 39 million tonnes. After touching a high level output of 69 million tonnes during 1986, it gradually declined in subsequent years to a level of 39 million tonnes during 1995 due to shrinkage in area and unit yield.

9.20.2 Cuba produced 61.51 lakh tonnes of cane sugar during 1976. Production at this level was 12.02 per cent of total output of world cane sugar. The production after touching a peak level of 84.44 lakh tonnes during 1990 declined in the subsequent years, due to restrictions imposed to the country on the supply of lubricants, spare parts, pesticides and fertilzer, and loss of assured export market to Soviet Union on its disintigration and stood at 44.00 lakh tonnes during 1993. The country slid down from a position of number two in the production of cane sugar during 1976 to number seven by 1996 on loss of assured market due to disintegration of Soviet Union.

9.21 *United States*

9.21.1 The production of sugarcane in USA increased from a level of 20 million tonnes during 1962-66 to 28 million tonnes during 1995 due to increase in area from 0.22 to 0.38 million hectare despite decline in per hectare yield from 90 to 74 tonnes per hectare during the period.

9.21.2 During 1976 USA produced 28.21 lakh tonnes of cane sugar and claimed a share of 5.51 per cent in total output. The level of output gradually improved and stood at 30.48 lakh tonnes during 1996. At this level, its share in total world output was 3.48 per cent and the country was eighth largest producer of cane sugar.

9.22 *South Africa*

9.22.1 The production of sugarcane in South Africa increased from a level of 9 million tonnes during 1962-66 to 17 million tonnes during 1995. This happened due to increase in area from 0.12 to 0.29 million hectare despite a decline in per hectare yield from 79 to 58 tonnes during the period. About 55 to 60% of sugar is currently sold in the domestic market and the remaining is exported.

9.22.2 South Africa with a production of 21.13 lakh tonnes of cane sugar contributed 4.13 per cent in total output during 1976. After touching a production level of 24.70 lakh tonnes during 1988, declined to 12.82 lakh tonnes during 1993 to recover to a level of 24.71 lakh tonnes during 1996. At this level, the country was the ninth largest producer of cane sugar with share in total output being 2.82 per cent.

9.23 *Mauritius*

9.23.1 The production of sugarcane in Mauritius after exhibiting some degree of inter-year variations stood at 5.2 million tonnes during 1995, almost at the same level of 5.14 million

tonnes during 1962-66. The same is the case in respect of area under the crop. The per hectare yield however improved from 63 to 70 tonnes during the same period.

9.23.2 Mauritius produced 7.31 lakh tonnes of cane sugar during 1976, its share being only 1.43 per cent in total output. The production after touching a high of 7.48 lakh tonnes during 1986 declined to 6.24 lakh tonnes being only 0.72 per cent of total output during 1996. It occupied 15th position in the top 15 nations producing cane sugar. Out of 6 lakh tonnes of average production more than 5 lakh tonnes is exported. 95% of exports are two Asia Caribiean Pacific Council (ACP) countries at a preferential price well above the world market price.

9.24 *Size of Sugar Mills*

9.24.1 All over the world, the sugar units have much larger capacities, many times higher than the average capacity of a unit in India, as will be evident from the following table 9.3

Table 9.3 – Statement Showing Distribution of Sugar Mills With Cane Crushing Capacity and Sugar Production Per unit In Various Countries

Country	No. of units	Average cane crushing per day (tonnes)	Average sugar production per unit (tonnes)
Thailand	45	10307	14054
Australia	28	9216	183321
South Africa	13	6877	137769
Hawai	9	4111	44111
Mexico	67	4749	71015
Colombia	10	4590	214900
Brazil*	213	9168	64018
Cuba	156	4229	45538**
Mauritius	16	3195	42970
India	416	2531	33700

Based on: F.O. Licht Year Book on World Sugar and Sweetener Year Book, 1995 and Memorundam from Indian Sugar Mills Association

* Only 53 units reported capacity

** the production declined substantially after the disintegration of Soviet Union in 1991/92.

9.24.2 From the foregoing, it would be seen that the average capacity of an Indian sugar unit is way below the capacity in various other sugar producing countries. In most of these countries, the small sized units were amalgamated into a larger unit with reduction in the number of sugar units. Contrary to this in India, greater emphasis has been laid on horizontal growth of the sugar mills.

9.25 *Sucrose Yields* per hectare*

9.25.1 Sucrose yield, per hectare, which is the single most important indicator of field performance, are is the product of two variables: cane yield per hectare and the sucrose content of cane. Regional and international differences in cane sucrose levels are explained by a number of factors. These fall into two broad categories: those factors that influence the *inherent* sucrose content of cane and those that affect the apparent sucrose content of the cane.

9.26 *Influences on the inherent Sucrose Content of Sugar Cane*

9.26.1 Chief among factors that influence the inherent sucrose content of cane are the field conditions in which the crop is grown, and the institutional arrangements governing cane payments.

9.26.2 Other things being equal, sucrose content tends to be higher in countries where the latter (ripening) stages of the crop's development is characterised by dry conditions and large swings between day-time and night-time termperatures. In the cane sector, these conditions are most common in sub-tropical growing areas, such as Brazil's Centre/South region and South Africa.

9.26.3 The basis upon which growers are paid is also an important determinant of the quality of delivered cane, because, if they are rewarded for the quantity of sucrose that they deliver, growers take steps to raise the sucrose content of their crop. For example, growers will plant high sucrose varieties take care to apply an appropriate mix of fertilisers, rather than just nitrogen (which boosts only the weight of the crop), and to manage the transport and storage of the crop in order to minimise post-harvest losses in sucrose content if they are paid by sucrose content of cane.

9.27 *Influences on the Apparent Sucrose Content of Sugar Cane*

9.27.1 There are also factors that influence the apparent, as distinct from the inherent, sucrose content of cane. These include the length of the harvest, the point at which the crop is sampled for its sucrose content and the efficiency of cane transport.

* The discussion in paras 9.25 to 9.28 is based on unpublished "Outline of a Competitiveness Study of Indian Sugar Industries" by LMC International, England.

9.27.2 The average sucrose levels recorded in an industry are related to the period over which the crop is harvested, because the sucrose content changes during the course of the harvest, rising to a peak mid way through the harvest and then declining. Thus, industries that operate within a short season are able to harvest the entire cane crop at or around peak sucrose content. When crop season is lengthend, as happends in India during years of abundent cane supply, average sucrose content would fall.

9.27.3 The point at which the cane is sampled for quality also has an influence on apparent sucrose levels, owing to the decline in sucrose content that occurs after harvesting. It is usual for sucrose content to be measured when the crop changes hands between the grower and the Mill, and, in most industries, samples are drawn at the factory, either upon reception or at the slicer/first mill. Thus statistics regarding sucrose content are presented net of any losses that occur between harvesting and the point of measurement. Where samples are drawn upon reception, post harvest losses are restricted to those incurred between harvesting and delivery. Where samples are taken only after the cane has entered the factory, losses may be further inflated as a result of time spent in the reception area and, in some industries, by losses during washing.

9.28 *The impact of yields and Sucrose Content on Sucrose Yields*

9.28.1 In countries where significantly less than 100% of the planted area is harvested annually, there is an important distinction to be made between agronomic and commercial yields. More often than not, cane and sucrose yields are quoted on an agronomic basis, i.e., per harvested hectare. While this tells us how much cane is produced for every hectare of land that is harvested, it takes no account of the fact that every year a part of the cane area is not harvested.

9.28.2 Because growers incur costs on all land that is under cane including opportunity cost of forgoing another crop, this agronomic measure of yields does not take full account of the commercial realities of cane growing. For this reason, a better measure of sucrose yield would be per hectare per year on the basis of total area under cane.

9.28.3 Sucrose yields for some of the selected countries both on the basis of per harvested hectare and per hectare per year are presented in Annexures 9.3 and 9.4. The Annexures reveal some interesting contrasts. Of all the industries included in this survey, Maharashtra achieves the highest sucrose yields, *per hectare per year*. Australia is the other industry that stands out among this group of countries. All India average sucrose yield are lower than those in Australia and to a marginal extent as compared to European Union, Mexico and U.S.A.

Chapter 10

Laws and Practices Relating to Sugar Industry in other cane sugar Producing Countries

10.1 The systems that govern the sugar industry in major sugar producing countries demonstrate a wide range. At one end of the spectrum is the highly liberalised sugar industry in Australia, Australia employs no tariff, or non-tariff, barriers to trade, and maintains the domestic price of raw and white sugar at export parity. At the other end of the spectrum lies the European Union, a highly regulated industry, which uses a variety of instruments to maintain the domestic price of sugar far above the export parity, despite being a large net exporter. The other selected countries retain some degrees of control over their sugar industries using various mechanisms, which have as, their main objective lending price support to the sugar industries.

10.2 As mentioned in Chapter 1, a questionnaire (Annexure 1.6) was sent to the following countries to ascertain information about laws and practices relating to sugarcane, sugar industry and sugar trade :-

Australia, Brazil, China, Columbia, Cuba, Fiji, France, Germany, Indonesia, Mauritius, Mexico, Pakistan, Philippines, South Africa, Sri Lanka, Taiwan, Thailand, UK and USA.

10.3 Replies have been received from Brazil, European Union, Indonesia, Mauritius, Philippines, South Africa, Sri Lanka and Taiwan. A team of the Committee visited Australia, Thailand, Mauritius and South Africa for on-the-spot study of the practices being followed in those countries and their impact on the growers and the sugar industry. Based on the replies received from the concerned organisations in the above mentioned countries, the information collected and the assessment made by the team of the Committee in the countries visited by it and other relevant information obtained from 'Outline of a competitiveness study' undertaken by LMC International, England, another study conducted by Tate & Lyle, London and other available sources, the position in respect of twelve countries, viz., Australia, Brazil, European Union, Indonesia, Mauritius, Mexico, Philippines, South Africa, Sri Lanka, Taiwan, Thailand and USA is indicated in the following paras.

10.4 *Australia*

10.4.1 *Licensing*

There is no formal licensing of new factories, however, the strong system of cane zoning has the same effect as mill licensing.

No Licence is required to expand a cane mill. However, because mills are zoned a factory cannot expand and 'poach' cane from a neighboring mill.

10.4.2 *Cane Area Reservation*

Under the provisions of the sugar Industry Act 1991, there are no specific production controls but each farmer has under a system introduced in 1995 an assignment of land to be put under sugarcane for production of raw sugar. He has to supply the cane grown on the assigned land to a specified mill. Cane grown on non-assigned land is known as "penalty cane" and receives an exceptionally low price. This system controls the area under sugarcane and indirectly the level of sugar production.

10.4.3 As against rate of $ 25 per tonne from assigned land cane, he is given only $ 1 per tonne for from non-assigned land cane. If the growers in an area wish to bring extra land under cane, the same has to be agreed between the Mill and the growers after consultation with the Queensland Sugar Corporation (QSC) in regard to feasibility of marketing additional sugar. If the grower does not grow cane for several seasons without giving a sufficient reason, then the assignment is withdrawn and he can not grow cane nor would mills accept his cane.

10.4.4 *Price Control*

The Queensland Sugar Corporation (QSC) retains a statutory right to acquire all raw sugar produced in Queensland (representing around 95% of total Australian sugar production). The QSC sells this sugar on behalf of growers and millers. It is a non-profit organisation and only expenditure incurred on establishment, godown maintenance and terminal and export expenses are taken out from the proceeds.

The refiners purchase raw sugar from the QSC and are free to market this refined sugar as and when they like.

There is no direct support of the domestic sugar price by the government, either through the setting of support prices or through intervention buying.

All domestic sales of raw sugar are w.e.f. 1st July, 1997 price at export parity, i.e., at the price the industry receives from its sale to the world market.

10.4.5 *Sugarcane Pricing*

The Queensland sugar industry operates a revenue sharing agreement. According to this agreement, the cane price is determined on the basis of growers' share of revenues, which is established according to a formula which takes account of cane quality and factory efficiency. As a result, growers' share of proceeds is not fixed, but has averaged around 60% to 65%, in recent seasons. Millers are obliged to pay for cane transport out of their share of the proceeds.

Since 1989, millers and growers have shared in the proceeds from the sale of raw sugar only; refiners now benefit from 100% of the value added from the production and sale of refined sugar. Molasses and bagasse are the sole property of the millers.

The cane payment formula is designed to provide incentives for both farming and milling efficiency. The cane price formula is only one part of a whole series of contracts and arrangements to determine the real share of proceeds between farmers and millers. Such arrangements include the advance system, transport allowances, continuous crushing allowances, sharing of irrigation and drainage costs, R & D, and so on.

QSC makes payment for the sugar on its receipt at its terminals and for that purpose draws credit from banks.

10.4.6 *Import/Export:*

All import tariffs on sugar were removed on 01-7-97. All export sales are undertaken on the QSC's behalf by CSR (which is also the country's largest cane miller). Currently about 85% of its production is exported. Under a market-sharing agreement, sugar companies receive a pro-rata share of the value of sales to the domestic and export markets, based on their raw sugar production base. In turn, the companies share this revenue with their growers based on the standard industry cane payments formula.

The QSC maintains a strict quality standards in storage and loading and is responsible for quality of consignments for exports. It also owns 7 sugar Terminals for storage of raw sugar prior to export or supply to refineries. Sugar is discharged directly from the terminals to ships. QSC is governed by a Board of 10 members, which includes 3 growers, 3 millers, 3 independent experts selected by a Government nominated selection committee and one Chief Executive.

10.4.7 *Government Assistance:*

The Australian sugar Industry receives no direct assistance or subsidies from the government.

Sugarcane producers receive government support from a subsidy on water used for irrigation of cane. Producers have access to water at below its market-based cost.

10.4.8 *Payment for transportation*

In most districts the transportation of the crop from a delivery point near the farm is the responsibility of the mill. In some areas where delivery points are not close to the farm an allowances is made for transport costs, usually approximately two-thirds of the actual cost of transport.

10.4.9 *Sugar Research Institute*

Since its establishment in 1949, the Sugar Research Institute (SRI) has been the research and development arm of the Australian Sugar milling industry.

SRI Undertakes basic and applied research leading to improvements in sugar industry process methods and equipments. SRI also provides assistance to raw sugar mills on specific issues. The research activities of the institute, cover the following:

i) Cane harvesting and transport

ii) Cane preparation, milling and diffusion

iii) Juice clarification, heating and evaporation

iv) Sugar crystalisation, separation, drying and transport

v) Steam generation and energy systems

vi) Alternate products; and

vii) Effluent treatment

SRI activities are mainly financed by voluntary levies paid by Australia raw sugar mills.

Brisbane Sugar Experiment Station (BSES).

BSES is funded on a contribution from growers and mills @ 7 cents each per tonne and contribution upto an equal amount is given by the State Government. While BSES conducts research on sugarcane, SRI at Mackay conducts research on sugar production process.

For sugar Research and Development Corporation (SRDC) which is a federal body, 6.5 cents from mills and 6.5 cents from growers/tonne of cane is deducted and the Federal Government gives a matching grant of upto 13 cents per tonne. SRDC gives research grants to SRI, BSES, universities and other institutions for research in sugarcane and sugar industry.

10.5 *Brazil*

10.5.1 *Licensing*

For setting up of a new sugar unit, license or permit is not required.

There is no restriction on the minimum or the maximum capacity of a new sugar mill to be set up.

10.5.2 *Cane Area Reservation*

The sugarcane area for each sugar mill is not legally determined.

The sugar mills do not have reserved area. When the grower has an agreement, he is obliged to supply cane only to the mills. The system is presently being controlled by the

Government. From May 1998, the system of prices and production is to be liberated and the growers will plant cane under an agreement with mill. However, the majority of the cane area (75% in Central/South and 80% in North/North East) is farmed by the Mills themselves either on land that they own or lease. For balance of this requirements, the Mills negotiate with independent growers and competition is quite intense

10.5.3 *Price Control*

There is no control on the prices of sugar sold by sugar mills.

No part of sugar production is compulsorily acquired by the Government. The Government does not distribute sugar among consumer or any section of consumer at fixed price below the market-price.

There is no control on the sale of sugar by the sugar mills through any system.

The consumption requirement is met through domestic production and excess production is exported.

The futures trading is permitted.

No minimum level of stock is maintained to ensure price stability.

There is no control on the stock limit of traders.

Since the liberalisation of sugar marketing in the early 1990s, the government has lost much of its control over domestic sugar prices. Although the government is able to use export quotas to control the amount of sugar that may be sold in the domestic and export markets, there is no mechanism in place which ensures a steady release of sugar onto the domestic market throughout the year. Thus, many poorly financed mills distress sell sugar on the domestic market during the milling season, and the prices tend to be bid down to export parity. In other words, the ex-mill price of sugar sold in the domestic market tends to reflect the value of sugar sold for export, so-called export parity. During the off-season, domestic sugar prices tend to rise as the supply of sugar in the local market diminishes. During this period prices can rise as high as the tariff-inclusive cost of making imports (import parity). Thus, sugar prices in Brazil exhibit a cyclical pattern within each crop year and, owing to high domestic interest rates and the high cost of making exports, these intra-seasonal price swings are very pronounced.

The very low levels to which domestic sugar prices fall during the milling season have resulted in ex-mill prices averaging almost the same as the world price of sugar during recent seasons. However, those mills that have to sell all their sugar during the milling season are unable to benefit from the higher prices during the off-season, and only financially better off mills that are able to store sugar for sale during the off-season benefit from these higher prices, which are supported during this period by the modest level of tariff protection (16%) on sugar imports.

Most sugar producers do benefits from the artificially high price of alcohol in Brazil, which acts as a form of cross-subsidy to their sugar operations.

10.5.4 *Sugarcane Pricing*

Presently the basic price of sugarcane is determined by the Government. From May 1998, price of sugarcane will be determined through an agreement between the grower and sugar mill.

The basic price of sugarcane determined by the Government for North East region is 25 per cent more than that received by the farmers of South Central. The price control is proposed to be liberalised from May, 1998.

Presently the price of sugarcane is fixed through an act of the Government, the final price to be paid to grower is linked to the sucrose of the sugarcane. Mills pay premium for cane with sucrose content exceeding 12.256% according an official premium scale.

Presently the price of sugarcane paid to the farmers is not linked to the price for sugar obtained by the mills.

The payment to the sugarcane growers for the cane supplied by them are generally paid in four instalments. The first 70 per cent is paid within a month and the rest in 3 parts within 30, 60 and 90 days thereafter.

10.5.5 *Import/Export*

Brazil does not import sugar. The excess production of sugar is exported to regulate the prices of the commodity for domestic consumers.

The exports of sugar is liberalised and is made either by individuals or traders.

Until 1990, the Sugar and Alcohol Institute (IAA) bought and sold all export sugar at prescribed producer prices. In 1990, the IAA was abolished and, with it, the monopoly over sugar exports. However, the Secretariat for Regional Development (SRD) retains some control over exports and domestic sales, through its granting of export licenses (quotas) and through taxes.

The government sets export quotas by controlling the issue of export licences. In recent years, no tax has been levied on sugar that is sold within quota, whereas any sugar that is exported without a licence has been subject to a 40% tax.

Export quotas are established to ensure that the domestic market is adequately supplied with sugar. In practice, this tends to mean that the domestic market is over-supplied, because the government is usually very cautious in its allocation of export licences. The government

typically announces provisional export quotas at the beginning of the milling season and increases these quotas only if its becomes apparent that the industry will produce sufficient sugar to justify a higher level of exports.

10.5.6 *Sugar Industry Development*

No particular fund is maintained by the Government for grant of assistance to sugar mills for the purpose of research and development.

One institute and Federal Universities with the contribution of growers and sugar mills are engaged with research and development work on sugarcane and sugar industry. Almost all the research and development activities are presently private.

10.5.7 *Incentives for New Mills*

No incentive/concession is provided of setting up for new sugar factories or for substantial expansion of existing factories. For setting up of new sugar factories, financial contribution is also not made by the Government.

10.5.8 *Taxes*

1% of the sugarcane price for social assistance of the crop workers.

1% of the sugar and 2% of alcohol prices for the social assistance of the industrial workers.

10.5.9 *Agency for purchase of cane*

There is no legal restrictions on the agency through which sugar mills have to obtain their supplies of cane from the growers.

10.5.10 *Packing of sugar*

There is no legal restriction on the kind of material in which sugar can be packed.

10.5.11 *Number of Ratoons*

Four to five ratoons of cane crop are generally taken by the growers.

10.5.12 *Ceiling in Land Holdings*

There is no ceiling on land holding.

Of the total production of sugar cane, 70 % is obtained from the captive farms of the sugars and the remaining 30% from the growers.

10.5.13 *Programme for mixing of alcohol with fuel*

The Proalcool programme was born out of the world energy crisis of the mid- 1970s in an effort to reduce the country's oil imports and so improve its balance of payments. Since its inception, cane production in Brazil has increased from approximately 75 million tonnes to its current level of 250 million tonnes. Most of this increase has taken place in the Centre/South, where cane output has expanded from less than 50 million tonnes to around 200 million tonnes.

The support provided to sugar producers by the Proalcool programme has come in many forms:

(i) *Subsidised credit.* During the 1970s, cane processors (and processors of many other agricultural commodities) received credit at preferential rates. Indeed, real (inflation-adjusted) interest rates during this period were negative, reflecting low nominal interest rates and high inflation. Although this support has long ceased to exist (real interest rates are currently very high), this initial support enabled millers to write off much, if not all, of their capital investment in a short period of time.

(ii) *Economies of scale.* The addition of distilleries (and the corresponding increase in milling capacity and ancillary services) to sugar factories has permitted sugar producers to exploit economies of scale that they would have been unable to do in the absence of the Proalcool programme. The farming sector has been able to exploit economies of scale in cane production, owing to the more efficient use of machinery and labour.

(iii) *Sugar house configuration.* Because the molasses by-product of the sugar production process is transferred to the distillery, where the fermentable sugars are recovered in the form of alcohol, there has been little incentive for mills to exhaust molasses in their sugar house (or boiling house). As a result, mills have operated truncated sugar houses, where the sugar undergoes only two, rather than three, boiling, which is the norm in the sugar industry. This unusual sugar house configuration is a direct consequence of the Proalcool programme, and reduces the capital investment required to produce sugar.

(iv) *Molasses by-product credit.* Not only do mills benefit from not having to exhaust their molasses, they also benefit from the fact that their sucrose-rich molasses are valued very highly by their distilleries, owing to the high price at which they are able to sell the alcohol which they can recover from those molasses. Given that mills produce around 400 kg of molasses of for every tonne of sugar, the sugar factories receive credit at these higher prices for the transfer of molasses from the sugar house to the distillery.

On the negative side of the equation, it is important to bear in mind that, prior to the liberalisation of domestic sugar prices, the IAA used to set sugar prices at a very low level as part of its parity pricing system, which was designed to ensure that millers were indifferent between the production of sugar and alcohol.

Attempts have been made to estimate the value of the subsidy afforded to sugar producers by the existence of the Proalcool programme. One such report, which formed the cornerstone of the Argentinean government's case for exempting sugar from the Mercosur free trade agreement, estimated this subsidy to be equivalent to almost US$75/tonne, which excludes the benefits arising from the inflated value of molasses.

10.6 *European Union*

10.6.1 *Licensing*

For setting up a new sugar unit no licence or permit is required. All sugar manufacturers are required to inform their Government of their production of sugar. In practice, only sugar manufacturers who have been granted a production quota can economically produce sugar. There is no restriction on the minimum or the maximum capacity of a new sugar mill. The technical capacities are between 1-7 lakh tonnes.

10.6.2 *Cane/beet Area Reservation*

The cane/beet area of sugar mills are not legally determined. At the same time sugarcane/beet growers are not legally obliged to supply beet and cane to a particular mill. However, beet and cane growers contract annually with the sugar manufacturers for the supply of sugarcane/beet.

10.6.3 *Production Control*

The EU Commission grants production quotas to each member state, which are in turn allocated among domestic beet processors. Beet processors are responsible for allocating their quotas among their growers. There are two production quotas in the EU: the basic, or A, quota and the specialisation, or B, quota. In theory only, the A quotas broadly reflect national consumption levels, while the B quotas are set as a percentage of the A quotas. The original idea behind the B quota was to provide an insurance against poor crops, with any surplus output to be exported with the aid of subsidies. In reality, national B quotas were set so that the combined A & B quotas-which is known as the maximum quota-reflected historical production levels. As a consequence, the magnitude of B quotas in relation to A quotas varies between countries.

Any sugar which is produced in excess of the maximum quota is known as C sugar and must be exported to the world market without any subsidies. The only instance in which C sugar need not be exported is if it is "carried forward" (in storage) to the following season, when it will be considered to be the first part of the following season's A quota production. The quantity of C sugar which may be carried forward is limited to 20% of the A quota. All C sugar which is carried forward receives a storage subsidy, in common with all A and B quota sugar.

Sugar production in the EU is governed by the Sugar Regime-a largely self-financing system that provides guaranteed prices to growers and processors. The Regime has as its core objective the establishment and defence of these prices. Four main policy instruments come into play in defending the minimum, or intervention, price that the Commission establishes:

(i) Production quotas, which regulate the quantity of sugar produced and eligible for sale on the domestic market at the guaranteed price.

(ii) Export restitution, which ensure that traders receive sufficient incentive to export excess quota sugar by making up the difference between the price that traders would receive for their sugar on the domestic and world market.

(iii) Import tariffs and tariff-rate quotas, which control the quantity of foreign sugar that comes onto the domestic market.

(iv) Storage refunds, which ensure that domestic production is released smoothly onto the domestic market throughout the marketing year.

The action of these instruments has not been significantly curtailed by the commitments tabled to the GATT by the EU and the domestic price remains at a level far above the world price.

The benefits of price support are passed onto the beet growers as the price of beet is also centrally determined, as a function of the intervention price. However, contracts between individual processors and their growers may differ in some respects, such as payments relating to certain aspects of beet quality.

10.6.4 *Price Control*

Under the EU Sugar Regime, within quota (A and B) sales of sugar on the domestic EU market receive prices that are fixed annually by the EU Commission, which are supported well above world price levels. There are three elements of price support; the intervention price, the tariff rate quota and the export of surplus sugar.

The support price is maintained through an import quota which allows a certain amount of sugar into the EU, at reduced or zero duty. The majority of this sugar comes in under the Sugar Protocol. The Sugar Protocol is an agreement signed in 1975 by selected countries from the Afro-Caribbean Pacific (ACP) region, under which the EC undertook to import 1.3 million tonnes (white value) per annum for an indefinite period. There is a similar agreement with India for 10,000 tonnes (white value) as well as a quota of 482,600 mt (white value) for the French Overseas Departments (DOM) of Reunion and Guadeloupe. These imports receive a preferential price, equivalent to the guaranteed minimum price for EU white beet sugar minus the processing margin.

In practice, no imports enter the EU outside those which receive some kind of relief on import duties. The current tariff for raw sugar stands at about 219% (with a commitment under GATT to reduce it to 175% by 2000). Imports with this tariff would only be feasible at extremely low levels of the world price. Until recently, this tariff operated as a variable imports levy (VIL). Under the VIL, imported sugar was levied duty at a rate which reflected the difference between the landed price of imported sugar and the EU Commission's target price for white sugar. Through this system, the duty on imported sugar increased at low levels of the world price, and fell at higher levels of the world price. The VIL was converted into a fixed, ad valorem tariff, following the successful conclusion of the Uruguay Round of the GATT in 1994. Table 10.1 (shown below) illustrates the EU's tariff commitments under GATT.

Table 10.1 – EU-Import Tariff Information

	Raw Sugar	White Sugar
Current Tariff Rate	ECU396/mt US$461/mt	ECU489/mt US$594/mt
GATT Commitments		
Tariffs		
Base Rate	ECU424/mt	ECU524/mt
Final Rate	ECU339/mt	ECU419/mt
Minimum Access (mt. rv)		1,418,209
Export Subsidy Reductions		–
—volume ('000 tonnes)		340
—expenditure (%)		36
End of Transition Period		2000/01

Note 1. Based on exchangfe rate of US$1=ECU0.823. This tariff rate is the rate specified for the EU under GATT for 1996/97

2. This is for the EU-12 and represents the ACP import quota under the Sugar Protocol.

Source: LMC database (Sweetener Analysis, March 1996); WTO

The third element of domestic price support is the export of surplus sugar, preventing it from driving down the sales price on the domestic market. Surplus A and B sugar is exported with subsidies that are granted to traders who bid for the minimum level of restitution (subsidy) that they need in order to be able to compete on the world market. C sugar must be exported from the EU (in practice, a proportion of C sugar production is always carried forward to become the first tranche of the following season's A quota), and receives only the world price.

In addition, there is a mechanism that aims to maintain the domestic sugar price at a similar level throughout the year using storage refunds. Storage refunds compensate EU producers for storage costs, and ensure that sugar is released onto the market in an orderly fashion throughout the marketing year. This means that the domestic sugar price will not be depressed at the start of the season by producers trying to minimise outlays for the storage of sugar.

The Sugar Regime is financed by means of production levies on A and B quota sugar of 2% and up to 39.5% of the intervention price, respectively. These levies are used to provide export refunds or restitution payments to processors exporting quota sugar to the world market. Thus, the price which processors (and growers) actually receive for their sugar (or beets) is the prevailing sugar price minus these levies.

In the final GATT text, export restitution on quota sugar were officially deemed to be subsidies. As a result, the EU was obliged to make commitments regarding the volume of sugar eligible for these subsidies, as well as the total expenditure on these subsidies. Under its GATT commitments, the EU is required to cut export subsidies on sugar by 21% in volume terms over the implementation period compared with the GATT reference period (1986 to 1990).

The required reduction in subsidised volume over the period is 340,000 tonnes, representing around 11% of within quota exports. This is not expected to cause major problems for the EU, because EU exports have already fallen from their levels in the second half of the 1980s, which is the period that was used as the GATT reference period.

Table 10.2 summarises the average beet, cane and sugar prices between 1993/94 and 1994/95 to illustrate the degree of price support that the sugar industry receives. This reveals that the domestic wholesale price of white sugar averaged more than three times the equivalent price of white sugar exported to the international market during the same period.

Table 10.2 – EU-Prices of Beet, Cane and Sugar, Average 1993/94-1995/96 (US$/tonne)

	Beet	White Sugar	Raw Sugar
Beet Price	58	-	-
Wholesale prices			
-Domestic sales	-	843	-
-Preferential exports	-	-	-
-Free market exports	-	280	-
Retail prices			
-Domestic sales	-	1,357	-

There is a standing obligation to maintain minimum stocks by sugar producers and refiners (maximum 5% of a quota or 5% of sugar refined during last 12 months).

There is no compulsory acquisition of any part of the production of sugar by the Government.

The Government does not distribute sugar among consumers or any section of consumer at a fixed price below the market price.

Warehouse where sugar is stored are controlled for one year. Control based on sugar movements are made during the rest of the year.

Futures trading is permitted and currently used for the exported sugar.

10.6.5 *Sugarcane/beet Pricing*

The price paid for beets is also regulated and is not a matter for independent negotiation between growers and processors. Beets that are proceesed to produce quota sugar receive the basic beet price. This price is derived from the white sugar intervention price after deducting the processing margin, the beet transport allowance and a credit for molasses sales. The basic beet price currently stands at 58% of the intervention price, and is subject to the production and elimination levies. Minimum price is fixed for standard quality of 16% sugar content.

10.6.6 *Import/Export*

The quantum of sugar imported or exported is regulated in order to ensure both availability of sugar at reasonable prices for domestic consumers and remunerative price for domestic producers.

The export policy aims to export the sugar produced and/or imported which is in excess of the domestic needs.

Anyone is allowed to export sugar, provided he holds a licence. The delivery of this licence is decided by the Sugar Division.

Any quota sugar (A and B) that must be exported is eligible for an export restitution (although these are to be phased out under the GATT). Companies wishing to export quota sugar must tender for this rebate, and licences are granted to those companies which bid for the lowest rebate. Tenders are held weekly and exporters have six months in which to export the sugar after they have been granted a licence.

There are quantitative restrictions only on preferential imports. Limited quantities of raw sugar are imported without duty or with reduced duty for supply to sugar refineries.

Supplies of raw sugar exceeding this need at the beginning of July, 1997 attracted an import duty.

10.6.7 *Sugar Industry Development*

No fund is maintained by the Government for grant of assistance to sugar mills or for cane development for the purpose of research and development. Exceptions are made in case of Portugal and French Overseas Depts.

The research and development activities for promoting the productivity of sugarcane and sugar industry, etc. are mainly managed by private sectors. The Government has no role.

10.6.8 *Incentives for new Mills*

No incentives/concessions are provided for setting up of new sugar factories or for expansion of existing mills.

The Government makes no financial contribution for setting up of new sugar factories. Exceptions are decided by the council of Ministers.

10.6.9 *Taxes*

Both the beet/cane growers and sugar manufacturers pay production levies to cover the costs of exporting their surplus production.

10.6.10 *Agency for supply of cane*

There are no legal restrictions on any agency through which sugar mills have to obtain their supplies of cane from the growers.

10.6.11 *Packing of Sugar*

Sugar for domestic consumption is packed in 1 kg bags.

10.6.12 *Ceiling on land holdings*

There is no ceiling on land holdings.

10.6.13 *Miscellaneous*

Policies of pricing for sugarcane, sugar and any other connected matter are the same in different provinces/regions.

There are no alternate uses of sugarcane.

10.7 *Indonesia*

10.7.1 *Licensing*

This is intended to prevent new mills being built within the catchment area of an existing mill. For setting up of a new sugar unit, a permit is required from the Government. However, there exists no act or rules for getting a permit.

There is no restriction on the capacity of a sugar mill. It depends on the availability of land for sugarcane cultivation, which is legally determined.

10.7.2 *Cane Area Reservation*

The sugarcane growers are not legally obliged to supply cane to mill.

The sugarcane area once determined is not re-demarcated by any other causes.

10.7.3 *Price Control*

The price of sugar is determined by the Government. Almost all sugar production is sold to the Government.

Sugar prices in different provinces/regions are the same.

There is no fluctuation in the prices of sugar. Right now all sugar trading is carried out by BULOG, the state run distribution agency. There is no control on sugar stocks held by distributors and retailers. The margin available to producers marketing sugar independently of BULOG is relatively small and so independent marketing is limited.

10.7.4 *Sugarcane Pricing*

Usually there is no cane price determination. The farmers get a kind of yield share which is determined by its sucrose contents.

- For rendement below 8.50%, the share of cane growers is 68%.
- The share becomes 70% for the rendement above 8.5%.

10.7.5 *Import/Export*

The quantum of sugar import is decided by the amount to meet domestic requirement. The average annual per capita sugar consumption is 15 kg.

There has been no export of sugar within last 3 decades.

10.7.6 *Incentives for New Mills*

No incentives/concessions are provided by the Government for setting up of new sugar mill. The Government, however, permits the new sugar mill to sell a part of sugar produced directly to the consumers.

There is no financial contribution from the Government for setting up of a new sugar mill in private sector.

10.7.7 *Sugar Industry Development*

No fund is maintained by the Government for grant of assistance to sugar mills for the purpose of research and development. Every sugar mill plan a small budget for carrying out research and development.

Since 80% of sugar mills are owned by the Government, a small financial assistance is provided to Indonesia Sugar Research Institute to conduct research. Part of the government assistance is deducted from the sugar price to be paid to each sugar mills.

The steps taken to maximise the production of sugarcane and sugar are:

a) Setting up of new sugar mills in new areas,

b) Increase the yield of sugarcane and sugar through adopting appropriate technology.

c) To maintain the price of sugar at high level.

d) Provide assistance to cane growers.

10.7.8 *Taxes*

Retail price determined by the Government is 20% higher than the price fixed for sugar produced by the mills. Taxes are included in the retail price of sugar.

10.7.9 *Cane Production*

In Java where there is the Intensive Cane Farmers Scheme, all the field activities, including harvesting and transportation of cane are carried out by collective farmers unit and Rural Cooperative Units.

For improving the yield and quality of cane, the Government provides credit facilities to the farmers for the purchase of fertilizers, pesticides, seed canes, etc. along with extension services.

Sugarcane is planted solely for the production of sugar.

10.7.10 Number of Ratoon

In general 2-3 ratoons are taken. But in traditional cane areas, more than five ratoons are taken by the farmers.

10.7.11 Ceiling on Land Holding

There is ceiling on land holding. For un-irrigated and upland, the ceiling of land ownership is 5.0 ha. Despite this, the land can be rented and sugarcane can be grown by the private enterprise or cooperatives. Sugar mills can rent about 50 ha. of land for raising cane nurseries and for field trials.

10.8 Mauritius

10.8.1 Licensing

For setting up of a new sugar unit, licence or permit is required.

New licences are not being issued at present.

For improving mill efficiency, a number of old and inefficient units have merged into larger units through the process of Centralisation. The Centralisation process also helps in the Bagasse Energy Development Programme of the Industry.

10.8.2 Mauritius Sugar Authority (MSA)

The MSA is a statutory authority which coordinates the activities of various agencies in the sugarcane and sugar sector and advises the Government on all policy matters.

10.8.3 Cane Area Reservation

All areas under sugar cane have been delimited into different factory areas.

Cane growers are legally obliged to supply cane to the mill within their own factory areas. In exceptional cases growers can send their cane to other factory areas after obtaining prior permission of Arbitration and Control Board.

The likelihood of new mills being set up is very remote. However the demarcation of the factory area is redefined by the Control Board.

10.8.4 Price Control

The Mauritius Sugar Syndicate (MSS) is the sole marketing agency in Mauritius. There is no control on price of sugar which is exported by the MSS. However, the maximum price of sugar for the local market is fixed by Government, and is generally below the cost of

production.

Government does not compulsorily acquire any part of sugar production for distribution at a lower price.

In principle futures trading is permitted, but in practice futures trading do not take place as all sugar exported is sold as per special agreements.

In case production exceeds the export commitments and local requirement, the MSS keeps stocks.

There is no control on the stocks maintained by traders.

The internal consumption represents only 6% of total production.

10.8.5 *Sugarcane Pricing*

Farmers are paid on the basis of sucrose content of cane sent to the sugar mills. The Arbitration and Control Board carries out all the analysis and computation of sugar accruing to planters and millers. Planters receive 76% and millers the remaining 24% of the sugar produced from the cane. However, about 65% of cane supply to factories comes from the land owned by the millers themselves.

The price of sugar paid to the millers and the planter is based on the price obtained by the MSS for all sales.

Advances payments to sugarcane growers are made by the MSS one week after the delivery of their first cane to the mills. Payments are effected regularly during crop period until the final payment in June of the ensuing season.

10.8.6 *Import/Export*

The quantum of sugar export is not regulated whereas sugar imports for local consumptions are subject to Government authorisation.

Mauritius sells the bulk of its production to the European Union as per the Sugar Protocol and this is for an indefinite period. The long term policy is to maintain level of production so as to fulfill all quotas allocated to Mauritius at a preferential price.

All the exports are done through MSS.

The import duty is 80% ad-valorem. This duty may however be waived by the Government in case the import is for local market.

Sugar is a controlled product and as such only the MSS is allowed to import sugar.

10.8.7 *Sugar Industry Development*

All existing funds for growers and producers are self financed. These inclued Sugar Insurance Fund, Modernisation and Rehabilitation Fund, Agriculture Research Fund, Sugar Planters Fund, Sugar Employees Fund. A number of para-Statal bodies providing support to the industry are also funded by the sugar industry through a cess.

These bodies include:

Body		Functions
Mauritius Sugar Authority	:	Policy formulation
Mauritius Sugar Research Institute	:	Research
Mauritius Sugar Terminal Corporation	:	Sugar Storage and loading
Farmers Service Corporation	:	Extension and support to small planters.
Sugar Planters Mechanical Pool Corporation	:	Land Preparation Equipment
Cane Planters and Millers Arbitration and Control Board	:	Cane Analysis, apportionment of sugar price and arbitration of disputes
Sugar Industry Labour Welfare Fund	:	Employee Welfare.

10.8.8 *Incentives for new Mills*

Measures taken to maximise the production of sugarcane and sugar include:

a) provision of adequate irrigation facilities in drier areas,

b) breeding high quality cane varieties,

c) improve mill productivity, and

d) improving sugarcane husbandry by small planters through activities of the Farmers Service Corporation.

No incentives are offered for setting up of new mills.

10.8.9 *Taxes*

There are no special taxes which are levied as such. Planters who produce more than 60 tonnes of sugar and millers pay normal individual and corporate taxes.

10.8.10 *Numbers of Ratoons*

The number of ratoons varies between 8-10 ratoons. It depends on factors like cane varieties and ability to replant.

10.8.11 *Transport Cost*

The grower is entitled to a refund on the cost of transport of canes to the factory over a distance exceeding four miles.

10.8.12 *Research & Development*

Mauritius Sugar Industry Research Institute (MSIRI) is a premier research institute in the sugar sector. It is financed out of cess on sugar realisation. The Institute also does extension work directly on mill owned land and large holdings. For small farmers, there is a statutory body called Farmer Service Corporation (FSC) which does this extension work. Of the total expenses of FSC, 50% comes from cess and 50% as a grant from Ministry of Agriculture. The FSC works under one window one roof' concept and all facilities are available at the same place to the small farmers.

10.9 *Mexico*

10.9.1 *Licensing*

This is an untried area of Mexican legislation, principally because no new mills have been built in Mexico after the privatisation of industry.

10.9.2 *Cane Area Reservation*

There is no specific zoning of cane. In other words, growers are not bound to deliver cane to mills within a certain area.

Mills advance various forms of credit for a minimum of one year or one ratoon, and this tends to bind growers to deliver to an individual mill at least for a specified period of time.

10.9.3 *Pricing of Sugarcane*

The cane sugar producers have a standard contract for buying and selling cane. The price that the cane producers receive is 54 per cent of the value of a kilogram of sugar, multiplied by the factory production.

10.9.4 *Price Control*

Until recently, the government published an official sugar price, but this practice was abandoned early in 1996 and prices are now free.

10.9.5 *Import/Export*

Sugar for the export market requires a license. There is no controls on the quantity of sugar to be sold to the domestic market.

10.9.6 *Transportation Cost*

The transport cost varies depending on the refinery and the site of the estates. The average cost of the crop (cutting, collection and transport) is approximately 30 percent of the value of a tonne of cane.

10.10 *Philippines*

10.10.1 *Licensing*

For setting up of a new sugar unit licence or permit is needed. The grant of such licence or permit is according to environment safety, land use and zoning laws. There is however no restriction on the minimum or maximum capacity of a new sugar mill to be set up.

10.10.2 *Cane Area Reservation*

The sugarcane area for each mill is not legally determined. There is no legal obligation where to mill the cane. There is no reserved sugarcane area for each mill.

10.10.3 *Price Control*

There is no price control on the price of sugar sold by the sugar mills. Compulsory acquisition of any part of the production of the sugar mill is not made by the Government. There is no control on the sale of sugar by the sugar mills. Violent fluctuations in the domestic market price of this sugar is controlled through market allocation of sugar. Futures trading in sugar is not practised. A minimum level of stocks are maintained to ensure price stability. There are no controls on the amount of sugar stocks to be held by the wholesalers/distributors and retailers.

The Government does not distribute sugar to any section of consumer at fixed price below the market price.

10.10.4 *Import/Export*

The quantum of sugar imports and exports are regulated with a view to ensure stability of price for domestic consumers as well as to ensure remunerative price for the domestic producers.

There is no long or medium term policy for exports. The exports from the country are allowed to be made by individual traders. The extent of duties imposed on import of sugar is according to GATT and Asean Free Trade Agreement (AFTA) commitment of the country. The quantitative restrictions on the import of sugar are as per GATT-Minimum Access volume.

10.10.5 *Sugar Industry Development*

Funds are maintained by the Government for grant of assistance to sugar mills for the purpose of research and development.

10.10.6 *Incentives for new Mills*

For setting up of new sugar factories or substantial expansions of existing factories, incentives/concessions in the form of tariff free and tax holidays are provided on imported machineries.

No financial contribution is made by the Government for setting up of new sugar factories. The Government provides financial support for extension and development of new varieties.

10.10.7 *Taxes*

VAT at 10 percent

10.10.8 *Agency of Supply of Cane*

There are no legal restrictions on agency through which sugar mills have to obtain their supplies of cane.

10.10.9 *Packaging of Sugar*

There are no legal restriction on the kind of material in which sugar can be packed for bulk sale to domestic consumers.

10.10.10 *Number of ratoons.*

In Philippines, on an average, three ratoons are taken.

10.10.11 *Ceilings on land holdings*

There is ceiling on land holding and sugar mills are not exempt. For research and development purpose by sugar mills, there is no ceiling.

10.10.12 *Miscellaneous*

There are no differences in policies for sugar cane and sugar in different provinces/regions.

There are no alternate usages of sugarcane.

No steps are taken to minimise the fluctuation in production of sugarcane and sugar.

10.11 *South Africa*

10.11.1 *Licensing*

From April 1, 1998 there would be free entry for growers (provided a Mill Undertakes to be able to accept their cane) and for a new investor wanting to build a new mill. There is no restriction on the capacity of new sugar mill; it is entirely upto the investor.

10.11.2 *Cane Area Reservation*

The cane area for each sugar mill is not legally determined. The growers make their own decisions regarding which mill they want to deliver to. They may then enter into a cane supply agreement with that mill-but this is a voluntary process.

10.11.3 *Price Control*

The South African Sugar Association (SASA), an organisation, with equal representation from Millers and Cane Growers (who have to be a member of some cane association) sets the maximum sale price for sugar-presently basis free on rail, Durban, for local market. The Government does not acquire any part of production of sugar mill.

There is no price control at wholesale or retail level.

The milling/refining companies are responsible for selling and distributing local market sugars.

The minimum level of stocks of sugar are maintained through industrial agreement and there is no Government interference.

10.11.4 *Sugarcane Pricing*

Farmers are paid for the sucrose content of the cane which is tested by independent Cane Testing Service run by SASA. This is by agreement of millers and growers through their proceeds sharing partnership agreement. As per the partnership agreement, from the gross proceeds (domestic/export sales of sugar/molasses) all relevant industry costs are deducted and the net proceeds are distributed according to a formula agreed to by the millers and growers. The payment to growers are made monthly. Payment to the cane growers and millers is made in the ratio of 64:36. This ratio changes from year to year and a few years back it was 62:38. 97.5% of payment for cane supplies are made initially and the balance after the test of sucrose content. There is a test station of SASA in every mill.

10.11.5 *Export/Import*

About 55-60% of sugar is sold in the domestic market and the remaining is exported.

All raw sugar is sold and supplied by the SASA. A portion of refined exports is made by the Millers/Refineries and the balance via SA Sugar Association. 98% of exports are made by SASA. All millers and growers thus share in the net proceeds. Agreement is reached amongst millers on an obligation to export a percentage of production. This varies each year depending upon the size of the crop and the size of the local market.

On imported sugar a duty of $169 per ton is levied. There is however no quantitative restriction on import of sugar.

10.11.6 *Sugar Industry Development:*

No fund is maintained by the Govt. for grant of assistance to sugar mills for purpose of research and development. Milling research is actually paid for by the Miller only. The Govt. has no role in research and development activities for promoting the productivity of sugarcane and sugar industry.

10.11.7 *Taxes*

Individual growers and millers pay taxes to the Central Government in respect of income derived from sale of cane (sucrose) and sugar respectively.

10.11.8 *Agency of purchase of Cane*

There are no legal restrictions on the agency through which sugar mills have to obtain their supplies of cane from growers.

There are no regulations to minimise the fluctuation in production of sugarcane and sugar but the millers and growers enter into cane supply agreements. The agreed length of milling season determines the amount of cane that would be crushed.

10.11.9 *Land Ceiling*

Milling companies own about 16 per cent of land under cane.

10.11.10 *Miscellaneous*

The policies of pricing for sugarcane and sugar in different provinces are the same. There are no alternate usages of sugarcane.

10.11.11 *Transport Cost:*

The transport of the crop is paid for in full by the farmers.

10.11.12 *Research*

The Sugar Milling Research Institute (SMRI) is the Central Scientific Organisation involved in research work into the manufacturing problems of the South African sugar industry. The Institute is financed by a levy on the sugar produced at member mills and by payments for contract research and technical services undertaken for individual mills. It also receives some Government grants. Some big sugar manufacturers have their own R&D facilities also.

All research associated with the agricultural aspects of the cultivation of sugarcane is handled separately by the South African Sugar Association's Experiment Station (SASEX). The SASA financed the experiment station for sugarcane to the extent of 40 million Rands and the contribution comes from millers and growers.

10.12 *Sri Lanka*

10.12.1 *Licensing:*

Investment in any project has to be approved by the Board of Investment (BOI) of Sri Lanka. There is however no restriction on the minimum or the maximum capacity of a new sugar mill.

10.12.2 *Cane Area Resrvation:*

Sugar cane area for sugar mills is not legally determined. The allottee farmers are obliged to supply cane to the respective mill. Private growers can supply their cane to a mill of their choice.

Extent of land allocated for each mill is based on mill capacity.

10.12.3 *Price Control:*

Sugar is sold ex-factory at a floor price of $500/tonne. There is no compulsory aquisition of any part of sugar production. There is no control on sale of sugar by the sugar mills.

There is no futures trading at present.

10.12.4 *Sugarcane Pricing:*

It is determined by sugar companies. There is no agreement between growers and mills. In one mill, it is based on average sugar recovery, while in others sugarcane price is a flat-rated and sucrose content is not taken into account.

Cane payment is made within 14 days of delivery.

10.12.5 *Import/Export*

There is no control on sugar imports, but import duty is levied.

10.12.6 *Government Assistance:*

No fund is maintained to assist sugar companies. Research on sugarcane is handled by Sugarcane Research Institute. (SRI) of Sri Lanka. All research funds come from cess imposed on both locally-produced and imported sugar.

For setting up of new mill or substantial expansions, Government provides land, infra-structure facilities, tax concessions etc.

Government is not involved in extension, education, input supplies etc. These are done by the sugar companies.

10.12.7 *Taxes:*

There is no sales tax on sugar and sugar cane.

10.12.8 *Ratoon:*

Usually 3 ratoons, but in some instances, upto 6-7 ratoons are maintained.

Ceiling on land holding:

It is one hectare for irrigated land and 1.75 ha. for rain-fed land. Except for 1 mill, others do not have commercial cane plantations. Mills are allowed to have upto above 250 hectares land for purpose of research and development.

10.12.9 *Miscellaneous:*

Sugar is not distributed at a subsidised rate to any section of consumers.

10.13 *China (Taiwan)*

10.13.1 *Licensing*

In general, the setting up of a new sugar unit need a license or permit. No new mill has been set up in Taiwan since 1945. Factory expansions require licences in the same way as new mills.

10.13.2 *Cane Area Reservation*

There is full and comprehensive zoning. Every grower is allocated a mill by the local administration.

The Sugarcane area for each mill is legally determined. Such areas are demarcated in the vicinity of each sugar mill. The demarcation is to prevent the mutual competition and help each mill to acquire sugarcane stability. If a particular mill faces difficulties in processing all of the cane in its zone, the government redefines the zones.

The cane growers are legally obliged to supply cane only to the mills within the reserved area. At the same time, sugar factories are required to crush all the sugarcane in their area. The basis of re-demarcation of such area for new mill is on the basis of distance of transportation, cost reduction and crushing capacity of mill.

10.13.3 *Price Control*

Farmer's sugar is sold and consumed domestically. Taiwan Sugar Corporation (TSC) also sells its own sugar to stabilize prices, but selling price is determined by the Government.

No part of sugar is compulsorily acquired by the Government. The sale of sugar is controlled by TSC Business Department. Due to general control on price, there is no violent fluctuations in the domestic market price of the sugar. The minimum level of stocks is required to be maintained to ensure price stability.

In Taiwan there is no policy to distribute sugar among the consumer or any section of consumers at fixed price below the market price.

There are no controls on the amount of sugar stocks to be held by the traders.

10.13.4 *Sugarcane Pricing*

Farmer's sugarcane is not purchased by sugar mill. TSC is using a sugar sharing system for contract farmers. In exchange for the sugarcane that a farmer grows for TSC, he receives a portion of the processed sugar. The sharing ratio is 55:45 in favour of the cane farmers. A portion of the farmer's sugar is purchased by TSC at a guaranteed price. The payment to the sugarcane growers is made in one lump-sum immediately within a fixed period.

TSC has established a "Sugar Stabilization Fund" with a portion of the export sales withheld for the Fund. In the year the price of exported sugar falls below the guaranteed price offered by TSC, the difference is drawn from this fund to pay the farmers.

10.13.5 *Import/Export*

The quantum of sugar imports and exports are regulated with a view to ensure stability of price for domestic consumers as well as to ensure remunerative price for the domestic producers. This policy is implemented by TSC.

At present, TSC exports a yearly quota of 10,000 to 20,000 tonnes to the USA at a favoured price. Presently, the quantitative restrictions on the import of sugar is 50,000 tonne per year.

10.13.6 *Sugar Industry Development*

TSC extracts 2 per cent from the business amount as a fund for research and development each year.

10.13.7 *Incentives for New Mills*

About 95 per cent shares are owned by government agencies and therefore TSC is a government owned enterprise. Hence, the research and development activities for promoting the productivity of sugarcane and sugar industry are managed by TSC itself.

No incentives/concessions are provided for setting up of new sugar factories or substantial expansions of existing mills. Government make no contribution for setting up of new sugar mills.

10.13.8 *Taxes*

There used to be taxes on sale of sugar by the mills to the domestic consumers. Since 1990, this tax has been abolished.

10.13.9 *Agency for supply of cane*

There are no legal restrictions on the agency through which mills have to obtain their supplies of cane from the growers.

10.13.10 *Ceiling on Land holdings*

There is ceiling on land holding. Each sugar mill has its own farm for obtaining cane for milling. Taiwan Sugar Research Institute has its own farm for the purpose of research and development. There is no restriction on the size of such farms.

10.13.11 *Miscellaneous*

There are no differences in policies of pricing for sugarcane and sugar in different provinces/regions.

There is no alternate usage of cane.

10.14 *Thailand*

10.14.1 *Level of Control*

The Thai sugar industry is highly regulated, with sugar policy being formulated and administered by the Office of the Cane and Sugar Board (TCSB), a tripartite body comprising grower, miller and government representatives. Thai sugar policy regulates the following aspects of sugar production and marketing:

(i) processing capacity;

(ii) domestic and export marketing; and

(iii) the distribution of revenues between growers and millers.

There have been two important changes to the key features of Thai sugar policy during the past few years. These include the introduction of a quality-based cane payments system in the 1992/93 crop year, and the removal of the country's ban on sugar imports in 1995. The lifting of the import ban was negotiated during the Uruguay Round of the international trade talks, when the government agreed to introduce a system of import tariffs.

10.14.2 *Licensing*

New mills and relocating mills do require a licence, but restrictions have prevented the construction of any new mill.

Mill expansions do require licences. However, these are not vigorously enforced and unlicensed expansions have occurred.

10.14.3 *Cane Area Reservation*

No zoning of cane and growers are free to deliver cane to whichever mill they choose. However, in practice the farmers generally supply cane to the same mill. Efforts are also being made to ensure that growers supply cane to the mill in their area by linking supply of fertilizers at cheaper rates to growers supplying cane to the same mill.

10.14.4 *Price & Import/Export Controls*

Mills are issued with monthly quota, which determines the quantity of sugar that may be released by a mill to the domestic market in that month. This is intended to control the supply of sugar to the domestic market and to regulate prices. The remainder of its output (quotas B and C) is exported and receives a lower price, reflecting prices prevailing in the world market. The percentage shares of each mill's output allocated to A, B and C quotas are identical for all mills.

The ex-factory and retail prices of sugar sold in the domestic market have been fixed at their current levels since 1980.

Until 1995, domestic sugar industry was protected by a ban on imports. However, following the Uruguay Round of international trade talks, Thailand replaced the ban with a system of import tariffs. The basic tariff rate on raw and white sugar imports is 104%, which fully exploits Thailand's tariff potential under GATT. However, sugar entering the country within the minimum access (tariff rate) quota of just over 13,000 tonnes is subject to a reduced tariff of 65%. Furthermore, any sugar originating from fellow members of the Association of South East Asian Nations (Asean) is eligible for a 35% margin of preference relative to the basic tariff rate under the Asean Free Trade Agreement (AFTA). However, any company wishing to make imports must first apply for a licence from the TCSB, and no imports have, as yet, taken place.

In practice, only around 30% of sugar produced in Thailand receives the protected domestic price; almost all of the remaining 70% is sold at world market prices. The only export sugar that earns a preferential price is that which is shipped to the US under the tariff rate quota. However, Thailand only has a small US quota, equivalent to 1.4% of the minimum quota, and was authorised to export 31,212 tonnes to the US in 1995/96.

The rate of tariff protection that the domestic sugar industry receives is scheduled to fall gradually over the years until 2004/05, when the basic (outside-quota) tariff cannot exceed 94%. Moreover, the minimum access quota must increase to 13,760 tonnes by the end of the transition period.

There is also a quota B, which currently amounts to 800,000 tonnes. All of this sugar is sold by the Thai Cane and Sugar Corporation (TCSC)-the export marketing agent of the TCSB-for export. However, only 50% of the quota is actually marketed by the TCSC; the mills market the remaining 50% themselves, along with the balance of their sugar (quota C), through six licensed export companies. The purpose of quota B is to establish a representative export price of sugar, which is used to establish industry revenues for the purpose of revenue sharing between millers and growers.

10.14.5 Grower/Processor Relationship:

The overwhelming majority of sugar is marketed privately by millers; sugar is not sold through a single marketing body as it is in Australia and South Africa.

Growers, as a group receive 70% of the industry's net sugar revenues. Within this total amount to be disbursed among growers on this basis payments to individual growers are based on a quality based cane payment formula. In addition, growers receive a payment, in the form of a fixed sum per tonne of delivered cane, for the molasses recovered by the factories from 1991-92, growers get 10 baht per tonne of cane out of revenue from by-products.

To establish gross revenues form the sale of sugar, the industry distinguishes between sugar that is sold in a domestic and export markets. The price received by millers in the local market is known, because domestic sugar prices are fixed.

For sugar that is sold for export, the average price received by the TCSC for quota B sugar is assumed to represent the average price earned from all export sales, which includes quota B sugar as well as the quota C sugar that is exported privately by the millers. Price of quota B is determined jointly by growers, millers and Government by bidding. The total export tonnage is monitored, and, using the average price earned from the sale of quota B sugar, the industry derives a figure for gross export revenues.

In the years when export prices are low, the cane and Sugar Fund, financed out of contribution of 0.05% of net revenue, compensates the growers to some extent towards the cane price.

10.14.6 *Research and Development:*

R&D in sugarcane and sugar industry is financed by the sugarcane Planters and by the sugar industry through Cane and Sugar Fund.

10.15 *United States*

10.15.1 *Production Controls*

The US sugar market has been regulated in some form since the 1930s, and sugar policy is now governed by the Sugar Programme. Established in its current form by the Agriculture and Food Act of 1981, the Programme has been modified by three subsequent acts, the most recent being the Federal Agricultural Improvement and Reform (FAIR) Act of 1996.

The US Sugar Programme impose no controls over the level of production of beet, cane or sugar. Furthermore, neither the Sugar Programme nor any other domestic programme, imposes any controls over the production of High Fructose Corn Syrup (HFCS).

10.15.2 *Price Support*

The Sugar Programme, which is administered by the United States Department of Agriculture (USDA), seeks to support growers and processors through high domestic sugar prices, and is designed to operate at no cost to the US government. An important feature of the Programme is that it seeks only to defend a minimum level of beet, cane and sugar prices; it is not designed to stabilise prices and, therefore, has no mechanisms for preventing prices from rising above these support levels at times of high world prices.

At the heart of the Sugar Programme are two main policy instruments:

(i) The loan programme, which provides the government with a means of supporting domestic sugar prices (and indirectly beet and cane prices) by buying sugar at a guaranteed minimum price.

(ii) The tariff-rate (import) quota (TRQ), which offers the government a means of maintaining domestic sugar prices above these support prices by restricting the flow of sugar entering the country.

Table 10.3 summarises the average beet, cane and sugar prices between 1993-94 and 1994-95. This reveals that domestic white sugar prices averaged more than twice the equivalent price of white sugar exported to the international market during this period. Even domestic raw sugar prices were considerably higher than the average world white sugar price.

Table 10.3 – US-Prices of Beet, Cane and Sugar, Average 1993/94-1995/96 (US$/tonne)

	Cane/Beet	White Sugar	Raw Sugar
Cane price	32	-	-
Beet Price	43	-	-
Wholesale prices			
-Domestic sales	-	596	412
-Preferential exports	-	-	-
-Free market exports		230	-
Retail prices			
-Domestic sales	-	889	-

Source: LMC Estimates, USDA.

One of the unintended consequences of high domestic sugar prices has been the development of a large corn-based sweetener industry, which is not governed by the Sugar Programme and has resulted in sugar losing almost half of the caloric sweetener market.

10.15.3 *Marketing Arrangements*

Since the abolition of marketing allotments in the recent FAIR Act, the US government no longer exercises any control over domestic marketing arrangements. Sugar producers are free to market their sugar to whom they wish and at whatever price they wish.

10:15.4 *Grower/Processor Relationships*

Throughout the US, growers and processors share revenues earned from the sale of sugar; in some instances, they also share revenues earned from molasses and, in the beet sector, beet pulp. These contracts are negotiated privately between growers and processors and, although there are some similarities between many of these contracts, there is no industry standard contract in either the beet or cane sector.

In practice, beet growers receive around 50%-55% of the net selling price of sugar (the sugar price minus marketing costs), while the equivalent figure in the cane sector is around 60%-65%.

10.15.5 *Government Assistance and Subsidies*

Other than the price support provided through the mechanisms described above and some contribution to research and development in the sugar industry, the US government offers no direct assistance or subsidies to growers or processors.

10.15.6 *The Impact of Closely Related Products*

Owing to the low cost of corn (maize) and the high price of sugar, the production of HFCS is viable in the US. Indeed, the HFCS processing margin has been so great in most years that corn wet millers have been able to price their products at considerable discounts to sugar, therefore ensuring that end-users have switched to their products wherever possible.

Since it was first produced in the early 1970s, HFCS has replaced sugar in almost all liquid uses, and currently accounts for more than 45% of domestic caloric sweetener consumption. Although HFCS is unlikely to displace sugar from any more of its current uses, the continuation of high support prices will ensure that the use of sugar will be restricted to those areas where it is consumed in granulated form.

10.16 *Summary*

10.16.1 Out of twelve countries studied in this chapter, there is system of cane zoning in Australia, Indonesia, Mauritius and Taiwan while there is no system of cane zoning in European Union, Mexico, Philippines, South Africa, Thailand and USA. In certain countries like Brazil, there is a binding contract between millers and growers. In Sri Lanka, allottee farmers are obliged to supply cane to the respective mills, but private growers can supply their cane to a mill of their choice. In countries where there is no reservation of cane area for different mills and where there is no other form of binding contract between millers and growers, intense competition for cane can develop. Thailand is often cited as an example of a country where despite the requirement for mill licensing, the absence of an enforced policy of cane zoning has resulted in damaging competition for cane among mills. Cane is transported over excessive

distances to the detriment of quality and industry costs have risen sharply. Millers cannot effectively schedule cane deliveries and there is little co-operation between millers and growers in terms of cane development and agricultural extension work. Of course, in areas such as new cane plantations being established in Indonesia, off the island of Java, where cane will be mostly hundred per cent mill owned, no legal zoning of cane would be necessary.

10.16.2 For setting up of a sugar factory among the countries studied above, no licensing is required in Australia, Brazil, European Union, South Africa and USA, whereas it is needed in other countries. Licence is generally not required for expansion of capacity except in Taiwan and Thailand. In Thailand, however, this is not vigorously enforced and unlicensed expansions have occurred. There is no restriction on minimum or maximum capacity of a new sugar in any country.

10.16.3 No incentive / concession for setting up of new sugar factories or expansion of existing factories is allowed in any country. However, in Philippines, tariff free import of machinery and tax holiday are provided for setting up of new sugar factories or substantial expansion of existing factories.

10.16.4 The research and development activities are financed through cess in Sri Lanka and Taiwan and finance is partly contributed by Government in USA. Philippines maintains a fund for research and development. In Indonesia, a small financial contribution is made by Government as 80% of mills are owned by Government. In other countries, it is financed by the industry or by industry and growers together.

10.16.5 There is no control on price of sugar in Brazil, Philippines, and USA. In South Africa, SASA, an organisation with equal representations from Millers and Cane Growers, set the maximum sale price for sugar. In Sri Lanka, sugar is sold ex-factory at a fixed floor price. European Union operates a complex system to support domestic sugar prices much above the world prices. In Indonesia and Taiwan, price of sugar is determined by Government which is generally below the cost of production. In Mauritius, the maximum price of sugar for the local market is fixed by Government which is generally below the cost of production. In Thailand, mills are issued monthly quota of sugar to be sold in the domestic market and ex-factory and retail prices of sugar sold in the domestic market have been fixed at their current levels since 1980. In Brazil, there is no mechanism to ensure a steady release of sugar into the domestic market throughout the year. As a result, prices exhibit a cyclical pattern within each crop year; falling to export parity level during the milling season and rising to import parity level during the off season. In Australia sugar is sold at export parity price w.e.f. 01-07-97.

10.16.6 *Futures trading is permitted in Brazil and South Africa.*

10.16.7 In so far as pricing of sugarcane is concerned, it is based on revenue sharing in Australia, Indonesia, Mauritius, Philippines, Taiwan, Thailand, Mexico, South Africa and USA.

In Brazil, it is at present determined by Government, but from May 1998, it will be determined by an agreement between growers and mills. In Sri Lanka, it is determined by sugar companies.

10.16.8 The share of growers in the revenue from cane sugar sales varies. It averaged at 60-65% in Australia, and is 64% in South Africa, 68-70% in Indonesia, 54% in Mexico, 76% in Mauritius, 55% in Taiwan, 70% in Thailand and 60-65% in USA. In Mauritius, however, about 65% of cane supply to factories comes from the land owned by the Millers themselves and 95% of its exports (which constitute over 80% of its production) are at a preferential price well above the world market price.

10.16.9 There is no restriction in any country on the agency through which factories have to obtain cane from the growers.

10.16.10 In no country any part of sugar is distributed at a subsidised rate to any section of consumers, nor is any part of production compulsorily acquired by Government at a controlled price. However, as mentioned in para 10.16.5 above, the price for domestic consumer fixed in Thailand and Mauritius is below the cost of production and the factories have to recovers this loss from exports.

10.16.11 There is no control on stock limit of traders in any of these countries.

10.16.12 There is no legal restriction in any country on the kind of material in which sugar can be packed.

10.16.13 Import of sugar is regulated in Indonesia, Mexico, Mauritius and Philippines. The ban on import of sugar has been removed in Thailand, but these are subject to high rate of tariff protection (104%) which will gradually fall to 94% by 2004-05. In Australia, import tariffs were removed from 1.7.97. In South Africa and Sri Lanka, there is no quantitative restriction, but import duties are levied. Brazil does not import sugar but has import tariff of 16%. The rates of import duty levied by different countries at present are indicated in Annexure 10.1.

10.16.14 The export of sugar in Brazil is liberalised and is made either by individuals or traders, but is subject to export licenses (quotas). Sugar which is exported without licence has to bear export tax at 40%. In Mauritius, all exports are made through MSS and in South Africa through SA Sugar Association. In Thailand, 50% long term exports (quota B) are marketed by TCSC, the remaining 50% of 'B' quota and entire remaining exports (C quota) are exported by millers through licenced exports houses. In Taiwan, the entire foreign trade is regulated. In European Union, exports are subsidised by levy on domestic sale. Anyone who holds a licence can export. Licences are granted to companies which bid for the lowest subsidy rate.

10.16.15 In Brazil, four to five ratoons are generally taken. In Indonesia, two to three ratoons are taken but in traditional cane areas, more than five ratoons are taken. In Philippines, about three ratoons and in Mauritius, about eight to ten ratoons are taken.

10.16.16 In Indonesia, there is ceiling on land holding but land can be rented and sugarcane be grown by the private enterprise or co-operatives. Sugar mills can rent about fifty hectares of land (against a ceiling of five hectares) for raising cane nurseries and for field trials. In Philippines, sugar mills are not exempt from land ceilings, but for R & D purpose by sugar mills, there is no ceiling. In Sri Lanka, mills are allowed to have upto 250 hectares of land for the purpose of R & D, while the ceiling is one hectare for irrigated and 1.75 hectares for rain-fed land. In Taiwan, there is ceiling on land holding but there is no restriction on the size of farms owned by sugar mills for obtaining cane for milling or by Taiwan Sugar Research Institute for R & D. There is no ceiling on land holdings in Brazil, European Union and South Africa.

10.16.17 In Thailand, sugar policy is formulated and administered by a tripartite body comprising growers, millers and Government representatives.

10.17. *Key Differences Between the Above Systems and the Indian System*

The profiles of the sugar systems presented above a breathtaking array of policy measures that have been adopted by different countries to protect their domestic sugar industries. Furthermore, the systems described above represent just a handful of the numerous systems that operate worldwide. The Indian sugar system ranks among one of the most complex systems in the world, and is made all the more complex by the fact that it is targeted primarily at the country's sugar sector; producers of gur and khandsari, who process a significant proportion of the country's cane crop, are largely free of government control. In this respect, the Indian system is more akin to the US Sugar Programme which gives a free rein to the country's corn sweetener industry. Although this sector draws on a different raw material, corn (maize) rather than sugar beet or sugarcane, the end product nevertheless competes with sugar, and the country's substantial corn processing industry thrives under the price umbrella that is provided to support the country's sugar producers. In the EU, by contrast, the Sugar Regime imposes very strict production quotas on corn sweetener production, which prevent these alternative caloric sweeteners from competing with, and taking market share from, sugar.

Another striking features of India's dual sweetener sector is that, in the absence of any control over cane production, changes in the size of the cane harvest are reflected primarily in the level of sugar output (and in the supply of free sale sugar, in particular). This is because the domestic demand for gur and khandsari is relatively stable, and gur is neither stored from one season to the next, nor traded internationally. As a result, the output of these alternative sweeteners does not vary greatly from season to season, instead, the sugar sector acts as the buffer in India's sweetener industry. This distinctive feature of the industry manifests itself in a production cycle which is far more pronounced than in any other country in the world, and which has far reaching implications for both the domestic and world sugar markets.

In the absence of revenue sharing, which is a feature of all but one of the countries discussed in the first part of this chapter (Brazil), these swings in sugar production impact most directly on the country's millers, because they must pay a guaranteed cane price irrespective of the final selling price of sugar. In other words, millers bear 100% of the risk associated with changes in sugar prices. Although the periodic financial crises that result eventually filter through to growers, in the form of delayed cane payments, there is no system of risk sharing as there is in most of the world's leading sugar industries, where millers and growers share sugar revenues on the basis of a predetermined revenue split.

Another important feature of Indian industry is that unlike in many other countries, payment for cane is on basis of weight and is not related to sucrose content of cane.

There is, however, one important feature of Indian sugar policy that exerts some control over the sale of cane. This is the policy of cane zoning. Not all sugar industries operate this policy; among the countries profiled above, Brazil and Thailand are notable for not operating such systems. Thailand provides the best illustration of how the absence of zoning affects an industry.

- Millers compete openly for cane, bidding up the cane price (through the payments of price supplements) in order to secure supplies.
- Millers cannot effectively schedule cane deliveries, because it is in the growers interest to deliver cane at the peak of the sucrose curve, when they receive the highest price for their cane.
- There is little co-operation between millers and growers in terms of cane development, infrastructural development or agricultural extension work. This is because millers are reluctant to work with individual growers since it is quite possible that they will not deliver cane to their mills.

This combination of effects not only inflates cane prices, it also prevents the smooth operation of the milling season and hinders the long term development of the cane and sugar sectors.

Chapter 11

General Approach

11.1 The Terms of Reference of the Committee require it to suggest (a) modifications, amendments or repeal of any existing law and controls with a view to ensure healthy growth and development of the sugar industry and building healthy relationship between the farmers and the industry, (b) ways and means to increase production and efficiency through modernisation so that sugar is available to the general public at reasonable prices and (c) methods for increasing productivity of sugarcane and ways to ensure fair and remunerative prices to sugarcane growers.

11.2 Fair and remunerative prices to sugarcane growers and availability of sugar to the public at reasonable prices can be ensured in the long run only if the sugarcane cultivation and sugar industry develop on healthy lines and there is maximum efficiency in sugarcane cultivation and its processing. The Committee, therefore, proposes to examine the entire gamut of Government policies and institutional arrangements relating to sugarcane research, development and supply, setting up and functioning of sugar mills, research and development in the industry, utilisation of by-products, imports and exports to see if any modifications therein are required for promoting efficiency at farm and the factory level. Since a substantial part of sugarcane is also used for manufacture of gur and khandsari, we propose to examine policies relating to that sector also.

11.3 Any modifications, amendments or repeal of any existing law would follow the Government decisions on the Committee's recommendations in regard to various policy issues. We, therefore, do not propose to suggest specific drafts of modifications, amendments or repeal of any existing law and would suggest only broad changes that need to be made.

11.4 Sugar industry is a highly regulated industry. There are large number of regulations relating to virtually all the aspects of the industry including pricing of sugarcane, price and distribution of sugar, setting up of new and expansion of existing sugar mills, storage and sale of sugar by wholesalers and retailers, sale of by-products of the industry etc. Controls lead to corruption, delays, abuse of power and distortions in economic decision making due to bureaucratic and political considerations. These deflect the time and energies of entrepreneurs from efficient management of their units to complying with procedural requirements, pursuing various authorities for approvals, permissions and relaxations and trying to find loopholes to evade their provisions. These negative effects of controls have to be set off against the likely advantages to be derived from them. This is the rationale for abolition or relaxation of various controls which the Government of India have been carrying out during the last few years under the policy of liberalisation and economic reforms throughout the economy to speed up the rate of economic growth. Various controls still existing on the sugar industry need to be reviewed in this light and only where there are compelling reasons for continuing with a control in the peculiar conditions of the industry or broad based socio-economic considerations that its continuance

would be justified. In such cases, necessary modifications or simplification of procedure will be considered to minimise their adverse effects.

11.5 The general policies relating to subsidies on agricultural input like irrigation water, electricity for pumping and fertilisers and ceilings on agricultural land have an impact on sugarcane cultivation like other agricultural crops. The existing legislation on cooperatives has an impact on the working of the cooperative sugar factories. Similarly, labour legislation and policies regarding trade unions, industrial disputes, job security, retrenchment of surplus labour etc. may have an effect on labour productivity and modernisation. These general Government policies do not fall strictly within the Terms of Reference of the Committee. We, therefore, do not propose to deal with these issues in our Report except where any specific modification in respect of sugarcane or sugar industry may be necessary and which can be attempted within the overall framework of these general policies.

Chapter 12

Licensing & Cane Area Reservation

IDR Act, 1951

12.1.1 In 1930-31, sugar industry was in its infancy. After tariff protection, number of factories rose steadily and was around 139 in 1950-51. The sugar factories were set up by entrepreneurs without any permit or licence from Government of India. The Industries (Development & Regulation) Act, 1951 was promulgated in May 1951 and thereafter it became mandatory for all sugar factories in operation to obtain licences. Since then, establishment of new factories and expansion of existing capacities requires prior licensing.

12.1.2 At the time of introduction of licensing in 1951, there were

139 sugar factories with an assessed installed capacity of 16.68 lakh tonnes

as against which the actual production was 11.01 lakh tonnes. No new licences were issued till 1954 as existing installed capacity was considered adequate. Thereafter the targeted capacity was raised to 20.3 lakh tonnes and application for licences were invited. The response was tardy and in 1955-56 when the First Plan ended, there were 143 units, an addition of mere 4 units with an installed capacity of 17.77 lakh tonnes, and there was shortfall of 2.53 lakh tonnes installed capacity against the target.

2nd Five Year Plan (1956-61). Licensing Committee

12.2.1 For the Second Five Year Plan (1956-61), licensed capacity was fixed at 25.4 lakh tonnes and a Licensing Committee was set up with following guidelines to sanction additional capacities :-

(i) Availability of sugarcane and facilities of transporting raw materials to the factories.

(ii) Possibility of developing sugarcane cultivation in the area having regard to availability of irrigation facilities, weather conditions and other relevant factors.

(iii) Technical feasibility and economic viability of the project.

(iv) Capacity of the entrepreneurs to complete the proposed project in time.

12.2.2 Details of capacity licensed and commissioned and the position at the end of plan period in 1960-61 is shown in Table 12.1.

Table 12.1 - Progress of licence implementation during 2nd Plan

Period (1956-61)	Licences issued		Licences implemented	
	Number of units	Capacity (L/tonnes)	Number of units	Capacity (L/tonnes)
New	52	7.37	36	5.20
Expansion	71	4.75	40	2.58
Total	123	12.12	76	7.78

(Source : Indian Sugar Mill Association Year Book)

Third Five Year Plan (1961-66)

12.3.1 With the anticipated increase in demand for sugar, fresh applications were called for. A Negotiating Committee appointed by Ministry of Industry in 1960, after scrutiny of applications, approved grant of licences for 20 new units and expansion in 40 existing units. Due to glut in production in 1959-60 and 1960-61, licensing was suspended in May 1961.

12.3.2 In 1962, a fresh assessment of capacity was done adopting new norms of recovery and duration. Licensed and installed capacity at the end of the 3rd Plan period was 33.78 and 32.25 lakh tonnes respectively.

Fourth Five Year Plan (1969-74)

12.4 There was a break of two years and the 4th Plan commenced in 1969-70. Licences were issued for additional capacity of 11.2 lakh tonnes during these two years. Based on the average working results of 1958-59 to 1967-68 seasons, fresh assessment of capacity was done and the figures of licenced and installed capacities were brought down from earlier level. Overall licensed capacity in early 1969 was reduced from 44.80 lakh tonnes to 44.51 lakh tonnes. To keep up with rising consumption trend, licensed capacity during the Plan was fixed at 56 lakh tonnes and the installed capacity actually achieved stood at 43.06 lakh tonnes. New licences were issued for a minimum economic capacity of 1250 TCD only.

Libralised licensing policy

12.5 Vide Press Note dated 1st January, 1972, relaxation in licensing procedure was announced covering expansion cases only. A capacity of 1.21 lakh tonnes was registered. The scheme was withdrawn from 1.11.72.

Fifth Five Year Plan (1974-79)

12.6 In 1974, there were 244 factories in operation with an installed capacity of 43.06 lakh tonnes. At the end of plan period in 1979, the licensed capacity and installed capacity was 74.19 and 56.26 lakh tonnes respectively.

Sixth Five Year Plan (1980-85)

12.7.1 Working Group set up to assess capacity creation requirements based on anticipated consumption growth recommended a licensed capacity of 80.42 lakh tonnes. The ratio of new and expansion for additional capacity was recommended at 40:60. Government reversed the ratio.

Press Note dated 4.7.84

12.7.2 Ministry of Industry issued guidelines for licensing new factories vide Press Note dated 4th July, 1984. The salient features were as follows:-

(i) Priority in licensing to cooperative and public sector would continue.

(ii) No licence for establishment of a new factory would be given for a location within 30 kilometres of an existing factory.

(iii) In areas where there are many sugar factories, State Government would ensure adequate cane area for them by proper zoning before taking up cases of expansion or new factories.

12.7.3 Vide Press Note no. 14 dated 24th September 1984, Government restricted the expansion to 3500 TCD with rare exceptions for licensing beyond 3500 TCD. New sugar factories were to be confined to districts with adequate cane availability. All applications for new and expansion were to be routed through State Governments who were to certify about cane availability while forwarding them.

12.7.4 At the end of the plan period, licensed and installed capacity were 87.47 and 72.98 lakh tonnes respectively.

Seventh Five Year Plan (1985-90)

12.8.1 Ministry of Industry issued a number of guidelines on licensing, making notable changes in procedure and policy during the period. They are summarised below :-

Press Note No. 1 (1989 series) dated 2.1.87)

12.8.2 Earlier conditions on sectoral priority in licensing, need for cane availability, zoning of cane area by State Governments and routing of licence applications through State Government were repeated. The distance between existing factory and proposed new factory was raised from 30 kms to 40 kms.

12.8.3 Minimum capacity for new sugar factory was raised to 2500 TCD. Upper limit of expansion was pegged at 3500 TCD and expansion beyond this upto 5000 TCD was allowed on increased cane availability in existing area through productivity improvements.

Press Note No. 15 (1988) dated 10.6.88

12.8.4 By this Press Note, the validity period of letters of intent was raised from one to three years. By Press Note no. 27 dated 19.10.89, Government dispersed with the requirement of routing licence applications through State Government and allowed direct applications to Secretariat for Industrial Approval in the Department of Industrial Development. However, State Governments were required to certify about cane availability in each case. This was a major step in streamlining licensing procedure and cutting down delays.

Press Note No. 12 (1989) dated 11.5.89

12.8.5 In industrially backward area suited for cane cultivation, initial licensing of new factories in cooperative/public sector would be for 1750 TCD to be expanded to 2500 TCD within five years of commencing production.

12.8.6 Spatial distance was reduced from 40 kms to 25 kms on fulfillment of specific conditions as (i) average cane yield to be 20% more than national average, (ii) 40% of cane area to be under improved variety and (iii) adequate cane availability through zoning should be ensured for existing factories and initial capacity would be only 2500 TCD. Incentives would be granted to 1750 TCD factories also.

Reassessment of capacity

12.9.1 On the recommendations of the Committee on Development Programme during 8th Five Year Plan, the installed capacity was reassessed based on the working results of 1978-79 to 1987-88 seasons (10 years). Because of improved working conditions, the assessed capacity was more.

12.9.2 At the end of the Seventh Five Year Plan period (1990), the licensed and installed capacities were 162.23 and 93.41 lakh tonnes respectively. There was a sharp increase in licensed capacity from 87.47 lakh tonnes as on 1985 to 162.23 lakh tonnes as on 1990 against the target of 132.61 lakh tonnes. During 1985-90, 103 new licences and 161 expansion licences were issued. Balance capacity was covered by reendorsement of licences under various Press Notes issued on the subject. However, installed capacity rose from 72.98 lakh tonnes (1985) to only 93.41 lakh tonnes (1990), implying non-completion of several

projects licensed. As against the target of 491 licences, only 396 factories were in operation. The maximum number of non-commissioning was in the cooperative sector.

12.9.3 There was a break for two years, ie, 1990-91 and 1991-92 before the next Five Year Plan was started.

Press Note No. 16 (1991) dated 8.11.91

12.10 A fresh Press Note was issued conveying several amendments to guidelines on licensing covering the period 1991-92 to 1996-97. They are summarised as under :-

(i) New licences could be issued for capacity without any maximum limit but not below 2500 TCD.

(ii) Distance between proposed and existing factory was kept at 25 kms with a stipulation of reduction to 15 kms in special cases where cane availability so justifies.

(iii) New factories will pay cane price based on sucrose content of sugarcane.

(iv) Priority for expansion upto 2500 TCD will be given.

(v) Grant of licences would be limited by the quantum of additional capacity to be created upto 1996-97.

(vi) Licences for establishing downstream projects would also be given simultaneously, if requested for.

(vii) All applications for expansion of existing factories will be cleared automatically.

(viii) Other conditions as sectoral priority, examination of applications by Ministry of Food, etc. were retained.

Eighth Five Year Plan (1992-97)

12.11.1 The basic guidelines were notified by Government vide Press Note no. 16 (1991 series) dated 08.11.91 mentioned above. Ministry of Food vide O.M. no. 1-4/90-SPY (D II) dated 08.06.93 dispensed with the need for examining proposals in regard to licences for expansion in capacity by the Screeing Committee and instead a decision was taken to examine the cases on merit and send appropriate recommendations to the Secretariat for Industrial Approval in the Department of Industrial Development.

12.11.2 As on 28.2.98, the licensed capacity and installed capacity are 271.42 and 134.33 lakh tonnes respectively. Breakup of the capacity by sector is shown in Table 12.2.

Table 12.2 - Licensed and installed capacities as on 28.2.98

Sector	No. of factories		Capacity (lakh tonnes)	
	Licensed	Installed	Licensed	Installed
1. Govt/Public	79	66	20.00	13.03
2. Private	276	140	117.34	45.32
3. Cooperative	346	254	143.24	79.40
Total	701	460	281.58	137.75

Current policy

12.12.1 Current Government policy on licensing is governed by the two press notes issued by Ministry of Industry in 1997.

Press Note No. 1 (1997 series) dated 10.1.97

12.12.2 On 10th January 1997, vide Press Note No. 1 (1997 series), Government issued guidelines for considering application in regard to licensing in sugar industry. The main provisions with regard to minimum capacities, spatial distance between factories remained same. Special emphasis was laid on development of integrated complex including cogeneration of power. It was announced that expansion proposals would be cleared automatically.

Press Note No. 6 (1997) dated 25.05.97

12.12.3 Government reduced the validity period of letters of intent issued for setting up new sugar factories from three years to one year and laid down conditions for considering requests for extension of LOI, as given below:-

(i) Acquisition of land for location of sugar mill.

(ii) Commencement of civil work.

(iii) Placement of order for plant and machinery.

(iv) Filing of application for term loan (if required).

12.12.4 Any applicant requesting for extension of LOI, must comply with conditions (i) and (ii) and either of the other two and submit proof in support thereof.

12.12.5 Request for change of location has to be made within three months from the date of LOI. All earlier LOIs issued prior to 28th May, 1997 would be valid for one year or the date of expiry, whichever is earlier.

12.12.6 The above guideline was issued to neutralise the tendency of licences to block areas and not go ahead with setting up of factories.

Ninth Five Year Plan (1997-2002)

12.13 The task force constituted to formulate development programme for sugar industry for the Ninth Five Year Plan has projected sugar requirement to 184.83 lakh tonnes for internal consumption plus 10 lakh tonnes for export by 2001-02 on the assumption of 7% p.a. growth rate of GDP and 1.7% annual growth rate of population during the Plan period. Targets of licenced and installed capacity have been fixed at 252.46 and 205.08 lakh tonnes respectively. Yearwise targets are given in Table 12.3.

Table 12.3 – Targets of production, installed and licensed capacity of sugar (in lakh tonnes) during the 9th Plan at 5.60% compound growth in internal consumption on assumption of 7% growth in GDP

Year	Targets		
	Production	Installed Capacity	Licensed Capacity
1. 1997-1998	158.63	166.98	205.08
2. 1998-1999	166.95	175.74	215.98
3. 1999-2000	175.74	184.99	227.48
4. 2000-2001	185.03	194.77	239.62
5. 2001-2002	194.83	205.08	252.46

(Source : Ministry of Food)

Issue of licences

12.14.1 Licences for establishment of new sugar factories and expansion of capacity in existing factories is being issued over the years after following procedures laid down. There have frequently been bunching in issue of licences. For instance, during 1994-95, only two licences were issued while during 1996-97, as many as 42 licences were issued during the four months - January to April 1997. Earlier, during March 1994, 44 licences had been issued.

12.14.2 With capacity constraint by way of equipment suppliers, these licences, particularly new ones, would be completed after a long time. Issuing of numerous licences at any point of time would render the job of completion more difficult.

LICENCES UNDER IMPLEMENTATION

12.15 As on 28.2.98, the position of licences issued for setting up new sugar factories and expansion of existing factories which are yet to be implemented, is shown in Table 12.4.

Table 12.4 - Sectorwise licences which remain to be implemented

Category	Sector			Total
	Govt/Public	Private	Cooperative	
New mills	12	140	89	241
Expansion	25	82	128	235*

* includes 20 factories who had re-endorsed their capacities under various Press notes issued in 1986

(Source : Directorate of Sugar)

Pendency of licences

12.16 Further scrutiny of data reveals the period of pendency of these licences for completion. It is summarised in Table 12.5.

Table 12.5 - Period of pendency of licences

Category		Period of pendency in implementation (in years)			
		> 5	3 > < 5	< 3	Total
A.	New				
i)	Govt/Public Sector	2	-	10	12
ii)	Private Sector	12	34	94	140
iii)	Cooperative Sector	32	24	33	89
	Total	46	58	137	241
B.	Expansion				
i)	Govt/Public Sector	20	1	4	25
ii)	Private Sector	13	11	58	82(+2)
iii)	Cooperative Sector	46	13	49	108(+18)
	Total	79	25	111	215(+20)

(Source : Directorate of Sugar)

It will be seen that 46 licences for new mills and 77 for expansion are pending implementation for more than five years.

New factories

12.17 Licences have generally been issued for setting up a new capacity of 2500 TCD. In the State of UP, two new licences were issued for 3000 and 5000 TCD respectively and one licence for 800 TCD is pending for nearly 40 years. Barring this, new licences have been issued for 2500 TCD only, which is deemed to be the minimum economic capacity. Statewise and sectorwise details are given in Annexures 12(1) and 12(1)(a) to 12(1)(c).

Expansion licences

12.18 In respect of expansion, licences issued for different capacity range pending implementation are summarised below in Table 12.6. Statewise and sectorwise details are given in Annexure 12(2) and 12(2)(a) to 12(2)(c).

Table 12.6 - Capacitywise & sectorwise details of licences for expansion pending implementation

Category	Range of expansion (TCD)			
	Upto 2500	Upto 5000	5000 & and above	Total
Govt/Public Sector	21	4	-	25
Private Sector	20 (1)	40 (1)	22	82 (2)
Cooperative Sector	69 (8)	34 (10)	5	108 (18)
Total	110 (9)	78 (11)	27	215 (20)

Note :- Figures in brackets refer to re-endorsements done under various Press notes.
(Source : Directorate of Sugar)

12.19 119 out of 215 cases pertain to expansion of units upto the minimum stipulated economic capacity of 2500 TCD. Private sector leads the field in the case of licences under expansion beyond 5000 TCD. Bulk of these are being implemented in Uttar Pradesh.

Cane Area Reservation

12.20 Sugarcane is included in Section 2(a) of the Essential Commodities Act, 1955 by virtue of which Government is empowered to control its production, distribution and supply. There is no compulsion for farmers to cultivate cane. Government only regulates its supply to sugar factories by provisions of Clause 6 of the Sugarcane (Control)

Order, 1966. Factories are allotted cane areas from which they alone can draw cane. Under the provisions of Clause 11 of the said order, Central Government had delegated powers with regard to regulation of cane supply to the State Governments. Under Clause 6 of the Order, Central Government is empowered to reserve area for a factory having regard to the crushing capacity of the factory, the availability of sugarcane in the reserved area and the need for production of sugar with a view to enabling the factory to purchase the quantity of sugarcane required by it. The cane growers within the reserved area are required to enter into a bond with the factory for supply of specified quantity or percentage of sugarcane grown by them and are not allowed to supply cane to any factory outside the reserved area except under a permit issued in this behalf. The factories are correspondingly under obligation to crush all the cane which is bonded by the growers.

Views of the Committee

12.21 It is sometimes argued that these restrictions requiring supply of cane only to specified mill should be removed in the interest of competition and the growers should be free to supply cane to any mill of their choice. The Committee has given a careful thought to this issue. Sugarcane which is the main raw material for production of sugar is highly perishable. It dries up and loses its sucrose content if it is not crushed within a short period after harvesting. If it has to be transported over long distances it not only involves excessive cost of transportation but also leads to reduction in its sucrose content. In the absence of system of cane reservation, it will be difficult for sugar factories to regulate the supply of cane by the farmers according to the crushing capacity available on each day. It would then result in inadequate sugarcane being available on some days leading to uneconomic working of the mill and excessive cane coming to the mill on other days leading to long waiting period for the growers who bring cane. Some of them may in the latter case have to carry their cane to distant mills for disposal involving higher transportation cost as well as driage of cane.

12.22 The system of cane reservation enables permanent linkage between the mill and the cane growers. This would provide the necessary incentive to the mills to undertake the cane development work in its reserved area. In the absence of cane area reservation, a factory would not be sure that the additional cane or cane of better quality produced as a result of its development efforts would not go to another factory thus depriving it of any benefits of its investment in cane development.

The system of reservation also helps the cane development work by ensuring that the credit that may be advanced by the mill or by a bank on the guarantee of the mill would get recovered from the cane price at the time of supply of cane to the mill and thus helps the flow of credit for sugarcane growers. International experience also suggests as mentioned in para 10.16.1 that where, as in Thailand, there is no reservation of cane area for different mills and where there is no other form of binding contract between mills and growers, millers cannot effectively schedule cane deliveries and there is little cooperation between millers and growers in terms of cane development and agricultural extension work. The mills in such situations also tend to install higher capacities to be able to crush the cane that is offered for supply during the peak season which leads to higher cost of production. Even World Bank, which is generally in favour of removal of all restrictions, has conceded* that with very few exceptions, e.g., Thailand and Phillippines, zoning is widely practised throughout the world.

* Unpublished Draft Report on 'India's Sugar Industry - Priorities for Reforms' Vol I April 1997 Executive Summary para 5

12.23 In view of the above, the committee is of the considered view that the system of cane area reservation should continue. For obtaining full benefits from the system, however, certain modifications are necessary.

12.24 In some of the States, particularly in northern States, the cane area reservation is done on a year to year basis. As the Standing Committee on Food, Civil Supplies & Public Distribution [1995-96 (10th Lok Sabha)] in its 15th report on Sugar observed in para 10 of part-B, this results in growers not aligning their interest with the factory and the factory turning a Nelson's eye to cane development work. The Committee, therefore, recommend that the reservation orders of long term periodicity may be issued depending upon the capacities of the units as this will not only ensure durable planning for cane production in mill areas but would also facilitate execution of pre-sowing agreement between factories and cane growers. This Committee fully endorses the recommendations of the Standing Committee of the Lok Sabha and recommends that the reservation of cane area should be made on a permanent basis and not on year to year basis so that mills have interests in developing cane in their area.

12.25 The guidelines contained in Clause 6 of the Sugarcane (Control) Order, 1966 provide for the area being reserved having regard to the crushing capacity of the factory. This does not take into account the additional cane that would be required on expansion of the capacity of the mills. Many of the factories in this country are of small capacities and they need to expand to reach an economic size. If the reserved area is based only on the requirement of cane for the existing capacity it may become difficult for the factory to expand in future. At the same time excessive additional area cannot be permanently earmarked for a factory for its possible expansion thus preventing the setting up of a new mill or expansion of the capacity of another mill merely for meeting the contingency of expansion of the capacity of the factory at an indeterminate future date and the factory may not actually expand its capacity. On balance it may, therefore, be adequate if the additional cane required for the factory to meet its requirements for expansion which is under implementation is taken into account.

12.26 Even when the cane area is reserved on a permanent basis, it may sometimes become necessary to transfer some area out of the reserved area of a mill for setting up a new mill or expansion of the capacity of another mill or on account of the diversion of area in the reserved area of the adjoining mill to some other crop leading to inadequate availability of cane for that mill. However, in such cases transfer of any part of the reserved area from a mill should be made only if cane availability is surplus to its requirements for its existing capacity, including expansion under implementation, for the length of the normal season. However, in order to provide a disincentive against neglect of cane development work in the reserved area, if the per hectare yield of cane in the area of the factory is less than the average yield in other similar areas due to inadequate development work by the factory, then availability of cane in the reserved area may be determined on the basis of per hectare yield in similar areas rather than the per hectare yield in the area of the mills. In all such cases the excess area may be transferred from the factory only after giving it an opportunity to show cause against such transfer. Provisions in this regard may be suitably made in Sugarcane (Control) Order.

12.27 It has been stated by some of the mills during the visits of the Committee that State Governments sometimes under political pressures or for other considerations transfer the cane area from the reserved area of a factory to another. This often adversely affects the working of the

factory from which the area is transferred due to inadequate availability of cane. Since the availability of adequate quantity of cane from a reasonable distance is an essential prerequisite for economic working of a sugar mill and any unjustified transfer of area from the reserved area of a factory would have serious adverse effect on it, a provision may also be made in the Sugarcane (Control) Order for appeal to a quasi-judicial authority to be set up by the Government of India against an order of transfer of cane area from the reserved area of a factory to another.

12.28 It has been reported to the Committee that in some of the States where no systematic demarcation of the reserved area of various factories in the States has been done in the recent past, the present reserved areas are not conducive to efficient functioning of the mills. In many cases, these involve transportation of cane by factories over long distances while areas nearer to them have been allotted to some other factory. There is a weight in this contention. The Standing Committee of the Lok Sabha 1995-96 in para 10 of the Report mentioned in para 12.24 above, also observed that in several cases, villages reserved or allotted to different factories are interspersed. It is recommended that in States where no systematic demarcation of reserved area has been done, a fresh demarcation of such areas may be made to ensure that the reserved area allotted to every factory is reasonable having regard to its requirement of cane, availability of cane in the area and distance of various cane growing areas from the factory. While making this redemarcation, factories may be given an opportunity of showing cause against the proposed transfer of area from its reserved area. Once the redemarcation has been made, the reserved area may thereafter be maintained on a permanent basis as recommended above.

12.29 Some of the sugar cooperatives have been registered as multi-State Cooperative Societies under the Multi-State Cooperative Societies Act. Section 18(2)(b) of the Act provides for consultation by the Central Registrar with the Registrars of Cooperative Societies of the States concerned before registering a cooperative society under the Act. It has been reported that this provision has sometimes not been followed. Since the registration of a multi-State Sugar Cooperative Society may involve the supply of cane from the reserved area of an existing mill in the other States, it is suggested that this provision regarding prior consultation with the Registrars of Cooperative Societies of the States concerned should be strictly followed and the Registrars of the States

concerned should before giving their consent ascertain the views of the concerned sugar factories if the transfer of any part of their reserved area to the multi-State Society would be involved.

12.30 While under the system of cane area reservation growers are required to supply their cane only to the factory within whose reserved area they are located, there may be situations where the factory refuses registration or bonding because of inadequate capacity or it is unable to crush the bonded cane within normal season so that the growers have to wait for their turn till hot summer months leading to driage of cane. The growers may, therefore, be permitted to supply cane to the factory outside the reserved area if the factory refuses registration or bonding because of inadequate capacity or it is unable to crush the bonded cane within normal season or at the latest within 15 days after end of the normal season. Cane should, however, not be transferred from the reserved area of a mill to another mill merely for the purpose of ironing out of difference in the availability of cane between the two mills during the year of cane shortage as it tends to penalise the mill which through its efforts at cane development ensures larger production of cane in its area.

12.31 The discipline of cane area reservation should apply equally to cooperative mills as well as to private mills. In the case of cooperative mills also the growers, whether they are members or non-members, should not be permitted to supply cane to a mill outside the reserved area and the mill should be under an obligation to crush all the bonded cane that is supplied to it. The growers in the area of the cooperative mill may also be permitted to supply cane to the factory outside the reserved area only in the circumstances mentioned in the previous para. However, this would require that non-members should also be treated equally with the members in regard to cane price and scheduling although the cooperative mill may pay dividend or give other concessions to its members by virtue of their share holding.

12.32 In some States, the penalty for poaching of cane by a factory in the reserved area of another factory is very inadequate. For example, it has been reported that in Punjab the penalty for poaching is only forfeiture of Rs.1000/- security or maximum fine of Rs.2000/- on conviction in a Court. This penalty is obviously totally inadequate to deter the mills from poaching of the cane in the reserved area of another mill. The penalty for the purpose needs to be suitably enhanced in all such States to make it an effective deterrent.

12.33 In regard to licensing the policy of the Central Government since the announcement of the new Industrial Policy in July, 1992 has been to progressively abolish licences. After 17th July 1997, now only the following nine industries need licences :-

(1) Coal and Lignite

(2) Petroleum (other than crude) and its distillation products.

(3) Distillation and brewing of alcoholic drinks.

(4) Sugar

(5) Cigars and cigarettes of tobacco and manufactured tobacco substitutes.

(6) Electronic aerospace and defence equipment: all types

(7) Industrial explosives including detonating fuses, safety fuses, gun powder, nitrocellulose and matches

(8) Hazardous chemicals

(9) Drugs and Pharmaceuticals

12.34 Some of the industries where licensing is still required such as coal and lignite and petroleum concern exhaustible natural resources, some like distillation of alcoholic drinks, cigars, cigarettes, hazardous chemicals, industrial explosives, drugs and pharmaceuticals are those which need control from the point of view of public health and safety, while others like electronic aerospace and defence equipment are concerned with the defence of the country. Sugar is the only industry which now needs compulsory licensing and does not fall in any of these categories.

12.35 The system of licensing as implemented so far in the sugar industry has prevented setting up of units close to each other and to any existing factory. It has, however, had a number of adverse effects. As a result of licensing, location of mills has been in many cases determined by political rather than economic considerations so that licences got issued in areas with low cane availability and higher cost of production. While the Licensing Policy guidelines required the availability of adequate quantity of cane it also permitted the issue of licence where there was possibility of developing sugarcane cultivation.

This was, of course, necessary as in many cases the sugarcane cultivation expands after a sugar mill, which provides assured avenue of marketing, is set up. However, this has sometimes been deliberately manipulated to indicate inflated estimates of likely sugarcane production in future merely to obtain a licence. As a result, the factories which have been set up in such areas have subsequently gone sick due to inadequate availability of cane and also adversely affected the existing neighbouring factories by drawing a part of cane from them. Secondly, long delays have frequently occurred in grant of licences as this involved the obtaining of comments from the State Governments, the consideration of the application by a Standing Committee in the Ministry of Food and thereafter by the Licensing Committee in the Ministry of Industry. Some of the applications also got delayed on political considerations. As a result of the long delays, the cost of installation went up and sometimes even the entrepreneurs lost interest. The Government of Bihar stated during the discussions with the Committee that in case of a number of licences granted in the State, the applicant had lost interest because of long delays and there was no possibility of those licences being implemented. These delays in issue of licences also resulted in periodical shortage of capacity. Thirdly, the requirement of minimum capacity led to setting up of units of prescribed minimum capacity even where adequate cane was not available for meeting the requirement of such capacity. Thus, even where the availability of cane would justify the setting up of only the 1500 tonnes or 1750 tonnes capacity mill, the applications were made for setting up of 2500 TCD capacity mills because that was the minimum capacity for which the licence would be issued. Since adequate cane did not become available for a number of years to fully utilise the capacity, the same remained under-utilised leading to higher overhead costs so that the units became sick. Fourthly, there was frequently bunching of licences. As mentioned in para 12.14.1 as many as 42 licences were issued during the four months from January to April, 1997 and earlier 44 licences were issued during March, 1994. Since the capacity of sugar machinery manufacturing in the country is limited and it can manufacture about 12 to 13 plants in a year, the large number of buyers resulted in the machinery prices going up and thus resulting in higher cost of installation. Fifthly, delicensing has afforded protection to many old and inefficient units by not allowing a more efficient unit to be set up in its vicinity to provide competition. Finally, there is the element of corruption and waste of entrepreneurs' time in pursuing applications for licences, their extension etc., common to all licensing regulations.

12.36 In view of these drawbacks and in light of the general policy of delicensing followed by the Government in other sectors, a strong case can be made out for delicensing of the sugar industry also. The Standing Committee of the 10th Lok Sabha in para 22 of Part B of its report referred to in para 12.24 above, had also recommended that the industry be delicensed. However, there are certain special features of the industry which also need to be taken into consideration. As mentioned above, sugarcane, which is the main raw material of the industry, is highly perishable and its transportation over long distance not only involves high cost but also loss of sucrose content and driage. It is, therefore, essential that the cane must be crushed within a short period after its harvesting. For this and other reasons such as the need to encourage cane development work by the sugar mills and ensuring proper scheduling of cane supplies, we have recommended above the retention of the system of cane area reservation with suitable modifications. This would necessarily require a licence to enable an applicant to make an application for cane area reservation. It is also necessary to ensure for the same considerations that new sugar factory is not installed very close to an existing sugar factory which would be possible only under a system of licensing. Some of the drawbacks earlier experienced in the system of licensing have now been removed with liberalised policy of licensing notified in January, 1997. After careful consideration, the Committee is, therefore, of the view that the balance of advantage lies in continuing the system of licences, subject to the modifications suggested in the subsequent paras :-

(i) While the liberalised policy for the grant of licences may be continued, even under the liberalised system, it needs to be ensured that the applicant for the licence is serious and capable of implementing the licence. Otherwise, the application may be filed merely to prevent a mill coming up in a particular area to avoid competition. Before issuing a licence / LOI, it should, therefore be ensured that the promoters have adequate financial resources to provide for equity or have the capability to arrange the requisite equity. In case of cooperative societies, it may be difficult for the promoters to arrange the entire requisite share capital, which at 10% of the estimated cost of over rupees fifty crores for 2500 TCD plant will be over rupees five crores, as large number of farmers are involved. In their case, it should, therefore be adequate if the promoters have collected at least 2.5% of estimated capital cost of the

unit for which licence has been applied. Department of Sugar & Edible Oil should indicate to Department of Industry from time to time, the estimated capital cost of mills with different capacities on the basis of the cost of projects recently financed by the financial institutions.

(ii) The restriction regarding maximum capacity of the unit to be licenced, which was initially imposed, has subsequently been rightly deleted. The restriction on the minimum capacity of 2500 TCD, however, still continues to be enforced. The restriction had been imposed to ensure that mills of uneconomic size are not set up. While the objective is unexceptional, it has sometimes unintended adverse effects. In many areas, the sugarcane required to sustain a 2500 TCD capacity mill would take a number of years to develop. In those areas, it may be economically better to initially instal a mill of a lower capacity to match likely availability of sugarcane and then progressively increase its capacity as the sugarcane availability improves. Because of the insistence in the licensing policy on licensing only mills of 2500 TCD capacity and above, the entrepreneurs had to set up mills of 2500 TCD even in such areas with the result that for a number of years, the capacity of the mills remained under-utilised due to inadequate availability of cane and the resultant increase in overhead cost per unit of output has landed the factories in financial difficulties. Further, in some areas, the availability of sugarcane even after development work is not likely to be adequate for a mill of 2500 TCD capacity but a lower capacity mill may still be viable in that area due to higher price of sugar because the area is deficit in meeting its requirements and cost of transportation from surplus area is high. Insistence on setting up of units with minimum 2500 TCD capacity deprives the farmers of these areas the benefit of a sugar mill, though same is otherwise economically viable. It is therefore recommended that the condition regarding minimum capacity of 2500 TCD may also be removed. It should be left to the entrepreneurs or the managers to determine the economic size of the unit to be set up by them and for the financial institutions to judge the viability of the unit of a particular size before financing it. The stipulation of minimum economic capacity of 2500 TCD in the licensing policy in fact gives a wrong signal to the financial institutions that the plant of this capacity is financially viable under all circumstances, which may in fact not be so.

(iii) There should be no need for a licence for expansion in capacity, only registration with the Government of India and the State Government should be enough. Even in the Press Note No. 1 of 1997, it is stipulated that all applications for expansion of the existing factories

will be cleared automatically. A large number of units in India are of small size and every encouragement needs to be given to them to expand their capacity. The procedural requirement of making an application for a licence for expansion may, therefore, also be done away with. However, if additional cane area is required to be included in the reserved area of a mill after expansion, the application will have to be made to the State Government for allocation of additional reserved area before expansion of capacity is undertaken. Such an application will be dealt by the State Government according to the procedure recommended by us for transfer of area from the reserved area of an existing mill, if such a transfer is involved.

(iv) As mentioned in para 12.12.3, the validity period of letter of intent issued for setting up of new sugar factories has been reduced from three years to one year and conditions have been prescribed for considering requests for extension of LOI. This has been done as many LOIs issued in the past did not fructify and remained approvals on paper for the entire initial validity of three years and the location mentioned in such LOIs remained unavailable for other applicants. Other locations less than fifteen kilometres away from the location mentioned in a valid LOI also cannot be considered and the farmers in the zone allocated to the proposed unit suffer. There is considerable force in this argument. However, in case of cooperative sugar mills, it takes considerable time to collect the necessary share capital from the growers and the sanction of the term loan by the financial institutions is also consequently delayed. There is no point in commencing the civil works or placing orders for plant and machinery until the financial resources have been tied up. They would, therefore, not be able to satisfy the conditions mentioned in the Press Note 6 of 1997 for extension in the validity period of the LOI. In case of cooperative societies, the initial period of validity of LOI may, therefore, be increased from one year to three years. The total period for implementation of the LOI may, however, remain five years.

(v) In Press Note dated 4.7.84, it was stipulated that no licence would normally be granted for establishing a new sugar factory within a radius of 30 kms of an existing unit. The minimum distance was increased to 40 kms vide Press Note dated 2.1.87. Subsequently, the minimum distance was reduced to 25 kms vide Press Note dated 11.5.89 on fulfilment of certain conditions regarding average cane yield and percentage of area under improved variety. This minimum distance of 25

kms was retained in the Press Note dated 8.11.91 with the stipulation that it could be relaxed to 15 kms in special cases where cane availability so justifies. This minimum distance has been reduced to 15 kms vide Press Note dated 10.1.97. The reasons for this reduction in minimum distance have not been indicated but it is presumably to allow setting up of a larger number of new units. The condition regarding minimum spatial distance is of considerable importance for ensuring economic viability of the sugar mills. The Committee have carefully considered the matter. It is of the considered view that the spatial distance of 15 kms between the new and the old sugar mill which would provide cane reserved area in a radius of 7.5 kms is grossly inadequate. With the increase in the size of economically viable mills, the requirement of reserved area for ensuring adequate availability of cane has tended to increase while the spatial distance has been progressively reduced from 40 to 15 kms. Setting up of new mills so close to the existing mill will also make it difficult to check poaching by one mill on the cane in the reserved area of the other mill, particularly during the seasons of low availability of sugarcane. At the same time, excessive distance requirement may prevent setting up of sugar mills in areas where they are needed, thus affecting adversely the interests of the growers of that area. Taking into account both the factors, the Committee is of the considered view that the radial distance from an existing mill for setting up of a new mill should be kept at 25 kms.

Chapter 13

Price Control & PDS

Position prior to 1942

13.1 In the formative years of the industry, when the factories were practically concentrated in the States of Uttar Pradesh and Bihar, the prices of different qualities of sugar used to be fixed on an informal basis in the Indian Sugar Syndicate in the context of ruling market conditions including the price of Java sugar and the position of demand and supply in the country.

Statutory Control 1942-1947

13.2 Statutory control over price and distribution of sugar was imposed by Government for the first time in April 1942 by an order under Defence of India Rules. The order was entitled Sugar Control Order, later amended as Sugar & Sugar Products Control Order. By this step, Government had full control over production, distribution and price of sugar. Full control lasted from 1st May, 1942 to 7th December, 1947.

Decontrol-Phases

13.3.1 Control was lifted from 8.12.47 for nearly two years upto 1.9.49. Decontrol was not functioning properly and several irregularities committed by Sugar Syndicate and its members came to light. There were allegations of heavy premium being charged by factories and selling agents over the price informally agreed to by the industry. Prices of sugar also rose in several markets. From 2nd September, 1949, control was reimposed and remained in force till December 1950. Production in 1949-50 was below 10 lakh tonnes and there was diversion of cane to other sweeteners which were free from any sort of control and could effectively compete with vacuum pan sugar industry. Partial relaxation on control was allowed in December 1950. Under the new dispensation, excess production after December 1950, which was 90% more than 1949-50 production, was allowed to be sold in the free market without any sort of restriction. In 1951-52 season, 95% of average production of 1948-49 and 1949-50 seasons was kept as basic production and 50% of excess alone was allowed to be sold in the free market. There was a sharp improvement in production in 1951-52 season. Control was relaxed in 1952-53 season, except for reservation of a small part of stock for controlled distribution at prices determined by Government. No statutory control was exercised in 1953-54 season. However, 25% of sugar was acquired at a predetermined price and distributed on tender

basis at a uniform price throughout the country on f.o.r. basis. No price control was exercised during the next three sugar seasons - 1954-55, 1955-56 and 1956-57.

13.3.2 Sugar prices started to rise after April 1958. In July 1958, Government fixed the ex-factory sugar prices for Uttar Pradesh, North Bihar and Punjab. No prices were fixed for sugar factories in other States. This was continued in 1958-59 season also. From 1st July 1959, entire production of the industry was taken over for distribution.

13.3.3 Government announced various incentives to improve sugar production 1959-60 and 1960-61. Production rose steeply to 30.28 lakh tonnes in 1960-61 as compared to 19.18 lakh tonnes in 1958-59. All controls on sugar were withdrawn from 28th September 1961, except for regulation of monthly release. To avoid over-production of sugar, Government promulgated the Sugar (Regulation of Productions) Ordinance, 1961 (later replaced by an Act on 29th September 1961) under which 10% cut in production over 1960-61 output was imposed for 1961-62 season. Production during 1961-62 was 27.30 lakh tonnes. Production further declined to 21.35 lakh tonnes in next season. Prices started rising from January 1963 and Government took various measures to check the price-rise but could not succeed in their aim. Sugar (Control) Order, 1963 was imposed from 17th April, 1963 thereby reintroducing control on price and distribution of sugar. Distribution of sugar within the State was left to the State Government along with check on wholesale and retail dealers. The policy of total control continued in the subsequent seasons from 1963-64 to 1966-67 and Government fixed ex-factory prices on zonal basis during all these years.

Partial control-1967-68 and beyond

13.4 1966-67 turned out to be a year of drought. Production of sugarcane and sugar was less by 22% and 40% respectively over the previous year. There was diversion of cane to gur and khandsari. Sugar industry crushed only 23% of available cane while other sweeteners consumed 65% of cane produced. The outlook for 1967-68 was very gloomy. Production was estimated at much less than 21.58 lakh tonnes produced during 1966-67 which would have led to steep rise in sugar prices. In order to increase sugar production and build up the financial status of the industry so as to compete with alternate sweeteners, Government abandoned the total control concept and introduced partial control from 1967-68 season. This was announced by Government in Parliament on 17th August, 1967. Under the new policy, 60% of

production achieved during 1967-68 sugar season was procured by Government from factories at predetermined prices and the balance 40% was to be sold in the free-sale market. Thus, the present day policy of levy and free-sale sugar was born. Thereafter, this policy was continued year after year with alterations in levy free-sale ratio as per Table 13.1 given below :-

Table 13.1 – Levy free-sale ratio

Season	Levy	Free-sale
1967-68	60	40
1968-69	70	30
1969-70		
1970-71	60	40

Decontrol-25.5.71 to 30.6.72

13.5 Due to high sugar production in 1969-70, carry-forward stock as on 1st October, 1970 was large. Government did not announce levy prices for 1970-71 and the previous price was continued. Free market prices were less than levy price causing distress to the industry. Government decontrolled sugar from 25th May, 1971 retaining monthly release mechanism. Prices slumped immediately. From August 1971, these started to rise and reached higher levels following Indo-Pak war in December 1971. Under a voluntary scheme, industry offered 60% of production at fixed ex-factory price of Rs. 150/- per quintal exclusive of excise duty for PDS needs. After six months, the scheme was discontinued by the industry on account of non-viability.

Partial control-1.7.72 to 15.8.78

13.6 Government reintroduced partial control from 1st July, 1972 with 60% as levy quota for internal needs, 3.5% for exports and balance 36.5% as free-sale. Levy quota was raised to 70% in 1972-73 season. On 28th September 1972, Government, for the first time, announced that levy sugar would be sold at a uniform price of Rs. 2/- per kg throughout the country. This was raised to Rs. 2.15 per kg from 1st December 1972. The system of levy sugar price distribution scheme was entrusted to Food Corporation of India eliminating private wholesale trade. The policy was continued upto 16.8.78. Levy ratio was reduced to 65% from 1974-75 season onwards. The issue price was retained without change till 1977-78 season.

decontrol-16.8.78 to 16.12.79

13.7.1 Production during 1977-78 rose to 64.57 lakh tonnes from 48.40 lakh tonnes in the previous year. Production was achieved by a long duration (167 days) and lower recovery (9.66%) leading to high cost of production. Sugar factories were advised to pay cane price as in the previous season. Levy sugar prices were determined by adjusting excess realisation in free-sale sugar. This brought down the price of levy sugar. To keep the free-sale price in the market at a reasonable level, Government reduced excise duty from 45% to 27.5% ad valorem on free-sale sugar. Government increased the levy sugar quota from 2.05 lakh tonnes to 2.31 lakh tonnes, effective 1st December, 1977. The levy sugar distribution was not fully geared and it was alleged that levy sugar was diverted to free-sale market for depressing free-sale prices, which dipped below levy sugar prices. Low realisation coupled with high cost of production and stock build up put a severe financial crunch on the industry and factories incurred losses.

13.7.2 Government reviewed the situation and decided to decontrol sugar from 16th August 1978, with the notion of encouraging consumption of sugar and liquidating the stockpile of sugar with the industry. Monthly release mechanism was also abandoned. With huge stocks, factories started selling sugar under cut-throat competition situation and prices crashed and the entire industry lost heavily. To remedy the situation, a system of voluntary monthly release was started by the industry from March 1979. Sugar prices started to become steady. From 5th June, 1979, Government resumed monthly release mechanism.

13.7.3 Sugar output in 1978-79 declined to 58.41 lakh tonnes from 64.57 lakh tonnes in 1977-78 (though it was still much higher than 48.40 lakh tonnes achieved in 1976-77) and consumption rose to around 62 lakh tonnes. Prices started to rise. Government announced price controls at ex-factory and retail level in September 1979 for different regions of the country, besides using the monthly release mechanism. The price controls did not run smoothly and led to hoarding and other malpractices.

Resumption of control-17.12.79

13.8 Partial control was reintroduced from 17th December, 1979 with levy ratio of 65%. This policy is being continued since then without a break with only change in levy free-sale as given in Table 13.2

Table 13.2 - Levy free-sale ratio over years since 1979-80

Season	Levy %	Free sale %
1979-80 to 1984-85	65	35
1985-86	55	45
1986-87 to 1987-88	50	50
1988-89 to 1991-92	45	55
1992-93 to 1997-98	40	60

Levy Sugar Price & Public Distribution System Administration

Partial control

13.9 Sugar production and distribution have been under control since 1941-42. In subsequent years after 1946-47, there were periods of decontrol in between and these have been indicated in paras 13.3, 13.5 and 13.7. The present policy of partial control under which levy and free sale quotas were allowed started from 1967-68 and is still being followed today. History of price fixation is recapitulated in the following paragraphs.

1941-42 to 1946-47 & 1949-50 to 1951-52

13.10 During the initial years, prices were fixed on the basis of schedules developed by late Shri R.C. Shrivastava, Director of National Sugar Institute, in 1937 based on the results of UP and Bihar factories in 1935-36. These schedules were again used for price fixation for subsequent years upto 1951-52.

1952-53 to 1957-58

13.11 These were years of decontrol. An expert committee under late Dr. B.V.N. Naidu (Statistician) submitted a report on cost schedules in 1953, recommending only an all India schedule. This was referred to another committee in April 1955, which was headed by late Shri P.A. Gopalkrishnan, ICS, Joint Secretary. The Committee made some additions to Dr. Naidu's schedule and recommended that full scale enquiry should be conducted on a regular basis by a reputed organisation. No action was taken.

1958-59 and beyond to 1963-64

13.12 Control was imposed on 30th July 1958. Government fixed ex-factory price based on 1955 Committee report and this was confined to factories in UP, North Bihar and Punjab only. The price was continued for next season. On representation of the industry about inadequacy of prices, Government referred the issue to Tariff Commission on 20th September 1958. Tariff Commission submitted its report on

12th September 1959, recommending fair prices for four zones covering the entire country. Government accepted the report and fixed prices of sugar. These were continued in 1959-60 and 1960-61 seasons. With the decontrol of sugar from 28th September 1961, no prices were fixed for 1961-62 season. After the imposition of control with effect from 17th April 1963, fresh prices were notified thereon for 16 zones as against four zones, based on the formula of Tariff Commission report. The number of pricing zones kept on varying and they were 20 in May 1964.

1964-65 to 1966-67

13.13 Government of India appointed a Sugar Enquiry Commission known as Dr. Sen Commission in August 1964. The Commission recommended a five zone pattern with corresponding cost schedules and a separate price for Assam. Government fixed six prices for 1964-65 season based on Tariff Commission formula. For 1965-66 and 1966-67 seasons, prices were fixed for 23 zones.

Partial control- 1967-68 to 1973-74

13.14.1 Partial control policy with a levy and free sale ratio of 60% and 40% respectively was introduced from 1967-68 season onwards. Levy prices were fixed for five zones as recommended by Sen Commission. Principles of levy price fixation were codified for the first time and inserted as Section 3(3c) of Essential Commodities Act 1955, by way of an amendment, ie, Act No. 36 of 1967.

13.14.2 For 1968-69, five zonal levy prices were announced. These were raised to 15 zones in 1969-70 season. These prices were continued for 1970-71 season till decontrol of sugar on 25th May 1971. With the reimposition of partial control from 1st July 1972, prices were fixed for levy sugar for 15 zones. For 1972-73 season, new prices were announced. Government requested Tariff Commission to enquire into the cost structure of the industry and recommend fresh cost schedules covering 1972-73 to 1974-75 vide letter dated 17th March 1972. The Commission submitted its report on 21st September 1973 by which time 1972-73 was nearly over. 1973-74 prices were fixed for 16 zones as per the Commission's recommendations.

1974-75 to 1979-80

13.15 Levy sugar prices of 1973-74 were extended for 1974-75 season despite cost increases, but levy quota was reduced from 70% to 65% to improve the earning of the industry due to non-revision of prices. Government made a major departure in price fixation by not strictly adhering to the methodology as laid down in Section 3(3c) of

E.C. Act. Instead of statutory minimum price, actual cane price as per estimate was considered. Levy prices so determined were further depressed by mopping up the excess realisation in free sale (difference between free sale price and levy price). This was done to ensure that on the entire sugar sold, a uniform return was available to the industry relying on the Supreme Court judgement in Panipat case. Levy prices so determined were announced on 12.7.75. These prices were extended for 1975-76 season initially and regular fixation was done on 9th February 1976. 1972 Tariff Commission's report covered upto 1974-75 season only. In December 1974, decision was taken by Government to wind up the Commission. Government entrusted the task of price enquiry to the Bureau of Industrial Costs and Prices (BICP) on 7th February 1976. BICP submitted its report in June 1976 recommending prices for 1975-76 season on the revised methodology. Fresh prices were notified on 3rd August 1976. For 1976-77 season, these prices were again notified. BICP submitted its final report in November 1978 recommending radical changes in pricing zones based on performance characteristic whereas hitherto such zones were generally based on agro climatic conditions and confined to State boundaries. In November 1977, Government explored the possibilities of fixing prices factory wise, but abandoned it on grounds of impracticability. Thus, for entire 1976-77 season, no prices were determined. For 1977-78 season, prices of August 1976 were notified on 22nd December 1977 and these were revised on 1st March 1978 by allowing ad hoc increases to zonal prices as an interim measure. Sugar was decontrolled from 16th August 1978 to 16th December 1979. At the time of resumption of partial control on 17th December 1979, small quantity of 1978-79 production remained unsold. Government notified prices for 1978-79 and 1979-80 seasons following the principles laid down in Section 3(3c) with regard to Statutory Minimum Cane Price and mopping up excess realisation in free sale. Sugar factories challenged these price fixations in various courts in the country. Different High Courts gave judgements for and against the price fixation. All these cases were finally disposed of by the Supreme Court on 22.09.93. The price determination orders were struck down and Government was directed to issue fresh orders. The levy sugar prices for 1975-76 to 1979-80 were amended vide order dated 22.02.95. The prices were determined strictly as per the provisions of Section 3(3c) of EC Act.

1980-81 to 1996-97

13.16 Faced with a plethora of court cases and the practical difficulties in assessing estimated free sale realisation, Government decided

to review the levy sugar price fixation methodology and appointed a High Level Committee headed by the then Chairman, BICP in March 1980. The Committee submitted its report in October 1980, which was accepted by the Government. Prices for 1980-81 were fixed as per the provisions of Section 3(3c) of EC Act. The procedure of price fixation continued thereafter unaltered. BICP, at the request of the Government, gave periodical reports on levy price fixation and based on them, Government determined levy sugar prices for subsequent seasons. Levy sugar prices were notified for different grades of sugar upto 1992-93 season. From 1993-94 onwards, only one price was notified for all grades of sugar. Ex-factory zonal levy sugar prices notified for the season 1996-97 for various zones are indicated in Annexure 13.1.

Reimbursement of difference in levy prices due to delayed notifications

13.17 Levy sugar distribution orders are issued to factories two months in advance and these orders are specific for the season and the prices to be paid by lifting agencies. New season sugar is released from December onwards for which orders are issued in October. From 1989-90 season, Government extended the previous season price on a provisional basis with an undertaking to pay the price differential between this price and the final price notified for quantities delivered at the initial price. The sugar factories submitted their claim for the arrears of price due to the Directorate of Sugar and this was eventually paid by Food Corporation of India. This practice is still being followed till date whenever levy sugar from new season's production has to be issued before notification of levy prices for that season. The dates on which zonal ex-factory levy sugar prices were notified during the last five years are indicated below.

Table 13.3 - Notification of zonal ex-factory levy sugar prices

Sugar season	Date of Notification of Prices	
	Provisional	Final
1992-93	24.12.92	01.03.93
1993-94	22.10.93	17.01.94 / 16.09.94
1994-95	17.10.94	16.03.95 / 27.05.95
1995-96	08.11.95	14.05.96
1996-97	30.10.96	12.02.97

13.18.1 Till 1971-72 season, State Governments were free to fix retail outlet prices for levy sugar within their boundaries. System of uniform all India issue price through fair price shops for levy sugar was started from 1972-73 season (1st October 1972). Initially, a price of Rs. 2/- per kg was notified. Uniform all India issue price comprises - (i) Average zonal ex-factory levy sugar price, (ii) Excise duty and cess, (iii) Handling and distribution charges and (iv) Wholesale and retail margin. Government created a Non Statutory Price Equalisation Fund to settle levy sugar price claims among States and its administration was entrusted to Food Corporation of India. The scheme was conceived as a self-balancing one so that Government need not pay any subsidy for distribution of levy sugar prices. However, in practice, it was not so and FCI ran into deficits which were not significant initially.

Subsidy on PDS

13.18.2 The issue prices remained unaltered from 1972 to 1977 and thereafter it was revised upwards for each season in tandem with the zonal ex-factory levy sugar prices upto 1988-89 season. 1989-90 season levy prices were notified on 27th January 1990, but issue price of Rs. 5.25 per kg, notified on 1st January 1989, continued. 1990-91 season price was announced on 27th March 1991, but issue price was revised upwards on 24th July 1991. For the next three seasons, 1991-92 to 1993-94, issue prices were raised periodically and it stood at Rs. 9.05 per kg on 1st February 1994. Higher zonal ex-factory levy sugar prices were notified for 1994-95 and 1995-96 seasons, but issue price remained static. It was raised to Rs. 10.50 per kg on 10th February 1997. Due to delays in revising issue prices or deliberate decision not to revise issue prices consequent on increase in ex-factory prices, Food Corporation of India ran into huge deficits in maintenance of Price Equalisation Fund and for the first time, direct subsidy in distribution of levy sugar through PDS had to be paid to FCI by the Government in 1995-96 which rose sharply in 1996-97. Details of subsidy paid to FCI are shown in Table 13.4.

Table 13.4 - Subsidy on levy sugar

Sr.	#Season	Extent of subsidy (Rs/crores)		
		Indigenous	Imported	Total
1	1994-95		566	566
2	1995-96	181	189	370
3	1996-97	816	-	816

(Source : Department of Sugar & Edible Oils)

13.18.3 With increase in SMP for sugarcane and zonal ex-factory prices for 1996-97, the issue price has been raised to Rs. 11.40/ per kg. with effect from 1st October, 1997.

13.18.4 It is commonly alleged that there is leakage in distribution of sugar through PDS and the benefit of subsidised sugar is taken largely by the relatively better off population. This is, to some extent, confirmed by recent study 'Public Distribution of Food in India - Coverage, Targetting and Leakages' by D. Ahluwalia in Food Policy, February '93. According to the study, about 39% of sugar supplied through the PDS during the period July 1986 to June 1987 leaked, i.e., it did not reach actual users of PDS. (If adjustment is made for probable undercount in the data, the leak would be about 34%). Of the sugar which was distributed to the card holders, 73% in rural areas was bought by upper 40% of consumers and only 17% by poorest 40%.

Views of the Committee

13.19 Under the partial decontrol policy being followed since 1967-68 with brief periods of complete decontrol, mills are required to supply a specified percentage of their production (40% at present) at prices fixed by Government of India. These levy prices are fixed at present for 20 separate zones indicated in the Annexure-13.1 based on SMP and the conversion cost for each zone. Since the factories have actually to pay cane prices much higher than the SMP, the levy prices do not cover the full cost of production and levy sugar has, therefore, to be supplied by the mills at below cost. The releases of not only the levy sugar but also the free sale sugar are controlled monthly by the Government. The system has had the adverse consequences mentioned in the following paras.

13.20 While sugar mills have to supply 40% of their sugar in levy at below cost, the khandsari units have no such obligation. Khandsari prices tend to move in tandem with the prices of freesale sugar. As discussed in para 20.8, in a period of cane shortage the khandsari units are, therefore, able to pay higher prices for sugarcane than the mills and thereby secure larger percentage of limited cane supplies. The sugar production thus falls even more than what would be warranted by fall in sugarcane production. This aggravates cyclical fluctuations in sugar production with all the attendant ill-effects mentioned in chapter 20.

13.21 Since mills have to supply 40% of the production at below cost, they have to recoup this loss from their freesale sugar. The freesale

prices, therefore, tend to be higher than they would be under a system of complete decontrol. As mentioned in chapter 19, the freesale ex-factory sugar prices have been on the average about Rs.318/- per quintal higher than the ex-factory levy sugar prices. They would thus be about Rs.130/- per quintal (40% of Rs.318/-) higher than what they would otherwise be. This puts the domestic sugar industry at a disadvantage vis-a-vis the imports which do not have to bear this burden. Likewise, it tends to discourage exports as price of free sale sugar from which exports have to be made, are higher to the extent of about Rs.130/- per quintal and to that extent exporters would be unable to compete in the international market. While the adverse affect of imports can be offset by countervailing import duties as suggested in chapter 19, it would not be possible to offset adverse affect on exports in the liberalised trade regime under WTO.

13.22 The levy prices are fixed zone-wise on the basis of conversion cost in each zone (which is necessary as the stocks are being compulsorily acquired). The levy prices are, therefore, higher in areas where due to lower recovery, shorter crushing season or other similar causes the cost of production is higher. The factories in high cost areas can thus sell 40% of their sugar at a higher price to Government than their counterparts in lower cost areas. As will be seen from Annexure 13.1, the levy price in south Gujarat, which is low cost area, was Rs.940/- per quintal and in Orissa as high as Rs.1421/- per quintal. The system thus encourages setting up of new units in areas where costs are higher, thereby leading to mis-allocation of national resources and building up of high cost sugar industry which may never be able to compete internationally if the system continues.

13.23 In order to make the levy system effective, the Government have imposed large number of controls on nature of material to be used for packaging, weight of bags for packaging, type of storage to be used, type of sugar to be produced, type of dealers to whom sugar can be sold etc. These controls impose additional cost on the industry and it cannot explore avenues for cost reduction, for example, by resorting to bulk storage and handling. Although some of these controls can be relaxed even under the system of partial decontrol and necessary recommendations in that regard have been made at appropriate places in the report, some of these are essential for enforcing implementation of the partial decontrol policy and would, therefore, continue to impose additional cost on the industry.

13.24 The Government of India not only fixes the price of levy sugar but also indirectly regulates prices of freesale sugar through its system of monthly releases. In its anxiety to keep the freesale prices low in the interest of the consumers, the government have not allowed freesale prices to rise adequately to fully compensate the mills for loss in levy. This explains why the increase in price of sugar has been substantially lower than the increase in price of agricultural commodities as a whole, food articles and for all commodities as indicated in para 8.1.3. Where domestic availability was inadequate, the Government have even resorted to imports to keep the freesale prices low. This, along with the tendency of the State Governments to jack up the State Advised Prices for sugarcane in the interest of sugarcane growers, is one of the major reasons for the poor financial health of the industry. This in turn reduces their ability to spend on cane development and modernisation and thereby affects their competitiveness in the long run. This is also the principal reason for investment in the industry not forthcoming without special incentives which had to be offered to attract such investment.

13.25 The system also leads to widespread resentment among cane growers as they feel that they have to bear the burden of subsidy for sugar in PDS while in case of other commodities like wheat and rice, the burden of subsidies is borne by the Government. In the past when imports on private account were not permitted, sugar prices could rise to some extent so that in reality the burden of subsidy was to that extent borne by the consumers of freesale sugar rather than the growers. Now that sugar imports have been placed on OGL, it will not be possible for freesale sugar prices to rise beyond import parity level and there will be greater incidence of the subsidy on the mills and eventually the cane growers. The resentment may then get sharpened.

13.26 Finally, as in case of all controls, the system produces corruption in the issue of release orders, in the distribution of sugar in PDS etc. and waste of time of entrepreneurs/managers in pursuing matters for issue of release orders, their revalidation, extension in delivery period etc. rather than in efficient running of the mills.

13.27 As against these adverse repercussions, the main advantage of the system of partial control is that it makes available certain quantity of sugar to consumers at lower price through PDS. However, it is well recognised that there are large leakages from PDS to open market where

prices are higher. The Standing Committee on Food, Civil Supplies and Public Distribution(1995-96 10th Lok Sabha) in its 15th Report on Sugar also while recommending the continuation of the policy of partial decontrol observed in para 29 in Part-B of its Report that "It has been brought to the notice of the Committee the large-scale leakage of levy sugar into open market is taking place, thus defeating the very purpose for which PDS has been commissioned". As mentioned in para 13.18.4, according to a recent study about 34% of sugar supplied through the PDS during the period of study did not reach actual users of PDS. Further, since the entitlement in PDS is not restricted to the poor and the poor in fact are able to take less advantage of the system because of their inability to get ration card issued and to pay in lump sum for monthly supplies, larger portion of the subsidy is pocketed by the non-poor. According to the same study, of the sugar which was distributed to the card holders, 73% in rural areas was bought by 40% of consumers who would be non-poor and only 17% by the poorest 40% of consumers. Even where sugar in PDS reaches the card holders, its financial benefit is very small. For an average family of five members, the allocation, even if there were no leakage, would be about 2 kg per month which would mean financial benefit of about Rs.6/- to Rs.8/- per month. This is also partially offset by higher price for freesale sugar if the consumer has to buy some of his requirement from the freesale. The poor consumers in the rural areas may in fact be net losers as they consume mainly gur / jaggery whose prices move in tandem with price of freesale sugar and would, therefore, be higher than under a system of complete decontrol of sugar as the freesale sugar prices are higher. The distribution of sugar in PDS also does not serve the purpose of improving the nutritional status of the poor which the supply of foodgrains in PDS performs as sugar has no nutritional value except calories. In fact, supplying sugar through PDS at cheaper price encourages switch over to sugar from gur which is nutritionally better as indicated in Table 6.30.

13.28 After weighing the advantages and disadvantages, the Committee feels that time has now come for complete decontrol of sugar prices. However, sudden decision to decontrol may adversely affect the factories which had been set up in relatively high cost areas due to advantage of higher levy prices, with consequent hardships for the cane growers supplying cane to such mills and the workers employed therein. It is, therefore, recommended that the decontrol may be phased over a

period of two years to allow time to such factories to take necessary steps to improve their efficiency so that they can face the competition. A policy change of this nature should be effected only at the beginning of a sugar season. It is suggested that from the beginning of the sugar season following the date of announcement of the Policy, the ratio of levy sugar may be reduced to 20% which may be continued at the same rate during the next sugar season and from the beginning of the subsequent sugar season, the levy may be completely abolished. So far as incentives for creation of new capacity and expansion of existing capacity are concerned necessary recommendations have been made in Chapter-22.

13.29 Sugar is produced during four to five months and is consumed throughout the year. If there is no mechanism for control over releases, the prices may crash during the beginning of crushing season and go up considerably towards the close of the season. This will bring distress to the consumers as well as the industry. In fact, the abandonment of monthly release mechanism on decontrol of sugar in August, 1978 was the major reason for failure of the policy. It is, therefore, recommended that the control on releases should continue even after complete decontrol of prices. The monthly releases, both under the system of partial and complete decontrol, should, however, be determined by a Committee comprising a senior officer of the Department of Sugar and representatives of National Federation of Cooperative Sugar Factories and ISMA so that the viewpoint of the industry is duly considered at a time when this decision which has major impact on the health of the industry is taken. As recommended in chapter 14, the efforts should be made to maintain price at about the level adopted by the proposed Sugarcane Pricing Board for determining the sugarcane price. This may be achieved though adjustment of freesale releases, operation of buffer stocks and control on exports beyond the minimum quantity recommended in chapter 19.

13.30 In view of what has been stated in para 13.27 above, there appears to be no justification for continuing the supply of sugar in PDS. The Committee, therefore, recommends that the supply of sugar through PDS may be discontinued on expiry of two years when complete decontrol is to take effect. The subsidy at present allowed in the supply of sugar through PDS can be distributed among the beneficiaries by adding to the subsidy at present allowed on foodgrains. However, if the Government wishes, for political or any other considerations, to continue

the supply of sugar through PDS, it may purchase the balance requirement during the first two years and the entire requirement after two years from industry or trade either (a) through open tenders or (b) at fixed price from the mills. The fixed price could be based on market price or average of three months sale price of sugar sold by the mills, whichever is lower. This criterion is already applied by the banks while evaluating the stocks for purpose of working capital finance and has also been adopted by Government for the purpose of determining interest to be paid on buffer stocks. This will, of course, involve additional subsidy as the cost of purchasing sugar from the market would be higher than the levy price. The additional subsidy would be offset to some extent by higher collections from excise duty on larger quantum of freesale sugar on which the excise duty rates are higher than for levy sugar. If there is still any deficiency, the balance may be met by suitable increase in excise duty on sugar.

13.31 Even during the continuance of the system of partial control, certain modifications in the existing policies are required to reduce its adverse effects. As mentioned above, the levy prices are at present fixed on the basis of SMP for sugarcane although the actual cane price paid by the factories is much higher. This was a sound policy so far, as otherwise the State Governments would have been tempted to fix even higher SAPs under the belief that the additional cost involved would be passed on to Government of India through increase in levy prices and the burden of additional subsidy would have to be borne by Government of India. We have recommended in chapter 14 constitution of a Sugarcane Pricing Board to determine the price of sugarcane in each zone. Once these prices are statutorily determined by the Board, there would be no justification for basing the levy price on SMP. The levy prices should thereafter be based on the actual cane price paid by the factory in the zone based on the determination of the statutory authority. This would involve additional subsidy on PDS if the issue price is sought to be maintained at the existing level. The same may be made up by suitable increase in excise duty.

13.32 Some of the mills during the visit of the teams of the Committee to various States and some of the State Governments during their discussions with the Committee have complained that the releases of freesale sugar are not distributed amongst various factories in a wholly equitable basis. There is need for total transparency in the system of such releases. Out of the total monthly release quota, the allocation for

various factories should normally be in proportion to their stocks. Where stocks of previous year still remain to be released those stocks should obviously be released first unless it becomes necessary for fresh stocks to be released in any area for meeting regional requirements. The basis of allocation amongst factories should be notified by Department of Sugar to apex organisations of the industry viz. National Federation of Cooperative Sugar Factories and ISMA so that they can convey these to factories and any factory which is aggrieved may be able to make a representation to the concerned officer in the Department.

13.33 At present, instructions require that at least 47.5% of monthly quota should be sold in each fortnight. This is an unnecessary restriction and sometimes compels the factories to dispose of their stocks at unduly low prices when the limited number of licensed wholesale dealers quote a low price to take advantage of the compulsion on the factories to dispose of the stocks. There is need to provide for greater flexibility in the matter. This restriction may, therefore, be removed and the mills may, in fact, be allowed to sell 10% of the monthly quota in the next month.

13.34 The mills which fail to sell the full quantity of freesale release become liable to penal action including conversion of the balance of freesale quota to levy. The failure to sell the full quantity of freesale release may often be due to circumstances beyond the control of the mills like strike, floods etc. or because of excessively low price. Since the object is primarily to prevent hoarding, penal action including its conversion to levy should be considered only in periods of rising free sale sugar prices when intention to hoard may be inferred and in cases of force majeure like strikes, floods etc. also this should not be applied.

13.35 The levy prices under system of partial decontrol should be announced before the start of the crushing season. As indicated in table 13.3, notification of zonal ex-factory levy sugar prices have sometimes been considerably delayed. Efforts should be made to avoid this as they affect the cash flow of the mills and consequently their ability to pay the cane price to the growers in time. Where for unavoidable reasons these get delayed, interest should be paid to the mills on the difference between the provisional levy price and the final price for the period of delay.

13.36 There are frequent delays by the nominees of the State Governments in lifting of levy sugar beyond initial time limit. Extension is in such cases generally allowed to the nominees of the State governments. This, however, blocks the funds of the mills which have to pay interest on the stocks. Interest may, therefore, be paid to the mills on delayed lifting of levy sugar beyond initial time limit where the delay is not due to any fault of the factory.

13.37 Interest on the average stock holding during the sugar year is included while working out the conversion cost on which levy sugar prices are based. During some years, however, the stocks may not be released during the sugar year. Where these are included in the buffer stock, the mills would get paid interest on these stocks. Where the stocks are not included in the buffer stock and are also not released during the sugar year, the mills tend to incur interest on their stock holding beyond one year period and the same is not included in the levy price calculations. They should, therefore, be reimbursed interest on stocks which are not released during the sugar year and are beyond 2½ months opening stock for meeting consumption requirement of the next sugar year if these are not included in the buffer stock.

13.38 Some of the State Governments have represented before the Committee that considerable delays take place in payments to them from Levy Equalisation Fund. The representatives of FCI have stated that the delay is normally on account of non-supply of necessary documents by the nominees of the State Governments. In such cases, of course, the responsibility for the delay would devolve on the nominee of the State Government itself. However, where the State Government has submitted the claim with necessary documents and the payment from the Fund gets delayed it is only fair that interest may be paid to the State Government on such delays beyond 90 days of their submission of claim with the necessary documents.

Chapter 14

Pricing of Sugarcane

14.1.1 Sugarcane is the main raw material for the sugar industry and accounts for 65 to 70 percent of cost of production of sugar. It is also a major source of income for millions of farmers. The determination of price for sugarcane is, therefore, a matter of critical importance both for the sugar industry and the cane growers. If cane prices are too low, the farmers will suffer due to fall in their incomes and if the alternative crops become more remunerative, they will switch over to the production of these crops. The sugarcane production will consequently fall, leading to fall in sugar production and adverse effect on the financial conditions of the mills. If on the other hand, the sugarcane prices are kept at artificially higher level, the cost of production and consequently, the price of sugar will rise and the consumers will suffer. In a system of partial decontrol, if attempt is then made to keep the price of freesale sugar low, as has been happening frequently in the past, the financial health of the industry suffers, cane arrears mount and mills are left with no funds to invest in modernisation of cane development. In the liberalised regime where imports are on OGL, the free sale sugar prices cannot, in any case, exceed the import parity levels and fixation of cane price at unduly high level is, therefore, bound to lead to sickness in the whole industry.

14.1.2 The Govt. of India have been fixing Statutory Minimum Price (SMP) under provisions of the Sugarcane (Control) Order, 1966. These have, however, so far been used mainly for fixation of the price for levy sugar. The actual cane price paid by the farmers has been announced by the State Governments, except in the case of co-operative sugar mills in the States of Maharashtra, Gujarat where they are fixed by the factories themselves with the approval of the Government, where Government has a share in the mills. The present position in regard to SMP and the actual cane price paid is indicated in the following paragraphs.

SMP

14.2.1 The Central Government fixes a Statutory Minimum Price (SMP) factory-wise, in terms of Clause 3 of the Sugarcane (Control) Order, 1966 (as amended upto 1983) in respect of each sugar season having regard to-

(a) Cost of production of sugarcane

(b) Return to the growers from alternative crops and the general trend of prices of agricultural commodities

(c) Availability of sugar to consumers at a fair price

(d) Price at which sugar produced from sugarcane is sold by sugar producers

(e) Recovery of sugar from sugarcane

14.2.2 A study is conducted by the Commission on Agricultural Costs and Prices (CACP) formerly known as Agricultural Prices Commission (APC) which submit its report annually on sugarcane price which the Government considers along with recommendations from the State Govts & others before taking a decision in this regard. A uniform SMP is fixed throughout the country linked to 8.5% recovery during peak season with proportionate increase for higher recoveries. The actual SMP, therefore varies from factory to factory depending on recovery percentage during peak season in the particular year. Payment for cane in all the mills is made on the basis of weight and there is no linkage with sucrose content.

14.2.3 The CACP comprises the following:-

Chairman - one (Person to be an economist of eminence)
Members-Five (Two official, three non-official)
Member Secretary-One

14.3 Annexure 14.1 gives the prices recommended by APC/CACP along with the SMP fixed by the Government for the years 1974 to 95. It will be seen that in recent years, Govt. have generally been announcing the price as recommended by CACP. In the last 12 years (1985-86 to 1996-97) Govt. have deviated from the recommendations of CACP only on four occasions. In 1990-91 and 1993-94, it announced SMP lower by Rs. 1/- and Rs. 2/- respectively; in 1992-93 and 1994-95, it announced SMP higher by Rs. 4/- and paise 60 respectively.

14.4.1 Under Clause 5A of the Sugarcane Control Order, the farmers are entitled to additional payment out of the excess price realization by the factories. A copy of the relevant clause is enclosed of Annexure 14.2. Under the formula, farmers and the mills share the excess realisation broadly in the ratio of 50:50. Zonewise 'L' factor in the formula is determind by Central Govt. and factory wise additional cane price is determined by the State Governments.

14.4.2 Time taken in notification of 'L' factor by the Department of Food for different Sugar Seasons is indicated below:-

Sugar Season	Date on which 'L' factor was communicated	Time taken after end of the season
1990-91	17-11-1992	14 months
1991-92	04-02-1994	17 months
1992-93	15-12-1994	14 months
1993-94	19-09-1995	12 months
1994-95	18-11-1996	14 months
1995-96	06-10-1997	13 months

(Source: Coop. Sugar - Nov. 97, Vol. 29)

The information regarding the dates on which factory wise additional cane price was determined by the State Govts. for each of these seasons is not available. A reference was made for obtaining this information to all major sugar producing State but no replies have been received.

14.5 Cost of production of sugarcane

Annexure 14.3 gives a breakup of average cost of production of sugarcane per quintal in respect of Andhra Pradesh, Bihar, Haryana, Karnataka, Maharashtra and UP for 5 latest years for which data is available in CACP reports. These are compared with S.M.P. recommended by CACP for those years in Annexure 14.4.

14.6 Comparison of increase in SMP of sugarcane with that in Minimum Support Price of other major agricultural commodities is given in Annexure 14.5. It shows that increase in S.M.P. for sugarcane has been broadly similar to that in support price for other agricultural commodities. The S.M.P. for sugarcane has increased by 160% from 1985-86 to 1996-97 while during same period support price for paddy increased by 168%, cotton by 158%, wheat by 156% & coarse cereals by 138%.

14.7 State Advised Prices

In a judgement delivered by the Allahabad High Court, it has been held that the State Governments do not have any power whatsoever to declare the price for sugarcane, as under law this power vests in the Central Govt. In practice, the State Governments have been announcing what are known as State Advised Prices, which the sugar factories are compelled to pay, and which are generally on higher side as compared to SMP. The position in various States is briefly indicated below:-

14.7.1 **Northern States** - Uttar Pradesh, Haryana, Punjab, Bihar and Madhya Pradesh : A uniform State Advised Price fixed for payment in one instalment after delivery of cane. It is not linked to recovery percent of cane. Premium is allowed for early high sucrose varieties. From season 1996-97, the Government of UP has been announcing price of sugarcane for only Public Sector and Cooperative mills. Private mills have now been fixing their own price.

14.7.2 Maharashtra : A Committee headed by the Chief Minister of the State determines the policy for a particular year for cane price and for finalising the cane price of the last season. The members of the Committee are as follows:-

1.	Honourable Chief Minister	Chairman
2.	Minister (Cooperation)	Member
3.	Minister (Irrigation)	Member
4.	Minister (Finance)	Member

5.	State Minister (Cooperation)	Member
6.	State Minister (Agriculture)	Member
7.	Chairman, Maharashtra Rajya Sahkari Sakhar Karkhana Sangh, Bombay	Invitee
8.	Chairman, Maharashtra Rajya Sahkari Bank	Invitee
9.	Secretary (Cooperation)	Invitee
10.	Secretary (Finance)	Invitee
11.	Secretary (Agriculture)	Invitee
12.	Secretary (Irrigation)	Invitee
13.	Commissioner of Sugar Maharashtra, Pune	Invitee

The Committee does not decide SAP as such but only the first advance to be given by the factory. The first advance is decided taking into account Statutory Minimum Price declared by Government of India, overall availability of Sugarcane, market prices of sugar and molasses and the likely final cane prices of various factories during the last season. This State Advised Minimum Price to be paid to the Cane Growers is ex-field and does not include transport and harvesting charges. The transport and harvesting charges are borne by the sugar factories. The first advance so decided by the Ministers' Committee is normally higher than the Statutory Minimum Price declared by the Government of India. Unlike SMP declared by Government of India, the SAP however, does not vary from factory to factory and is the same for all the factories irrespective of recovery. However, a departure was made from this policy in 1993-94 season when different prices for different factories were announced.

The State Ministers' Committee also takes decision about the norms for deciding final cane price of the preceding season. On the basis of the norms decided by the Ministers' Committee of the state, Commisioner of Sugar takes up the detailed exercise of fixing the final cane price for various factories. This final cane price however, differs from factory to factory since recovery, expenses and incomes are variant. While deciding final cane price and in order to maintain the price parity among various sugar factories, there is a system of a ceiling on the cash component of the final cane price and the balance is retained with the sugar factories as term deposits carrying interest. While deciding final cane price by the Commissioner of Sugar, all expenses incurred by the sugar factories in manufacturing sugar and income from sugar and various other byproducts are taken into account. The final cane price to the cane growers in Maharashtra is determined on the basis of the working results of the factory after permissible deductions. Because of the basis on working results and wide variations in recovery, there are variations in the cane prices from factory to factory.

14.7.3 **Gujarat:** All the sugar factories of the State are in Cooperative Sector and the farmers are their owners. The cane price is decided by the sugar factories themselves and Bhargava Formula is not applied in their State.

The formula adopted in the State is as under:

(a) **Ex-field price**

Minimum price declared by the Government of India (+) Additional Cane Price (–) Transport and harvesting charges.

(b) **Ex-factory price**

Minimum price declared by the Government of India (+) Additional Cane Price.

In South Gujarat, the cane price is paid in three instalments. First instalment is paid at the time of crushing, second at the closure of the season and the third and final instalment after the end of sugar year taking into consideration the estimated profit and loss.

In Saurashtra region, the cane price is paid in two instalments. Major amount is paid as first instalment at the time of crushing and second and final instalment is paid after the end of sugar year taking into consideration the estimated profit and loss.

The final prices are paid with the approval of the Board of Director. However, where there is a stake of the State Government, the final payment towards cane price is made with the approval of the Government.

14.7.4. **Karnataka:** The State Advised Price like the Statutory Minimum Price, is linked to sugar recovery of 8.5%. The sugar factories have to pay the cane price as per the State Advised Price. However, the Government does not impose any restrictions if some of the sugar factories pay more because of higher realisation due to increase in the prices of sugar and other by-products or if their conversion cost is comparatively low.

The Government of Karnataka has constituted a High Power Committee under the Chairmanship of the Chief Minister to advise the Government about the fixation of a suitable price to be paid for the sugarcane by the managements of the sugar factories. The meeting of the High Power Committee is convened every year which is attended by the managements of the sugar factories, representatives of the cane growers, M.Ps., M.L.As. and M.L.Cs. of sugarcane growing areas and the concerned officers of the State Government. The Hon'ble Chief Minister and the Chairman of the High Power Committee hears the views and suggestions of the participants, peruses all the related papers, weighs all the pros and cons of the matter and then decides about the State Advised Price to be recommended to the State Government.

The State government takes the following factors into consideration while fixing the S.A.P.

Realisation aspects:

(a) Realisation from the sale of free and levy sugar.

(b) Realisation from the sale of molasses, etc.

(c) Purchase Tax rebates to the farmers (Rs. 12/- per tonnes)

Expenditure Aspects:

(a) Conversion cost of sugar(weighted average)

(b) Purchase Tax and Turn-over tax

(c) Cane cost.

The sugar factories in Southern and Central Karnataka pay cane price ex-factory, except a few which meet the transportation charges to some extent as a gesture to the farmers. The sugar factories of Northern Karnataka(Belgaum, Bijapur, and Bidar District) pay cane price ex-field in instalments. In other words, they meet the harvesting and transportation charges in full.

14.7.5 **Tamil Nadu:** Before taking a decision on the level of State Advised Price to be fixed, the State Government convenes a meeting of the representatives of the cane Growers' Associations belonging to each sugar factory in the State and also the sugar factory managements, discusses with them and get their views. Taking into account the cost of cultivation for sugarcane, the income from sugarcane vis-a-vis other crops, the State Advised Price for cane(SAP) is fixed in such a way that it is fairly remunerative to the cane growers and does not affect the mills very much. Thus a reasonable level of SAP is being fixed and announced by the State Government, every season which is scrupulously followed by all the sugar mills in the State.

During the last ten seasons the SAP has been more than SMP ranging from a minimum of Rs. 25/- per tonne to a maximum of Rs. 105/- per tonne. Since a reasonable level of SAP is fixed by the State Government, no factory is defaulting in payment of cane dues.

Further the SAP fixed by the Government of Tamil Nadu is always higher than the final cane price fixed by the Government of India based on Bhargava Formula i.e. as per Clause 5-A of Sugarcane (Control) Order, 1966.

Besides the SAP, each sugar factory in the State spends on an average Rs. 25/- to Rs. 30/- per tonne by way of various subsidies and incentives given to cane growers for sugarcane development.

Based on the peak period average sugar recovery of the previous season, the State's Commissioner of Sugar fixes the mill wise prices of Sugarcane.

14.7.6 **Andhra Pradesh:** The cane price is fixed taking into account the cost of cultivation for sugarcane and other related aspects. The State Advised Prices are linked to a basic recovery of 8.5% of cane. The prices are generally higher than SMP. After the close of the season the additional cane price on the basis of Bhargava Formula is worked out and paid to the farmers.

14.8.1 Annexure 14.6 gives details of the minimum prices notified and the prices paid by sugar factories in major sugar producing states.

14.8.2 In North Indian States of U.P. Bihar, Punjab & Haryana, the prices paid by the units have been much higher than SMP. The position in case of U.P. is summarised in the Table below:

Table 14.1 – Difference between the SMP, and actual Price paid in the state of U.P. for the years 91-92 to 95-96

Year	Effective SMP	Additional cane price liability under 5A	Total cane price payable	Actual cane price paid	Price paid in excess of cane price payable
(1)	(2)	(3)	(4)	(5)	(6)
			(Rs/Quintal)		
1991-92	29.02	5.03	34.05	45.00	10.95
1992-93	35.59	8.61	44.20	46.00	1.80
1993-94	39.89	11.94	51.83	58.00	6.17
1994-95	44.03	10.52	54.55	66.00	11.45
1995-96	49.17	6.03	55.20	70.00	14.80

Source: ISMA's Memorandum to High Powered Committee on Sugar

Cane Price Arrears:

14.9.1 The provisions in regard to payment of cane price and recovery of cane arrears are contained in sugarcane control order 1966, and control orders of various state governments. These have been mentioned in chapter 5. However, relevant extracts are enclosed as Annexure 14.7.

14.9.2 Annexure 14.8 indicates the arrears of cane price as on 15th May and 15th October during 1992 to 1997.

14.9.3 Break up of arrears amount payable into Public Sector, Coop. Sector and Private Sector Units is also indicated in the Annexure referred to above. The arrears position is summarised in following table:-

Table 14.2 – Position of cane price arrears bifurcated into Public Sector, Coop. Sector and Private Sector for different period from November 92 to August 97

Position as on	Total arrears	Public sector	Coop Sector			Private sector
			Guj & Mah.	Others	Total	
15-5-92	597.68	135.12	-	-	212.28	250.28
	(14.65)	(30.43)	-	-	(9.33)	(18.40)
15-5-93	341.94	81.71	28.56	77.41	105.97	154.26
	(9.01)	(21.13)	(1.37)	(3.71)	(5.08)	(11.26)
15-5-94	166.34	32.36	23.57	41.16	64.73	69.25
	(3.64)	(7.53)	(0.97)	(1.70)	(2.67)	(4.05)
15-5-95	558.38	97.65	82.37	125.13	207.50	253.23
	(8.40)	(14.65)	(2.35)	(3.58)	(5.93)	(10.19)
15-5-96	1382.33	227.89	169.70	385.20	554.91	593.53
	(19.16)	(29.56)	(4.60)	(10.44)	(15.04)	(21.77)
15-5-97	997.09	233.60	35.64	267.05	302.69	460.80
	(17.10)	(34.30)	(1.24)	(9.29)	(10.53)	(20.23)
15-10-92	278.40	73.62	-	-	134.85	69.93
	(5.48)	(14.44)			(7.86)	(2.45)
15-10-93	85.48	15.62	19.83	8.96	28.79	41.07
	(1.88)	(3.85)	(0.74)	(0.34)	(1.08)	(2.78)
15-10-94	58.86	5.15	6.00	22.80	28.80	24.91
	(1.06)	(1.16)	(0.19)	(0.70)	(0.89)	(1.30)
15-10-95	158.45	32.36	11.66	51.07	62.73	63.36
	(1.85)	(4.38)	(0.25)	(1.08)	(1.33)	(2.01)
15-10-96	607.09	96.64	43.46	204.42	247.88	262.57
	(5.94)	(11.10)	(0.78)	(3.65)	(4.43)	(6.99)
15-10-97	296.61	66.37	9.35	63.44	72.79	157.45
	(3.87)	(8.71)	(0.24)	(1.63)	(1.87)	(5.25)

(Figures in brackets indicate percentage to total cane payment)

14.9.4 Cane arrears were particularly high during 1991-92 and 1995-96 sugar seasons when sugar productions had reached the peak of 134 and 164.5 lakhs tonnes respectively.

Percentage of cane price arrears is lower in Coop. Sector, particularly in Maharashtra & Gujarat, where most of Coop. Mills are located, as only advance payment is made in the beginning & final price is determined subsequently based on working results of other factories. Percentage of cane price in arrears has been higher in public sector mills as compared to private sector as the former mainly comprise of Sick Mills taken over by Govt. and their financial working results are poor.

View of the Committee

14.10.1 We have in Chapter 13 recommended the total decontrol of sugar prices in a phased manner. The Statutory Minimum Price (SMP) will in that event not be required for fixing the price of levy sugar. In any case, we have recommended in that Chapter that even during the period of partial control, the levy price should be based on the price to be determined by the Sugarcane Pricing Board as recommended in a subsequent para. However, announcement of SMP will still need to be continued as a guarantee of a minimum price to the growers. This will assure the grower that even during the period of low sugar prices, he will receive at least the SMP as a minimum price to cover his cost of cultivation. We would here emphasize that the decision of Government to announce SMP before the start of sowing season should be rigidly followed so that the growers are aware of the minimum price before planting and can thereby make a rational decision about planting of sugarcane or any other crop.

14.10.2 There is a feeling amongst the growers that the SMP is kept unduly low to have a lower level of levy price in the interest of maintaining a low price for sugar distributed through PDS without excessive burden of subsidy on the Government. This is not borne out by available data as given in Annexure 14.4 which shows that SMP recommended by CACP has generally been consistent with the cost of production. The basis of this apprehension will also be removed when recommendation to fix the price of levy sugar during the period of partial decontrol on the basis of cane price determined by the Sugarcane Pricing Board instead of SMP is implemented. Nevertheless, in order to allay this apprehension, it is suggested that suitable amendment may be made in Clause 3 of the Sugarcane (Control) Order, 1966. This clause provides that the SMP will be fixed having regard to (a) cost of production of sugarcane; (b) the return to the grower from alternative crops and the general trend of prices of the agricultural commodities;

(c) the availability of sugar to the consumer at a fair price; (d) price at which sugar produced from sugarcane is sold by producers of sugar; and (e) the recovery of sugar from sugarcane.

It is recommended that Clauses (c), (d) and (e) above may be deleted so that the SMP is not related to the price of sugar to be paid by consumers. As recommended later, it is the actual cane price determined by the Sugarcane Pricing Board that would get linked to the price of sugar.

14.10.3 The Statutory Minimum Price (SMP) is at present fixed at a uniform rate for the entire country and linked to 8.5 percent recovery. Some State Governments have suggested that different SMPs may be fixed for different States or different SMPs for tropical and sub-tropical regions as the cost of production varies. While it is true that cost of production of sugarcane would vary in different States and regions, we have to bear in mind the fact that for all agricultural commodities, such as wheat, paddy, cotton etc., the support prices fixed by the Govt. of India are uniform throughout the country, although the cost of production of those commodities also varies between different States/regions. It will not be appropriate to make an exception only in the case of sugarcane. Therefore, so long as the principle of uniform support price is followed for other agricultural commodities, the same principle may continue to be followed in case of sugarcane also.

14.10.4 The linking of SMP to recovery percentage however, makes actual SMP different for each factory and this would tend to penalise the more efficient factories which would have to pay higher cane price because of their higher recovery and thereby discourage modernisation and efficiency. It would also create resentment amongst the farmers in the areas of the mills with lower recovery, particularly, since the system of cane area reservation with compulsory sale of cane to specifies mill is recommended to be retained, as they would be getting lower prices for their sugarcane without any fault of theirs because of the inefficiency of the mill. These adverse effect, have so far not materialised primarily because the actual prices paid have been State Advised Prices which have been generally inform for whole State without link to the recovery percentage. However, in principle, these objections to the linking of SMP to recovery percentage are quite strong. The recovery percentage of a factory depends not only on the sucrose content of the cane supplied by the farmers but also on the technical status and level of efficiency

of the factory. A factory with out-dated machinery and inefficient management would have a lower recovery percentage than the more efficient modern factory even if their quality of sugarcane is the same. There is no justification for penalising the growers supplying cane to an inefficient mill. At the same time, there is a need to encourage the planting of sugarcane varieties with higher sucrose content. It is therefore, recommended that instead of linking S.M.P. to recovery percentage, S.M.P. may in future be fixed based on the average sucrose content of cane in the country and a premium may be allowed on recommendations of the CACP on the varieties which have higher sucrose content. The CACP will, no doubt, consult the concerned agricultural universities and sugarcane research institutions to determine varieties which have higher sucrose content and the extent of sucrose content in those varieties before recommending the premia.

14.10.5 Under clause 4 of the Sugarcane (Control) Order 1966, the Central Govt., or the State Govt. with concurrence of the central Govt., may fix a minimum price of sugarcane to be paid by the producers of khandsari sugar. This fixation of separate S.M.P. for khandsari was necessary so long as the S.M.P. was linked to 8.5 percent recovery, as recovery from khandsari units is generally much below 8.5 percent. However, since we are now recommending delinking of the SMP from the recovery percentage and instead allowing a premium for high sucrose varieties there would now be no justification for fixing any separate SMP for sugarcane to be purchased by the khandsari units. The khandsari units may, therefore, be required to pay the same S.M.P. and the provisions in the Sugarcane (Control) Order may be amended accordingly. An exception may, however, need to be made when khandsari units have to extend crushing beyond their normal crushing season during years of surplus cane production. Since their recovery would go down during that period, they may be unable to pay the SMP at that time because of their relatively higher costs. If SMP is rigidly enforced on such units during this period also, they will stop their operations and as a result, the mills will have to continue crushing even for a longer period during the hot summer months, thereby exposing the farmers to a greater loss and the entire cane may not even to lifted. It is, therefore, suggested that in case of khandsari units, SMP should be enforced only during the normal crushing season.

14.10.6 As mentioned in para 14.3, Govt. of India have generally been announcing SMP, as recommended by CACP but there have been

occasional deviations. When the S.M.P. is fixed at a rate lower than the one recommended by CACP, there is resentment among the growers that it has been reduced for extraneous considerations. A firm convention may, therefore, be set up to follow the recommendations of CACP in regard to SMP, unless after submission of report of the CACP there has been significant change in the prices of inputs or the support prices for competing crops have been fixed at a level beyond CACP's recommendations.

14.11.1 The fixation of actual cane price poses considerable difficulty. The practice of fixation of the prices by the State Governments known as S.A.Ps tends to get this important economic decision influenced by extraneous political considerations. There would be normal tendency on the part of State Governments to raise the price beyond the economically optimum price as large number of growers are involved. This tendency may get accentuated in the era of unstable and coalition Governments where short-term considerations of political expediency may far out-weigh any considerations of the long term impact on the sugar industry in the State and consequently on the long term interest of the cane growers themselves. There has also been a sort of competition between different States for announcing higher prices than the others and this tendency is also likely to be accentuated. This tendency to fix the cane price at an artificially high level without regard to the likely prices of sugarcane, coupled with the tendency on the part of the Govt. of India to keep the market price of freesale sugars low in the interest of consumers is the principal cause of the poor financial health of the industry.

14.11.2 The alternative system of cane price determination recommended by the Bhargava Commission and incorporated in clause 5A of the Sugarcane (Control) Order which broadly provides for sharing of the surplus income over and above SMP and conversion cost of the Mills equally between the growers and the mills has been a non-starter. As mentioned in para 14.4.2, there have been long delays in notification of 'L' factor by the Govt. of India. Thereafter, the State Governments have taken a long time in fixing the additional cane price under this clause. The actual information regarding extent of such delay is not available. Apparently, some of the State Govts. have not cared to fix this additional price at all. Moreover, the farmers in India are small farmers and they wish to obtain the entire, or atleast major portion of their cane price in one instalment at the time of delivery of the cane.

They are, therefore, not prepared to accept the S.M.P. at the time of delivery of cane and thereafter wait for a long period before getting the balance price. Even on principle, the formula is flawed as it links the cane price to the recovery percentage (which governs S.M.P.) and the sales realisation of the mill, to which the farmer is attached.

14.11.3 It has been sometimes suggested that, like other raw materials such as jute and cotton, the price of sugarcane may also be allowed to be determined by market forces, subject to minimum price being fixed by Government. There is, however, a vital difference between sugarcane and other raw material. While other raw materials like cotton or jute can be transported over long distances, sugarcane is a perishable crop which must be crushed within a very short period of its harvesting. Its transportation over a long distance not only involves excessive transportation cost but also leads to driage and loss in sucrose. For this and other considerations, the sugarcane grower is obliged to supply cane to a particular mill and the system of cane area reseravtion which provides a legal basis, is proposed to be continued for the efficient functioning of the sugar industry. A sugar mill, therefore, becomes a monopsonic buyer. An enlightened mill owner may be expected to fix a remunerative price for sugarcane taking into account the relative prices of competing crops, as otherwise the cane growers would divert the land to growing of other crops, the sugarcane production would decline and the mill would be deprived of its only raw material. However, in a situation where the competing crops providing comparable returns are not available, the mill owner may be tempted to fix an unduly low price. The farmers cannot also shift their entire land under cane to other crops and would normally have to keep the ratoon crop unless the price fixed is excessively low. Moreover, all mill owners may not be equally enlightened and fixation of different cane price by different mills in the neighbouring areas is bound to cause serious discontent among the growers of the Mills where lower prices are fixed. The system is also apt to result in prolonged agitations and disputes at the commencement of each crushing season. In many cases, the States Governments may have to intervene for maintaining law and order and the outcome may be the same as in the case of SAP. It may be mentioned that because of similar problems, the system of determination of cane price by the Cane and Sugar Board had to be introduced in Thailand since 1982-83, where earlier, the cane prices were fixed by mutual bargaining between sugar factories and the cane growers.

14.11.4 In most of the major sugar producing countries, the price of sugarcane is based on the price of sugar received by the mills. As mentioned in para 10.16.7, out of 12 countries studied by the Committee, this system operates in Australia, Indonesia, Mauritius, Philippines, Taiwan, Thailand, Mexico, South Africa and USA. The system is also fair to both the growers and the mills as both tend to benefit or suffer proportionately with the rise or fall in sugar prices. We, therefore, recommend that a similar system may be adopted in this country also, which will provide for determination of cane price on relevant economic consideration and not on any extraneous political or bureaucratic considerations.

14.11.5 The next question to be decided is the share of growers in the revenues from sale of sugar. As mentioned in para 10.16.8, the share of growers varies from 54 percent in Mexico, 55 percent in Taiwan, 60-65 percent in Australia (At present 62%), 64 percent in South Africa, 68-70 percent in Indonesia, 70% in Thailand and 76 percent in Mauritius. Mauritius is an exceptional case as 95 percent of its exports which constitute over 80 percent of its production are at preferential prices well above the world market prices so that the factories can function within 24 percent of their higher prices, and about 65 percent of cane supplied to factories comes from the land owned by the miller themselves. In other countries, it generally varies between 60-70 percent ignoring the exceptionally lower figures of 54% in Mexico and 55% in Taiwan. Logically, the sharing ratio should be determined by the ratio of the average cost of production of sugarcane to average cost of conversion of sugarcane to sugar. However, the actual cost of production of sugarcane would be matter of considerable controversy and it may be difficult to derive a ratio on that basis which would be found acceptable both to the growers and the millers. The next best alternative is to base it on the ratio of the prices actually paid by the mills to the price of sugar net of taxes actually received by them. This ratio may vary somewhat between the years when market price of sugar is low and those years when it is high and also in years when the State Advised Prices were fixed at an unduly high level. In order to minimise the effect of these aberrations, it would be desirable to have long term average to determine this ratio. It is, therefore, recommended that the share of growers may be fixed on the basis of percentage of average cost of purchase of sugarcane to total sales realisation, excluding excise duty and cess and the incidence of purchase and other taxes levied by

State Governments on sugarcane, during last 10 years. BICP may be requested to determine this percentage on the basis of information to be supplied by the factories and which may be verified to the extent necessary. It would be desirable to take the 10 years average preceding the year in which the decision to adopt this system is taken so that the audited figures of expenditure on purchase of sugarcane as well as sales realisation become available.

14.11.6 While S.M.P. may be uniform for the country as a whole, the cane price will need to be fixed separately for different zones as the price of sugar varies considerably in different areas. Within a zone, however all mills should be required to pay the same cane price. This will tend to reward efficient factories and penalise inefficient ones and thus provide an incentive for modernisation and improvement in efficiency.

14.11.7 While the growers' percentage share in cane price will be uniform throughout the country, some weightage needs to be given to the recovery percentage in the zone, as factories in high recovery zone will have relatively higher capacity to pay the sugarcane prices than those in the lower zone.

14.11.8 The cane price in each zone may thus be determined by the following formula:

$$\text{Cane price per tonne} = \text{Average price of sugar per quintal in zone during the year} \times \text{Growers' percentage share} \times \frac{\text{Average recovery in the zone during the year}}{\text{All India average recovery during the year}}$$

14.11.9 Sugarcane Pricing Board comprising an Economist of repute as Chairman to be appointed by the Govt. of India, and officers not below the rank of Joint Secretary from Departments of Sugar, and Civil Supplies and Ministry of Agriculture, Economic Adviser in the Ministry of Finance, one representative each of NFCSF and ISMA and two representatives of cane growers, one from tropical and another from sub

tropical region, to be nominated by Govt. of India as members, may be set up. The Board will determine before the end of September each year advance price for ensuing crushing season for different price zones in accordance with the above formula based on likely sugar price in the market, including exports, and recovery in the zone during the next sugar season, after hearing representatives of major sugar producing States, sugar mills and cane growers. The advance price will in no case be lower than S.M.P. nor higher than the cane price based on the likely import parity price (i.e., the landed cost of imports + import duty + handling charges at the ports). The final price for each zone will be determined by the Board before the end of November next based on the actual ex-factory sale prices in the zone, excluding excise and cess and incidence of purchase tax/cess on sugarcane and actual zonal and all India recovery. So long as partial control on sugar prices continues, the average sale price of sugar will be determined by weighted average of levy and free sale prices in each zone. The Board may be given a statutory status by making necessary provision in the Sugarcane Control Order.

14.11.10 The Board will also determine a premium for specified higher-sucrose varieties and early maturing varieties in different price zones by multiplying the premium recommended by CACP for such varieties for S.M.P. with the proportion which the cane price determined by the Board for the zone bears to be S.M.P.

14.11.11 The Board may adopt the existing levy sugar zones with such modifications as may be necessary to ensure homogenous zones on the basis of price of sugar and recovery percentage. All the mills may be statutorily required to intimate to the Board every month quantities of sugar sold and sales realisation. The Board may have a small staff to check the figures in case of doubt.

14.11.12 So long as system of partial control continues or releases are controlled by Govt. even under complete decontrol, the Govt. of India should ensure that the actual average price during the season does not go below the estimated cane price adopted by the Board.

14.11.13 The mills should be statutorily required to pay minimum of 80 percent of the advance price determined by the Board or S.M.P., which ever is higher, within 15 days of the supply of cane by the growers. The banks advance working capital loan to the extent of 85 percent of valuation

of stocks based on current months price or average of last 3 months' price, whichever is lower. In the beginning of the season, the sugar prices would normally be lower than the average of sugar price for the season to be adopted by the Pricing Board for determining the cane prices. The working capital loan available to the Mills is thus not likely to be more than 80% of the value of stocks, especially in the beginning of the crushing season. The payment of 80 percent of the price within 15 days of the supply of cane would, therefore, be fair to both the growers and the mills. The remaining amount out of the advance price shall be paid by the mills before the end of the sugar season. The difference between advance price and final price determined by the Board shall be paid by the mills within 15 days of the announcement of the final prices. A provision may be made in the Sugarcane (Control) Order of all the States, where this provision does not exist at present, for recovery of arrears of the sugarcane prices remaining unpaid till the end of sugar season as arrears of land revenue, besides payment of interest at the rate of 15 percent on any delay in the payment of cane price beyond the period indicated above and this provision should be strictly enforced to prevent any tendency for delay in payment of cane price.

14.11.14 With the adoption of this system, Clause 5A of the Sugarcane (Control) Order 1966, will be redundant and the same may be deleted. Clause 5 of the Order has already become redundant.

14.11.15 The co-operative sugar mills in Maharashtra, Gujarat and North Karnataka may continue the present practice of distributing the sale proceeds amongst the member growers if they so desire as growers are effectively the owners of these mills. The Cooperative mills in other States in which growers have majority of share capital, may also be free to adopt that system at their option. The Sugarcane Pricing Board should however determine the cane price in accordance with the above formula for Maharashtra and Gujarat also so that the co-operative factories in those States which wish to adopt this system may be able to do so and the same can also be taken into account for determining the levy prices for mills in these States so long as the system of partial control remains.

14.12 The cane price in India is paid on the basis of weight of sugarcane, while in most other sugar producing countries, the same is paid after taking into account the sucrose content of the cane supplied to the mills. The latter system has an advantage as it provides incentive

to the growers to plant high sucrose varieties and adopt cultural practices which increase the sucrose content of the cane at the time of its supply to the mills including harvesting of cane at maturity and minimising the time involved between harvesting of cane and its supply at the mills. We have given a careful consideration to this important matter. While on principle, the need for change over to the system of cane prices based on test of sucrose content of cane at the time of supply is unexceptionable, there would be serious practical difficulties in introducing this system in the country at this stage because of large number of farmers involved and the difficulty of instilling confidence among the growers about the correctness of the test. The Sugar Technology Mission is at present experimenting with quicker and simpler methods of estimation of sucrose content of cane. These efforts need to be expedited. Where a factory wishes to introduce such a system, it may be allowed, and in fact, even encouraged to do so, subject to the condition that average price paid by the mills to the growers is not lower than that determined by the Pricing Board for mills in the zone. The system has worked successfully in some of the countries because of the provision for an independent testing by an agency in which the growers have confidence. For example, in case of Thailand, testing of sucrose is done by the laboratories set up by the Cane and Sugar Board, a Statutory Authority comprising representatives of the Govt., cane growers and the millers. In South Africa, testing is done by the laboratory set up by South African Sugar Association, which is a joint organisation of the mills and the growers. In Mauritius, the testing is done by laboratories set up by the Mauritius Arbitration and Control Board which is headed by a Supreme Court judge and has representatives from growers and planters, besides others as members. It would, therefore, be necessary before starting the system of payment for cane based on sucrose content in any factory or an area to provide for conduct of the test or at least its supervision, by an agency of the State Government or an independent agency set up by it in which the growers may have confidence. Till then, the payment of prices on the basis of sucrose content of the high sucrose varieties may be started, as recommended above, as the first step in that direction.

14.13.1 Under proviso (i)(b) to clause 3A of the Sugarcane (Control) Order 1966, if the sugarcane delivered at any purchasing centre is transported to the factory by road by the owner on his own transport, rebate not exceeding 2.5 paise per quintal per kilometre, subject to a

maximum of 32 paise per quintal per kilometre, shall be made from the minimum price or the agreed price subject to certain verifications. This provision which was made in 1976 has obviously become outdated as the road freights have considerably increased. Instead of fixing a monetary ceiling which may again become outdated, this proviso may be amended to allow the cost of transportation as may be fixed by the State Government having regard to the actual cost of transportation in the area.

14.13.2 Under proviso (iii) to the above clause, where the sugarcane is brought bound in bundles and weighed as such, the authorities specified therein may allow suitable rebate in regard to the weight of the binding material not exceeding one kilogram per quintal of sugarcane. It has been reported that in some areas, the binding material weighs upto three kilograms per quintal. In order to discourage the transportation of useless trash alongwith the cane, the maximum weight of the binding material in this proviso may be increased to three kilograms per quintal of sugarcane.

14.13.3 In proviso (iv) to the same clause, the Central Government or other authorities specified therein may allow suitable rebate in the minimum price or the agreed price as the case may be, when the cane is supplied ex-field to sugar factories subject to the condition that the rebates so allowed shall not exceed the estimated expenditure on harvesting. When the cane is supplied ex-field, the factory will have to incur expenditure on transportation of the cane from the field to the factory also, besides expenditure on harvesting. The words 'harvesting and transportation' should, therefore, be substituted for the 'harvesting; in this clause.

Chapter 15

Cane Supply Arrangements

15.1 Sugarcane is the main raw material in a sugar factory. It is also highly perishable and its sucrose content gets substantially reduced if it is not milled within a short period after harvesting. The sucrose content also varies with the variety of cane and stage of maturity of the plant. Different varieties of cane reach their optimum sucrose content at varying periods. One of the most critical factors for the efficient functioning of a sugar factory, therefore, is the availability of adequate quantity of sugarcane of proper variety at the required time and with least delay after harvesting. The growers are normally keen to supply their cane soon after maturity so that they are able to get its price early and are able to use the land for production of the next crop. The capacity of the factory is, however, limited and it can take only the cane which it can crush in a day. Since a large number of small farmers supply cane to factories in India (normally about 35,000 farmers) it therefore requires very systematic and efficiently regulated arrangement for obtaining of cane supplies by the mills.

15.2 The Sugarcane (Control) Order, 1966 issued by the Central Government regulates certain aspects of supply of sugarcane by growers to the mills. The State Governments have, however, been delegated powers to reserve area for various sugar mills in the State. The State Governments have also enacted legislation or issued orders regulating supply of cane in their areas. The system of cane supply to the factories, therefore varies greatly. There are three main patterns - that followed by Northern States such as UP, Haryana and Punjab, that followed in tropical States of Andhra Pradesh, Tamil Nadu and part of Karnataka and that followed in Maharashtra and Gujarat.

15.3 Uttar Pradesh

15.3.1 In Uttar Pradesh, reservation of cane area, regulation of sugarcane supplies and payment of cane price etc. are covered under the following two enactments :-

(i) UP Sugarcane (Regulation of Supply & Purchase) Act, 1953 with Rules

(ii) UP Sugarcane Supply & Purchase Order, 1954

15.3.2 **Reservation of cane area** - The Cane Commissioner makes reservation of the cane area for each sugar factory in the State by issuing a Reservation Order ever year under Section 15 of the Act. Following steps are taken in this regard :-

(i) A reservation proposal is submitted by each factory giving its requirement of cane. The estimates given by the factories are examined by the Cane Commissioner and are published with or without modifications.

(ii) Meetings are held by the Cane Commissioner before the start of the crushing season to hear the views of the factories, cane growers and cooperative societies about the reservation of area.

(iii) After taking into consideration the views of the concerned parties, a Reservation Order is issued by the Cane Commissioner which is normally applicable for one season. However, changes in the Reservation Order are made during the season at the discretion of the Cane Commissioner.

(iv) The Reservation Order contains the names of all the purchasing centres which are required to be operated by the factories.

(v) As per the guidelines issued by the Cane Commissioner, the distance between one purchasing centre and the other should be at least five kms. In practice, however, these guidelines are often flouted and the factories are asked to open new centres at short distance from the existing centres mainly due to political pressures. In some factories, the number of cane purchasing centres has gone upto 100 and beyond.

15.3.3 **Purchase of cane through Cooperative Societies** - Sugarcane is purchased by the factories through the Cane Cooperative Societies and the factories do not have a direct link with the sugarcane growers in this regard. The payment of cane price is also made to the growers through the Cooperative Societies. Every farmer selling cane to the factory has to become member of the Society. In case of some new cooperative sugar mills, direct linkage of mill with the growers has been permitted.

15.3.4 **Bonding and supply of cane** - A bonding policy is issued by the Cane Commissioner every year laying down the various terms and conditions for the bonding and supply of cane. The main features are as under :-

(i) Basic quota of each grower is fixed on the basis of previous 2 / 3 years' supplies.

(ii) Each grower enters into a bond with the Cane Cooperative Society for supply upto 85% of his produce, subject to the limitation of basic quota. Additional bonding is also permitted, whenever the total bonded quantity falls short of the requirement of a factory. The grower has to supply the entire quantity of additional bond.

(iii) On the basis of this bonded quantity by the growers, the Cane Cooperative Societies enter into an agreement with the sugar factories as per the proforma prescribed in the Sugarcane Supply and Purchase Order.

(iv) The agreement provides that in the case of wilful short supply of cane by the grower below 85%, he will be required to pay a penalty @ 33 paise per quintal. On the other hand, for wilful failure on the part of the factory to purchase the cane as per agreement, the factory is liable to pay the full price of cane.

In practice, however, the penalty is never realised from the growers even when there is a wilful failure on their part to supply upto 85% of the bonded quantity. Moreover, this rate of penalty of 33 paise per quintal was fixed in 1961, when the cane price was Rs. 4.34 per quintal. This rate has remained unchanged till date, even though the actual price of sugarcane has gone upto Rs. 75 per quintal. This paltry rate of penalty is no deterrent for the growers against diversion of bonded cane to kolhus and crushers. The only penalty normally imposed is by way of reduction in his basic quota.

In the seasons of short cane crop, considerable diversion of bonded cane takes place to kolhus and crushers. In the seasons of surplus sugarcane, the factories are asked by the State Government to continue crushing till the entire cane is finished even though it is far in excess of the bonded quantity, as per the agreements. This becomes highly uneconomical to the factories, as they have to continue crushing in hot summer months when the recoveries come down to as low as two to three per cent.

15.3.5 Harvesting and Supplies of Cane

(i) Sugarcane is harvested by the growers themselves and is supplied either at the factory gate or at the cane purchasing centres. From the cane purchasing centres, sugarcane is transported by trucks hired by the factories. The driage of cane from purchase centre to factory is borne by the factory.

(ii) Supply calendars are prepared by the Cooperative Societies, as per the bond, according to which cane parchies are issued to the growers to enable them to supply their cane. The quota of growers is divided in the expected days of running of the factory and the parchies are isssued in equitable proportion.

(iii) The factories send their indents for requirement of cane everyday separately for supplies at the gate and supplies at each purchasing centre. The Societies in turn, issue parchies to the cane growers to enable them to harvest cane and supply to the factories.

(iv) Weighment of cane both at the gate as well as at the purchasing centres is made in the presence of the staff posted by the Cooperative Societies.

(v) The cane of early maturing varieties is supplied on a preferential basis and its procedure is also laid down in the bonding policy.

(vi) It has been alleged that during the seasons of surplus cane, the Cooperative Societies indulge in large scale irregularities in the issue of parchies in collusion with influential growers.

15.3.6 **Payment of cane price** - The factories are required to pay the cane price within 14 days of the supply of cane. The Act provides for levy of interest @ 7.5% for the delayed payment beyond 14 days. The payment of cane price is made by the factories to the Cooperative Societies periodically and the same is disbursed by the Societies to the growers in cash. It has been alleged that the payments made by the factories to the Societies remain undisbursed by the Societies for long periods causing undue hardship to the sugarcane growers.

From 1997-98 season onwards, the State Government has issued directions for the payment of cane price to the growers only through the banks. Although there are initial problems and difficulties in organising payments of a large number of growers through the banks, but the scheme is surely in the long term interest of sugarcane growers and the growers will be saved from the clutches of middlemen in respect of payment of cane price.

15.3.7 **Computerisation** - Till recently, the entire work of preparation of supply calendars, issue of parchies and payment of cane price etc., was done manually by the Cane Cooperative Societies. This work is now being gradually shifted on computers which have been installed by the factories at their own cost. Now many factories have installed computers and the above functions which were done by the Societies have been taken over by the factories.

15.3.8 **Society Commission** - Under the Act, society commission is paid by the factories to the Cooperative Societies at the rate fixed by the State Government from time to time. The present rate of society commission is 3% of the SMP linked to 8.5% recovery as announced by the Central Government every year. The present rate of society commission at 3% works out to Rs. 1.47 per quintal.

15.4 Other North Indian States

In other States of North India, a system which is similar to UP is being followed except that in Haryana and Punjab willing growers supply cane directly to the sugar factories although they are required to pay commission to societies. In Bihar, a part of cane supplies is arranged through Cane Growers' Cooperative Union and remaining by factories through direct purchase from growers.

In Haryana, farmers who supply the bonded cane are rewarded while there is a penalty which is levied on farmers who fail to supply the entire bonded cane. The penalty amount collected is again distributed to the cane growers who make full supplies of the bonded cane.

15.5 **Tropical States**

Karnataka - Under the provisions of Karnataka Regulations and Sugarcane Distribution Order, each factory has been assigned an area known as reserved area. The cane growers within the reserved area of the factory enter into agreement with the sugar mill for supply of a specified quantity of sugarcane. As per the provision of this Order, every grower of sugarcane in a reserved area of a factory has to supply 95% of the contracted cane to the factory. However, in practice, this provision is not strictly enforced. In the years of surplus cane production, the factory gets 100% supply of cane grown while in the years of lean sugarcane production, supplies hover around 60 to 75 per cent.

The sugar factories issue indents for harvesting of sugarcane on a calendar; the ratoon crop and the early maturing varieties get harvested in the beginning and the mid maturing plant cane gets the next priority.

In South Karnataka, the growers supply the cane at the factory gate while in North Karnataka, the purchases are made on ex-field basis.

In Northern Karnataka bordering Maharashtra under the registration of Multi State Cooperatives, the cane grown in certain villages which fall within the reserved area of a factory is diverted to cooperative sugar factories in the neighbouring State of Maharashtra. This violates the provisions relating to reservation of assigned area or zoning of a sugar factory. Multi State Cooperatives are registered by the Central Registrar of Societies in the Ministry of Agriculture without taking the consent of the respective State Governments.

15.6 In Tamil Nadu and Andhra Pradesh, each factory has been assigned reserved zone on a long term basis. This has facilitated the factories to take up cane development activities in their reserved areas, improving the cane yield and recovery per cent of sugar.

Every year, the cane farmers enter into an agreement with the sugar factories for registration of cane area before undertaking sugarcane planting. This ensures assured cane supplies and sugar production also remains more stable. It is only in certain years, when the cane prices become uneconomical that the cane farmers switch over to other crops and the factories face inadequate supplies of sugarcane and the sugar production suffers.

The sugar mill issues permits to sugarcane farmers for harvesting of sugarcane based on the maturity, age and the variety of the crop. The farmers harvest their cane and transport it to sugar factories. The payments are also made directly to the farmers which facilitate recovery of any loans advanced to the cane farmers.

The direct contact with the sugarcane farmers also enables the mills to introduce high yielding, high sugar varieties through various schemes of incentives etc.

Though the cane registration is done at the beginning of planting season, in some years when the cane planting exceeds the requirement of the sugar factory, the unregistered cane is crushed at the end of the season.

The sugarcane farmers supply cane at the factory gate and factory does not operate outstation purchasing centres as in the North. This also ensures minimum time lag between harvesting and supply of cane at the mills minimising the inversion losses. Factories bear transport cost upto certain radius and rest is borne by the growers.

15.7 In Maharashtra, Gujarat and Northern Karnataka, where most factories are in cooperative sector, the growers supply the cane ex-field and the sugar factories arrange for its harvesting and transportation to the factory. The harvesting is done as per daily crushing requirement and according to maturity of cane in different fields (normally on the basis of date of planting and variety of cane).

15.8 The sugar factories in these and other Southern States have a well defined cane sampling and delivery schedule. Under this system, each grower has to register his cane crop with details such as land survey number area, type of crops, variety, date of planting, irrigation system, date of cutting of previous crop in respect of ratoon crops etc. The sugar factory gets the crop surveyed primarily according to the date of plantation for the initial crushing campaign. The factory agricultural teams survey maturity of the crop by way of hand refractometers and make analysis and consolidate full data, particularly listing brix in descending order. For each day, cutting orders are given to contractors for cane starting from highest brix with combination of plantation date (and cane output estimated in the plot) coming down to next and next brix quantities as it ensures full requirement of the sugarcane quantities together giving required cane at highest level of brix for that day. The irrigation to cane is stopped two weeks before the probable cutting date.

15.9 As the season progresses, the date of planting becomes sole criterion. So far as cane variety is concerned, plantation of different varieties, i.e., early maturing, mid maturing and late maturing, is planned so as to give high recovery in each period and recovery graph is tried to be evened out or flattened out as much as possible.

15.10 In the cooperatives of Maharashtra, Gujarat and North Karnataka, harvesting and transport of cane is done through labour teams of contractors. The labour / contractors are strongly organised and wage rates are decided at State level by bargaining and with general support of the State Government.

15.11 **Views of the Committee**

15.11.1 Both the apex organisations of the sugar industry have criticised the system of compulsory purchase of cane through cane growers' cooperative societies in Uttar Pradesh. In reply to the questionnaire issued by the Committee, the NFCSFL has observed as under :-

'Wherever the cane purchasing societies are there, the farmers are facing lots of problem particularly in case of parchies. It has also come to notice that sometimes, the particular farmer does not have any sugarcane crop but he continued to receive parchies. The basic aims of the society was to provide facilities in terms of insecticide, pesticide, fertilisers and seed but the societies are not providing such facilities to cane growers. Therefore, role of these societies should be confined only for supply of inputs including credit for cane development and not for cane marketing. There should be direct linkage between the sugar factories and the farmers for marketing. The cane should be purchased by the sugar factories directly from the cane growers. This will help in restriction of unmatured / overmatured and stale cane supplies. The sugar factories should ensure recovery of crop loans given by cooperative societies.'

15.11.2 ISMA have likewise expressed the following views :-

'In Southern States like Tamil Nadu, Karnataka , Andhra Pradesh and in Maharashtra, where the factories deal with the sugarcane growers directly, considerable progress has been achieved in improving cane productivity. On the other hand, the role of cane societies in UP and Bihar is hardly of any consequence to the promotion and development of the sugar sector. On the contrary, there have been quite a few instances where societies have acted to the detriment of the interests of the farmers. There are innumerable instances of rampant irregularities and malpractices in the survey of cane area, preparation of supply calendars and issue of parchies. There have been cases where payments made by sugar mills to the societies have remained with them for a considerable period to the detriment of the farmers. In many cases, societies have reduced themselves into a hot bed of politics. All these go against the interests of the growers.'

15.11.3 The matter was also considered by the Standing Committee on Food, Civil Supplies & Public Distribution (1995-96), 10th Lok Sabha. The Committee in its report on sugar presented in December 1995 observed as under :-

'At present, the marketing of cane is effected through the institution of cane cooperatives / societies in Northern parts of the country. Besides marketing, disbursement of credit and other inputs, development works are also undertaken by them. The Committee note that these societies were set up initially to safeguard the interests of farmers against exploitation by middlemen and to improve the development work. However, these societies have failed in ameliorating the problems of cane growers so much so that the development work has come to standstill. In the opinion of the Committee, the system of procurement by cane unions / society has lost its relevance and they have neither been able to protect against exploitation nor have been able to supplement the efforts of sugar units to undertake cane development activities. According to Government's own admission, the system of distribution of harvest challan by cane union / societies has also led to various malpractices. The Committee, therefore, recommend that there should be direct linkage between farmers and sugar factory management and desirability or otherwise of these societies / unions be re-examined. The Committee should be apprised of the outcome of this re-examination'.

15.11.4 During discussion with the Committee, the Chairman of the UP Cane Growers' Federation also observed that there is no denying the fact that the working of the Sahkari Ganna Vikas Samities at present is not fully satisfactory, which is primarily due to the governmental control and the samities have become more bureaucratic in their outlook. He observed that the elected members have ceased to have any say in the working of these societies - 'They are functioning under the bureaucratic control of Cane Commissioner / Deputy Cane Commissioner and their staff. Secretaries of the societies at the mill level are appointed, transferred and controlled by Government. The democratic functioning of the Sahkari Samities has altogether ceased which is responsible for various allegations against the officials of the Samities.'

15.11.5 The Committee has given careful consideration to the matter. In the light of views expressed by both the apex organisations of the industry and the Standing Committee and the Committee's own observations during field visits, it is of the considered view that there should be no legal compulsion on mills to purchase cane only through cooperative societies as is at present the case with most mills in UP. All the mills in UP should also be free to have direct links with farmers regarding cane supply, payment of cane price and cane development as is the case in other major sugar producing States in the country, particularly in the tropical zone. This is essential to ensure that the mills are able to schedule their cane supplies according to maturity of the various varieties, undertake cane development in their area and arrange credit and inputs to the farmers by linking the recovery of the loans with payment of cane price. At the same time, there is need to have an organisation of the cane growers to protect their interests vis-a-vis the mill's management. We recommend that instead of present cooperative societies, associations of cane growers may be set up in the area of each mill in the private and public sector to protect the interests of the farmers in regard to payment of cane price, scheduling, weighment of cane etc. and to represent farmers in negotiations with factories and the Government. All cane suppliers to the mills may be required to be member of such associations and elections of their office bearers should be held under supervision of Cane Department or other such Department as the State Government may direct. No government officer should be on board of these associations so that these act genuinely as associations of cane growers. In order that the growers should look upon these associations as their own organisations and the latter feel themselves accountable to the grower, the activities of these associations should be funded by deduction from the price of cane delivered by the growers at the rate to be determined by the association. However, in order to help the association to collect the dues which may otherwise be difficult because of large number of members involved, the mills may deduct the subscription from the cane price and transmit it to the association. It may not be necessary to have these associations in the area of cooperative sugar mills as the mills are owned by the growers themselves. However, if in the case of any cooperative mill, there is a substantial percentage of non-members supplying cane to the mill, say 50% or more of the total growers, the association of cane growers may be formed in area of that cooperative mill also.

15.12 We have recommended in Chapter 20, a system of cane registration before planting to prevent the planting of excessive cane during certain years in order to reduce the fluctuations of production in the sugar cycle. The registration may be permitted to be made separately for early, mid, and late varieties so that balanced quantities of sugarcane of different maturities become available for crushing during different parts of the season. Preference in bonding may be given to the growers who have made the registration, although in the event of insufficient registration, bonds may be executed even with those who have not registered.

15.13 The present penalty for non-supply of bonded quantity of cane, viz., 33 paise per quintal has now become totally inadequate. It should be a specific percentage of cane price. Around five per cent may be a reasonable figure. However, unless this is strictly enforced, it would have no deterrent effect against diversion of bonded cane by the growers to the khandsari units during periods of low production when khandsari units may offer somewhat higher price. This provision may, therefore, be strictly enforced except where production is lower due to factors beyond the control of the grower. The amount of penalty should, however, not be credited to the funds of the mill but to a welfare fund to be utilised by a committee comprising the representatives of the farmers, on the welfare of the cane growers.

15.14 The cooperative sugar mills in Maharashtra, Gujarat and North Karnataka undertake the harvesting and transportation of cane, while in the other States, harvesting and transportation is undertaken by the growers themselves. There are certain advantages in the factories taking up harvesting and transportation of cane. It ensures better scheduling and availability of adequate quantities of cane as per daily requirement. The cane is harvested according to its maturity, there is no delay in transporting the harvested cane to the mills so that fresh cane is available for crushing and there is least driage or deterioration in quality. This is, in fact, a major reason for better technical efficiency of cooperative sugar factories in Maharashtra. However, the system may also involve higher cost on hired labour for harvesting and hiring of vehicles for transportation which may otherwise be harvested by the grower himself with the help of his family labour and transported in his own bullock cart or trolley. With unionisation, the wage rate of contract labour employed on harvesting may also go up, further pushing up the cost. It may, therefore, be left to each factory to determine whether harvesting and transportation should be arranged by it or left to the growers. Where a factory, other than cooperative factory, decides to take up harvesting and transportation of cane, the farmers should be free to harvest and transport the cane themselves if they so choose, unless there is an agreement between the mill and the growers' associations for entrusting the work to the factory. It should be not open to the factory to coerce the farmers to have the harvesting and transportation done by the factory by refusing to accept the cane harvested and transported by the grower himself or delaying the issue of parchies to such farmers.

15.15 In the Northern States, the system of setting up of purchasing centres by the factories for supply of cane by the growers is in vogue. In the tropical States, the growers are required to supply cane to the factory at the gate where harvesting and transportation is not undertaken by the factory itself. While purchase centres may be convenient for the farmers, particularly those situated away from the mills, they also involved additional cost and driage of cane. There should, therefore, be no legal compulsion in the matter and the desirability or otherwise of setting up of purchase centres and their number and location should be left in the Northern States also to the factories themselves. However, where the grower within the reserved area of the mill is required to supply cane either at the gate or at the purchasing centre which is located beyond 10 kms, he should be reimbursed the additional cost involved in transporting the cane beyond 10 kms, so that the growers living at a distance from the mills are not required to incur additional cost.

15.16 The system of payment of cane price by crossed cheques recently introduced in UP should be extended to other areas also. This will prevent malpractice in payment of cane price and also reduce the extent of poaching. Payment in cash may be permitted only in exceptional circumstances where there are no banks in the vicinity of the cane growers concerned. The State Governments may accordingly be empowered under Sugarcane Control Order to issue directions to the mills for payment of cane price by cheques.

Chapter 16

R&D and Modernisation in Sugar Industry

Research & Development is a time consuming activity, find intensive and some time iinstitutional. The sugar industryin India is eternally fighting for survival. Unless the industry is on a second economic footing it will the defficult for it to divert time and funds for research programme. The R&D initiatives often follow a 'gut feel' approach and involves successes and failores. The financial agencies. Therefore, do not feel comfortable for support R&D and hence it is the individual mills which have to take up the development work on their own, apart from Govt. and other institutions involved in the work.

16.1 A number of institutes have taken up some limited research on various aspects connected worth the process of manufacture of sugar hich includes juice extraction, juice purification crystallisation, sugar separation and drying, energy convservation, automation etc. Some of thes institutes are the following :

National Sugar Institute, Kanpur

Vasant Dada Sugar Institure, Pune

Guru Nana Dev University, Amritsar

Central Salt & Marine Chemicals Research Institute, Bhavnagar

National Physical Laboratory, New Delhi

Central Electronics & Engineering Research Institute, Pilani.

Tata Energy Research Institute, New Delhi

National Productivity Council, New Delhi

School of Energy, Trichinaplly

The technical cell of National Federation of Cooperative Sugar Factories Ltd. and Technical Committee of ISMA are also providing R&D services to their member factories.

The contribution of some of the above Institutes towards Research and Development can be briefly summarised as under :

16.1.1 A number of Ph.D Scholars are working at National Sugar Institute, Kanpur on various problems, which are likely to improve the profitability of sugar and its by-product industries. Some of the research work taken up at the National Sugar Institute is related to the following:

a) Elucidation of the structure of dextran in deteriorated harvested sugar cane.

b) Studies on nitrogenous sugars in sugarcane juice and their fate during clarification

c) Studies on the colour development in sugar in crystal and measures to check it.

d) Separation of sugar from molasses etc.

16.1.2 The Various other important contribution of National Sugar Institute during the recent years include the following :

i) Introduction of 31 colour series in sugar standard.

ii) Patenting of bagasse pol and moisture reducer chemical namely "Sushira"

iii) Design of continuous juice sulphitor

iv) Design of a modern condenser

v) Development of viscosity reducing agent

vi) Development of antiscalent for sugar industry

The institute has also developed various methods of estimation of organic acid components in technical sugar solutions, & determination of phosphate in sugar using lon Exchange Resins, Spectro photo metering methords of estimating reducing sugar and SO2 percent in sugars.

16.1.3 The Biochemistry Division of NSI, has undertaken work in the following areas :

i) Production of biogas and biomanure from cellulosic waste.

ii) Manufacture of compressed bakers yeast from molasses by fermentation.

iii) Treatment of distillery effluents by amonifying bacteria etc.

16.1.4 The Institute has patented instol as viscosity reducer in 1965 and has also patented the process for refining of sugar cane wax in 1996.

16.1 During the visit of the High Powered Committee team of National Sugar Institute, Kanpur, the institute expressed serious concern on a number of bottle necks like timely recruitment of qualified staff, lack of lab facilities and books etc. which has been the causes of poor output of the institute.

16.2 The VSI has also undertaken a number of research activities in sugarcane and sugar manufacture. The Plant Breeding Section of the institute has been instrumental in releasing COC

671 variety which is a high sugar early maturing variety suitable for planting in pre-season and harvesting in early crushing season. Similarly, VSI & Central Sugarcan Research Station (CSRS), Padegaon have jointly propagated (CO-8014 clearly maturing) and CO-8632 and late maturing verifies, which have been recently released in Maharashtra.

16.2.1 The Biotechnology Section of the institute has been working on issues relating to creation of genetic variability and micro propagation. The Institute have also been working on matters relating to seed multiplication through tissue culture, paired raw plant technique and planting of sugarcane, determination of status of micro nutrients in different soils and experiments on control of weedicides. Trials have also been taken by VSI on drip irrigation of sugarcane Experiments have also been made to develop sugarcane harvestor in collaboration with Agricultural University, Ludhiana. A prototype harvester has been claimed to have been develop which can be operated with 59 HP tractor.

16.2.2 The Microbiology Section, developed and commercialized methods of vermicompost production on large scale, from farm and industrial waste. Methods of enrichment of vermicompost by using Azotobactor and phosphorous sulubilizing culture have been standardised. The Entomology section has been engaged in developing methods of mass production of Trichogamma parasites useful in controlling shoot borer.

16.2.3 The Sugar Engineering section in VSI has been focussing its attention on improving cane preparation, mill performance and use of modern equipment of achieve higher productivity in the plant. It is rendering advice to various sugar factories in Maharashtra on power factor correction, and use of static excitation of alternators. It has also demonstrated possibilities of reducing energy conservation at the injection water and spray system and generation of incidential power for use in ancillary industry and for feed to the grid. VSI has also undertaken assessment of the performance of long tube rising and falling film evaporators'. It is energy audit cell is equipped with On-line instrumentation measuring and computerised data collection system. The energy audit programme was implemented in 5 sugar factories in Maharashtra during season 1995-96.

16.2.4 The Sugar Technology section of VSI has done consideral work in improvement of juice clarification techniques and to achieve better performance at the evaporators and vacuum pan and other being house equipments. Efforts have been made to reduce sugar losses in molasses by evolving better pan boiling techniques.

16.2.5 VSI has also taken initiatives in automation of Drip irrigation, automatic determination of moisture in bagasse and use of electronics density meters for on-line measurements of brix of some of the boiling house products.

16.3 A number of other CSIR institutes have also taken up R&D for Sugar Industry on selective basis.

16.3.1 CSMCRI, Bhavnagar has taken up limited research activities in the development of organic membranes for purification of canejuice.

16.3.2 The national Physical Laboratory in collaboration with Sugar Technology Mission (STM) is engaged in evolving an Near Infra Red Technique for On-line estimation of sugar content in sugarcane, bagasse & other sugar house products. The technique is under development at Mawana sugar works, Meerut, U.P.

16.3.3 Central Electronic and Engineering Research Institute, Pilani has been engaged in devising pH control system, pan control system etc. for Sugar Industry.

16.3.4 Tata Energy Research Institute (TERI) has recently taken up development of suitable membranes in collaboration with STM for the purpose of Ultra filtration of cane juice. The trials are to be shortly conducted at Simbhaoli Sugar Mills, (U.P.)

16.4 The technical cell of the National Federation of Cooperative Sugar Factories Ltd., provides technical advice to all Cooperative Sugar Mills in the country as per their requirements. It also formulates modernisation schemes for the Cooperative Sugar Factories to achieve better overall performance.

16.5 A number of engineering firms in the country such as Walchand Industries Ltd., KRUPP India. FCB-KCP, National Heavy Engineering Corporation. Ltd., Indian Sugar & Central Engineering Corpn. Triveru Engineering Works. DCM Data Products. Larsen & Toubro, BHEL etc. have developed several new machineries such as heavy duty fibriser, self setting mills, continuous pans, falling film evaporators, continuous centrifugals, hydraulic drive, fluidised bed boiler etc. for improving the performance of the Indian sugar industry.

16.6 The National Productivity Council has also done commendable work in the area of tribology, total productive maintenance, air pollution control and energy conservation in sugar mills. The School of Energy, Trichinapally has also taken up studies on Energy and Co-generation in Sugar Industry.

16.7 The pace of R&D in sugar industry has lately accelerated through the various initiatives taken up by the Sugar Technology Mission of the Govt. of India. The Sugar Technologists. Association of India has also been contributing towards dissemination of knowledge through organising various comention and seminars from time to time. The data and information collected during the course of various research work done by the sugar factories and various research institutes is discussed and exchanged during these seminars and meetings.

16.8.1 An important step towards furthering research in the sugar industry is the acquisition of data. At present very few sugar factories are equipped with various farms of data acquisition systems like temperature, pressure, flow, pH density, indicators & recorders in different sections

of the plant. The laboratories of various sugar factories also are presently equipped with very primitive equipments for the purpose of analysis and other day-to-day investigative work.

16.8.2 Hardly any sugar factory has a well equipped laboratory atleast with the following equipments for conducting various analysis to monitor the plant efficiencies at different stages of sugar manufacture.

Automatic Polarimeter, Pol tubes and standard quartz plates.

Spectro Photometer

Automatic Refractometer

Digital Photometer

Viscosity meter

Moisture analyser

Auto temperature control air oven

Auto temperature muffle furnace

Digital balances

Physical balance

Rapipol extractor

Brix Hydrometers

Standard lab distillation unit

Lab incubator

Lab crusher

Digital pH meter

Digital TDS meter

Orsat apparatus

Rich and Longe apparatus

Schrocter apparatus

Standard Glass lab apparatus/glass wares and chemicals.

18.8.3 Various sugar mills also do not have the following facilities which are necessary for adequate chemical control.

— On-line methods of recording the mass flow rates of various materials including juice steam condensates, massecuite and molasses etc.

— Temperature recorders, pressure transmitters. pH indicators and recorders at different stages for the purpose of control and process monitor. Also at present non of the sugar mills in India undertake direct estimation of sugar in cane as in generally done in many leading sugar producing countries. Direct estimation of sugar content in the entire quantity of cane that a mill receives for the purpose of processing into sugar is desirable. Unless this is done, it is impossible to correctly make a sugar balance, which is very necessary to correctly estimate the plant efficiency. Since the direct estimation of sugar content in cane is not done, the payment of cane price on quality basis is not possible. The payment of sugarcane price on weight basis does not encourage the sugarcane producers to grow sugarcane with high sugar content.

16.9 The Sugar Technology Mission has assigned the task to National Physical Laboratory to develop a suitable near Infra Red/Medium Infra Rad measurement system for On-line estimation of sugar in cane and in other sugar house products. The trials are already under way in a commercial sugar factory and it is expected that the technique will be available for commecial use soon.

The Sugar Technology Mission is also assisting in the trials of a number of new technologies which so far had not been either tried on a commecial scale any where in India or even any cane sugar mills in the world.

The various technologies under taken by the Sugar Technology Mission (STM) in different sections of the plant are the following.

16.9.1 Cane Juice Extraction

Extraction of joice is an important step in the processing of sugarcane into crystal sugar. The various efforts in the area of juice extraction are the following.

i) Low Pressure Extraction Technology

The technology can be described as a hybrid of the concentional milling process and diffusion process and assures better juice extraction, low energy consumption and down time. The technology is being set up at a capacity of of 3500 TCD in a sugar mill in Maharashtra and if found commercially sucessful, will be considered for replicationin order sugar factories thereafter.

ii) Cane Separation System

The Cane Separation System which provides for separating the soft core cane pulp from the find outer fibrous portion is under tial on a commercial basis at a capacity of 1200 TCD in a sugar factory in South India. this technology when commercialized will revolutionise the concept of juice extraction.

iii) Two Roller Mill

The sugar industry worldwide has been making use of a Three Roller Mill with a turning plate (trash plate) for the purpose of extraction of juice with improvements in preparatory index. There is substantial re-absorption of juice at a Three Roller Mill alongwith high power consumption. A specially designed Two Roller Mill with pressure feeders but without trash plate is therefore being set up to assess its efficacy compared to a Three Roller Mill.

16.9.2 Juice Processing

The sugar lost in process mainly constitutes the sugar loss in filter cake and sugar loss in molasses. Reducing these losses can directly assist in improving sugar recovery. A few of the technologies processes for juice processing which have been developed and are already commercially sucessfully and are awaiting replication or are under trial on a commercial scale are described below :

i) Decanter Centrifuge

A commercial trial of a Cecanter Centrifuge was taken up recently by Sugar Technology Mission (STM) on a plant sale at Valsad factory in Gujarat. It has been successfully demostrated that the Decanter Centrifuge can replace the existing vacuum filters for reducing the sugar loss in filter cake substantially alongwith obtaining better quality filtrates. Also un-like vacuum filtrates, the Decanter Centrifuges will not need the use of pollution causing bagaccilo as filter aid. It is awaiting replication.

ii) Vacuum Filtrate Treatment System

Hitherto the filtrate obtained through use of vacuum filters contain a lot of suspended matter and therefore re-circulated to the proces. Recent successful trials taken up by STM for the treatment of vacuum filtrates through the phospho Floatation process have been an important step in the area of juice clarification.

iii) Short Retention Clarifier

Similarly, the recent trials of a Short Retention Clarifier at a capacity of 5000 TCD in Gujarat have indicated that there is substantial scope for reducing the

retention time of joices. The present higher retention time of joice in the clarifier of upto 2.30 hrs often results in sugar losses due to inversion etc.

16.9.3 Process Automation

Practically every sugar factory today in India is manually controlling the process of joice clarification including addition of milk of line and control of pH through the use of SO_2 gases. The manual control does not ensure uniformity of operation and leads to poor process efficiencies. Therefore, the recent trials of the use of PLC based Control Systems alongwith the use of Film Type Sulphur burners have opened up the possibilities of adoption by the sugar mills of a real time technique for control process clarification.

16.9.4 Membrane Separation Technique

India is now well poised to export sugar to European countries and Middle East. The basic problem for export of Indian sugar to these countries is high colour index (ICUMSA) Techniques which remove the colour bodies have therefore to be developed Ultra filtration using memberanes is a step in this direction.

The Indian sugar industry has c\envinced keen interest in the use of membrane technique for purification of cane juices. The sugar Technology Mission is therefore taking up pilot scale ultra filtration trials on use of membranes for the purification of raw juices and other juices, without the use of chemicals for enhanced recovery of superior quality mill white sugar.

A number of other projects like Chemical treatment of bagasse for use as de-colourising agent. development of State-of-the-art pan automation control systems etc. to improve the overall process performance are under various stages of development.

16.9.5 Sugar quality improvements

The advent of food processing and beverage industry, increase in the quality consciousness of the consumer and need for profitable exports requires improvement in the quality of sugar produced by the Indian sugar industry. The Indian Industry has been either following the Double sulphitation process or the Double Carbonation Process for the manufacture of mill white sugar since its inception. In view of the changed scenario, the industry is now focussing its attention on improvements in sugar quality.

The Sugar Technology mission has already assisted in setting up a plant scale project in U.P. to produce mill white sugar with minimum SO_2 content, turbidity, ash and invert sugar. The process involves simultaneous treatment of vacuum filtrates and syrup through the phospho Floatation techniques and offers a possibility of retrofiting the existing process of sugar manufacture without recourse to the raw sugar melt refining route. The above process when tine tuffed may offer a very economical alternative to produce mill white sugar or comparable quality vis-a-vis retined sugar.

It can be therefore noted from the foregoing that considerable research & development activities are underway by various agencies for the purpose of improving the overall performance of the sugar industry. There are yet a number of gaps in technology which need immediate attention and offer a substantial scope for improvements in technical performance of the Indian sugar industry.

16.10 Views of the Committee

The Research and Development in the sugar industry in India. as mentioned already, is being taken up by a number of institutes like National Sugar Institute (NSI), Kanpur, Vasant Dada Sugar Institute (VSI), Pune, the CSIR Institute and the recently set up Sugar Technology Mission in the Deptt.. of Science & Technology etc.

16.10.1 The National Sugar Institute, Kanpur has been the premier institute for providing the technical man power and has been involved in the education and training of personnels for sugar industry at the supervisory level. The institute at present is under the control of the Deptt. of Sugar and Edible Oils, Govt. of India and therefore has to follow the various rules and regulations, that are applicable to a Govt. Deptt. These lead to delays in sanctioning of posts required for research, recruitment of scientists, purchase of requisite equipment for laboratories and books etc. There has sometimes been an embargo on recruitment of faculty even against the vacant posts. The grades and other facilities offered to the faculty are as per Central Govt. Scales and therefore, in many cases these are not sufficient to attract the right talent from the industry for such assignments. The present organisational structure ofthe institute is thus not conducive to efficient performance of its functions of teaching & research. Most other institutions engaged in teching & research such as IITs, IIMs, Universities, Research Institutes under ICAR etc. have for this very reason been set up as autonomous organisations. The committee, therefore recommends that NSI, Kanpur should be converted into an autonomous organisation as a Registered Society. The Society should have a Governing Body with an eminent person as its Chairman and a Scientist to be nominated by CSIR, eminent Sugar Technologist from out of a panel recommended by Sugar Technologists Association of India, a Research Scientist to be nominated by ICAR, a Scientist from Technology Information. Forecasting & Assessment Council (TIFAC), a representative each from National Federation of Cooperative Sugar Factories Limited (NFCSF) and Indian Sugar Mills Association (ISMA) to represent the industry and nominee of Ministry of Food & Consumer Affairs as its members. The requisite funds for the functioning of the institute may be provided into the extent of 75% from SDF and the remaining 25% may be met by the institute from consultancy, contract research and other sources. The focus of activities of the Institute should be on teaching and fundamental research in the various areas of Sugar Technology and Sugar Engineeging. The course content for various technical courses should also be revised to keep pace with the changes in the technology trends in the industry e.g. the coverage in the area of process instrumentation and automation should be suitably enhanced.

Further, in order to ensure that high quality of technical persons conversant with local languages are available to all major sugar producing states, there should be reservation of seats in the institute for condidates from major non-Hindi speaking sugar producing states such as Maharashtra, Gujarat, Tamil Nadu, Karnataka, Andhra Pradesh and Orissa.

16.10.2 VSI, Pune at present is being financed wholly by contributions from the growers. It is recommended that its expenditure should also be met to the extent of 50% by grant from SDF and balance through contribution from the sugarcane growers and from other sources. At the same tune, adequate representation may be provided to Deptt. of Sugar & Edible Oils. Ministry of Food & Consumer Affairs. ISMA, National Federation of Cooperative sugar Factories Ltd. etc. on the Board of the institute, to make it more accountable and sensitive to the needs of the entire industry.

16.10.3 A National Institute of Sugarcane and Sugar Technology is being set up at Mau, U.P. and the construction of the building of the institute is at an advanced stage of completion. Through members of the Committee have reservation about location of the institute, but since, the construction work is already at an advanced stage, the existing location may have to be accepted as fate acconipli. It is however, felt that as there is already an adequate infrastructure of research institutes at sugarcane under ICAR and as the proposed institute is also located in the similar agro climatic zone as the Indian Institute of Sugarcane Research. Lucknow, the proposed institute may concentrate mainly on research in cane processing. Its management structure and funding may also be broadly on the same pattern as suggested for National Sugar Institute, Kanpur.

16.10.4 The Committee notes with satisfaction the progress made by the recently set up Sugar Technology Mission (STM) in the Deptt. of Science & Technology. Govt of India in the Introduction of new technologies and technology upgradation of existing sugar mills in the Indian sugar industry. The modernisation and upgradation of the industry, however, should be a continuous process. Often while technologies are available their field application and implementation is very slow. The STM has been able to successfully fill up this gap and has accelerated the paceof modernisation in the sugar industry to achieve higher plant performance and efficiency. A number of new technologies have already been introduced with the purpose of reducing sugar losses, energy conservation and quality improvements. The Committee therefore, recommends that the STM should be made a regular organisation and should expand its activities and have in-house facilities for pilot scale trials for the purpose of process modification in the sugar plants.

16.10.5 The requisite funds for the functioning of STM may be provided through SDF to the extent of 50% and the balance 50% may be contributed suitably by the Deptt. of Science & Technology and through consultancy, contract research, fees and other sources.

16.10.6 An evaluation on the performance of the new technologies introduced by STM may be made after about 3 years of their successful introduction to asscess their benefits under field conditions and to remove any snags that may have occurred. In case a new technology has failed to be adopted on a wide scale, the reason for the same may also be identified, so that the corrective measures are taken.

16.10.7 The sugar industry is often required to get testing of materials like bulk and process chemicals. Testing of scales found in heat exchangers, testing a sugar quality, molasses, efluent water and particulate matter in an emissions etc. While the sugar mills do undertake some of the tests in their own, laboratories, it is not always possible for each sugar mill to have a complete set of facilities for conducting such tests and they depend on outsideagencies for the purpose. Such facilities are at present inadequage. The Committee therefore, recommends that the STM should be asked to create testing facilities exclusively for sugar industry. These testing facilities can be provided by the STM at New Delhi Such facilities may also be provided in a few regional testing laboratories to be selected by Government in consultation with NFCSF Ltd. & ISMA for the convenience of sugar mills located near to them. STM may provide necessary guidelines and supervisory control on these testing laboratories. In the initial stages some assistance may be provided to these laboratories but eventually they should meet the expenses on the facilities from out of fees to be changed.

16.10.8 In order to encourage research for the benefit of the sugar industry. chairs for research in the research institute including universities and IITs may be set up by the sugar industry. Matching contributions to the extent of 50% may be provided from SDF as grant to encourage the industry to set up the chairs.

16.10.9 The sugar mills in other countries produce various qualities of sugar to meet consumer demand for different qualities which the mills are able to set at a premium. In India. Sugar industry is required to produce only sugar in specified colour & size specification. This is an un-necessary restriction which serves no useful purpose. The Committee recommends that the Government should permit manufacture of different qualities of sugar including brown sugar and jaggery to meet consumer demand. The Government may however. charge excise duty at similar rates for different sugar qualities including jaggery that may be produced by the sugar mills. The charging of excise dury at the same rate for jaggery produced by the sugar mills will provide an effective protection to cottage scale jaggery producers besides preventing evasion of duty. The mills may be required to supply sugar of the grades as specified by the Government to meet the levy requirement as ling as the partial control on sugar continues.

16.10.10 The Committee feels that the Indian sugar industry is sufficiently mature and need not be told to maintain certain efficiency parameters as stipulated by the Government in its latter dated 31st May, 1988. The entrepreneurs and managers are aware of the advantages to operate at optimum effciency levels and therefore, there is no need for the Government to monitor the performance in this regard, which only leads to harassment and corruption. The Government therefore. May withdraw its letter dated 31st May, 1988 stipulating the various efficiency norms. It is, however emphasised that the relaxation from the requirement of prior approval permission for additions alterations to various items of plant and machinery conveyed in this letter and in the subsequent letter of 3rd January; 1990 from Department of Food should continue and these may continue to left to be determined by the factories on the basis of techno-economic feasibility.

Chapter 17

Research & Development in Sugarcane

17.1 Sugarcane is the main raw material in sugar production and accounts for about 65-70 percent of its cost of production. Research and development efforts to improve the yield and sucrose content of sugarcane and reduce its cost of production are, therefore, of critical importance for improving the efficiency of the sugar industry and making it competitive with the industry in the world. The present position in regard to research and development in sugar industry in India is indicated in the following paras.

17.2 *Research*

17.2.1 The main objectives of the sugarcane research have been: (i) to breed cane varieties with high yield and sugar content suitable for different agro-climatic regions of the country; (ii) to evolve efficient cultural practices such as time of planting, spacing, tillering, weeding, inter-cropping, etc.; (iii) to work out suitable schedules for irrigation and fertiliser application in different areas and zones; (iv) to develop control measures against insects, pests and diseases like red-rot, grassy shoot, pyrilla, borers, etc. (v) to develop improved agricultural implements for sugarcane cultivation, etc. As a result of research carried out by the Central and State research institutes and research centres and the Agricultural universities, considerable knowledge and know-how have become available for cultivating sugarcane in a scientific and efficient way.

17.2.2 There is a good network of research stations for sugarcane in the country. The Indian Council of Agricultural Research (ICAR) has two research institutes on sugarcane. The Sugarcane Breeding Institute (SBI) located at Coimbatore is responsible for developing improved high yielding varieties with high sugar content for tropical as well as sub - tropical regions of the country. Another institute Indian Institute of Sugarcane Research (IISR) located at Lucknow carries out basic research for developing sugarcane production and protection technologies for the country. Research on sugarcane is also conducted by Agricultural Universities and Agriculture Departments of State Governments. In addition, there are as many as 60 Research Stations in the various parts of the country to conduct research in agronomy, plant pathology and varietal selection etc. The varieties are tested for suitability at stations in different parts.

Varietal Improvement

17.2.3 Sugarcane Breeding Institute Coimbatore has released more than 2000 sugarcane varieties for different agro-climatic zones of the country. Every year the existing and the newly developed varieties are examined in the context of their suitability and utility. Based on the performance of the new sugarcane varieties in different agro-climatic situations as prevailing in different parts of the country, the varieties are being adopted by the farmers extensively. A list of varieties recommended for commercial cultivation in different states during the last decade

1987-97 are given in Annexure 17.1. In addition seven new varities have been released during 1997 for different agro-climatic zones, details of which are given in Annexure 17.2.

17.2.4 Despite this impressive list, the number of high sucrose varieties developed during the last 30 years is rather small (mainly CoJ64 in Sub tropics and CoC 671 in tropics). These have also subsequently become susceptible to red rot. High sucrose varieties are generally found to be susceptible to red rot. The development of such varieties resistant to red rot remains a priority item for research.

17.2.5 Twelve varieties have been evaluated by the Sugarcane Breeding Institute, Coimbatore for their performance under multi-ratooning system. The yield data of plant and ratoon crops indicated that varieties Co 8021, Co 8122, Co 8208 and Co 8362 are able to produce same level of cane yield in first and second ratoons compared to Co 6304 wherein there was a drastic yield drop every year. Further, varieties Co 8208 and Co 8362 are most ideal varieties even for growing upto third ratoon. The yield drop between 2nd and 3rd ratoon was only about 5 per cent.

17.2.6 The country has a huge collection of sugarcane germplasm being maintained by the Sugarcane Breeding Institute, Coimbatore. The cultivated and wild species of Saccharum alongwith related genera which can hybridize with sugarcane are the basic genetic resources of sugarcane. Out of 4803 clones, about 2070 are basic germplasm of species level, the rest being Indian and foreign hybrids and allied genera. Thus, the strength of biodiversity has turned into an opportunity for improving the varietal performance.

17.2.7 Research on ratooning has been carried on from very beginning but there is no discernible impact on the yield levels.

Lack of Suitable Varieties and their Balance

17.2.8 Large number of varieties have been released which are grouped into early and mid/ late ripening types. There are, however, lesser number of early ripening varieties. In this respect release of CoJ-64 in seventies with high sugar content and early duration played an important role in sugar sector. It has now become susceptible to red-rot disease in certain areas. More thrust is needed for the development of early maturing varieties having high yield, high sugar content, early maturity and resistance to diseases particularly red-rot. Production losses are also due to various biotic and abiotic stresses particularly water logging, soil salinity, drought, cyclone etc., for which resistant varieties need to be developed.

17.2.9 Sugar recovery for the last 40 years has been stagnating around 10%. There has been only a slight improvement in sugarcane productivity during the recent years. The compound growth rate in yield during 1949-50 to 1995-96 has been only 1.21% per annum as against 1.58% for all the crops. There is need to broaden the genetic base, employ recent approaches of genetic engineering and other processes for meeting location specific requirements.

17.2.10 Worldwide although cane breeders have had some success in developing high yielding varieties, but the yield improvements in the cane sector have not met with much success. Much of the explanation for slowed success stems from the perennial nature of the cane plant. From a research and development stand-point, this characteristic of the cane plant means that it takes many years to develop new varieties, owing to the need to investigate the results over successive ratoon crops. It also means that the uptake of new varieties is slow because growers only replant part of their cane area each year. Thus, cane breeders are disadvantaged in two ways. First, it is not essential that growers buy their seed cane from breeders, because cane can be propagated by farmers themselves. Second, growers replant only part of their cane areas each year.

17.2.11 The fact that it takes much longer in case of sugarcane to develop new varieties as compared to other crops, due to the need in case of the former to investigate the results over successive ratoon crops tends to discourage agricultural scientists from taking up research in sugar cane. This probably explains the relatively less attention paid to research in sugarcane in various Agricultural Universities.

17.2.12 The funding of sugarcane research in India has been limited to funds provided mainly by Central Government, with the main exception of Vasantdada Sugar Institute (V.S.I.) Pune which has been funded by cane growers. Due to budgetary constraints funds have been inadequate to equip the laboratories with latest equipment and facilities.

Improvement in Cutural Practices

17.2.13 The results of 106 farm trials conducted by Sugarcane Breeding Institute on various soil types with different varieties indicated that the juice quality was satisfactory with the application of either Azospirillum or Azotobacter except in saline clay soils. Improvement in cane yield was indicated with the application of Azospirillum in clay soils. There was about 25% saving in inorganic nitrogen with the application of Azotobacter or Azospirillum.

17.2.14 Iron and zinc deficiencies limit crop production. Foliar spray of ferrous sulphate (2.0%) and zinc sulphate (0.5%) thrice at early stages was found effective.

17.2.15 Trichoderma viride and Pleurotus sp. have been found useful to decompose pressmud. 25% of chemical fertilizer could be saved by using 10 t/ha of enriched pressmud.

17.2.16 Sugarcane production is highly energy intensive. On a conventional bullock operated farm, the energy required for producing one tonne of cane has been reported as 134.7 103 kcal, while on a tractor operated farm, it is 95.2 103 kcal. With the incorporation of machinery improvement, the energy balance can change significantly. While developing a suitable system of mechanization, attempts need be made to phase the total programme in such a way that the operations which are highly energy intensive, should be given priority. Therefore, labour intensive

operations need immediate mechanization. Keeping the above in view, a number of useful and commercially adoptable devices such as sett cutting machine, tractor driven cutter and planter, stubble shaver, etc. have been developed. Research efforts are being made to develop a suitable machine for harvesting of sugarcane.

17.2.17 Recently IISR, Lucknow has developed an innovative all in one cane cutter planter - that may be of great help to sugarcane growers. It is mounted on 35HP tractor and consists of furrow opening, tillage discs and sub units - that perform sett cutting, fertilizing and chemical dispensing, soil covering and pressing operations in a single pass of the tractor.

17.2.18 Operational Research Project (ORP): With a view to lift the yield levels, Vasantdada Sugar Institute, Pune initiated ORP from 1995-96. Under the Programme, demonstration plot of 100 ha. each were organised in planted cane and ratoon in 22 selected factories. In all, demonstrations on an area of 2341 ha. were organised wherein 4977 farmers participated.

The demonstrations were organised with following components:

(A) Planted Cane

i) Good quality seed

ii) Soil fertility and productivity management

iii) Water management

iv) Bio-fertilizers

v) Integrated disease and pest management.

(B) Ratoon

i) Cutting cane at ground level

ii) Manures, fertilizers, micro-nutrients and fertilizers

iii) Gap filling

iv) Trash mulching in alternate furrow.

17.2.19 The harvesting of cane plots under ORP indicated that sugarcane yields in planted cane and ratoon crop obtained were 105 tonnes per hectare and 84 tonnes per hectare respectively as against average yield of 63 and 50 tonnes per hectare. In another ORP implemented in Ambur areas during 1991-95, the average cane yield increased from 51.70 tonnes in 1990-91 to 75.29 tonnes per hectare in 1994-95.

17.2.20 Sugarcane makes a heavy demand on water. In general, the water management in sugarcane crop during formative phases is the most important factor in relation to productivity because of low availability of water resources and excessive evapo-transpiration. Application of

water at the critical stages of sugarcane crop may bring in efficiency in water use. Adoption of moisture conservation practices like trash mulching, cultivation of sugarcane varieties with deeper root system, and application of water under skip furrow method provides efficient water management. For effective use of irrigation water, feasibility of micro-irrigation system like drip irrigation and sprinklers, has to be worked out.

17.2.21 Four years study on various irrigation system by SBI indicated that there could be a saving of about 44% in irrigation water with increased water use efficiency by drip system of irrigation. However, the cost-benefit ratio was low due to high capital cost.

17.2.22 Drip Irrigation: Experiments conducted at VSI showed that drip irrigation was found to be suitable for sugarcane. Use of surface drip irrigation system employing pressure compensating drippers resulted in 40 to 50% saving of irrigation water and 20 to 25% increase in sugarcane yields. In collaboration with Electronics and Computer division of VSI, this section has developed automatic drip irrigation system. In this system moisture level in the sugarcane field is maintained at field capacity by using moisture sensors and microprocessors based unit. With this the moisture (water) requirement of inter crops can also be successfully controlled. Use of automatic drip irrigation system helped in further saving of irrigation water up to 7 to 8% and further increase in sugarcane production also by 7 to 8% as compared to manually operated drip irrigation system.

Inadequate availability of quality seed

17.2.23 The health and size of any crop depends on the quality of seed sown. In respect of sugarcane, availability of good and disease-free seed has not been to the desired extent. In the absence of healthy and disease-free seed, the farmers use sugarcane seed from any quarter at their will and hence potential yield is not realised. Heat therapy of sugarcane seed is very useful in reducing diseases carried through seed. The tissue culture technique is proving helpful in faster spread of seed of new varieties.

17.2.24 The nature and duration of the preceding crop causes considerable variation in planting time, fertility status of soil and crop productivity. In some areas, sugarcane is planted after a wheat crop i.e., in April and May. This results in poor tillering and low yield. An appropriate cropping system for such regions may improve cane yield and sugar recovery. Methods need to be developed for enhancing sprouting and tillering in late-planted sugarcane.

17.3 *Developmental Activities*

17.3.1 There is an extensive developmental network on sugarcane supported by central as well as respective state governments. There are Sugarcane Research Centres under ICAR system, State Agricultural Universities and departmental Farms under State Agriculture Department in all the major sugarcane growing states for propagation of improved production technologies through field demonstrations, extension services etc.

17.3.2 A set-up also exists at Centre and State levels for the promotion and development of sugarcane. Directorate of Sugarcane Development in the Ministry of Agriculture maintains liaison between the Central and State Governments on sugarcane development work. The IISR, Lucknow looks after the sub-tropical region and SBI, Coimbatore looks after the tropical region for propagation of improved sugarcane production technologies.

17.3.3 The pattern of crop development in various states differs vastly. In most of the states, particularly, sub-tropics the developmental work on this crop is state sponsored though sugar factories also have their own development network. The two developmental agencies, however, have been working independently. In contrast to this, in tropics, particularly in Maharashtra and Gujarat, the crop development is entrusted to sugar industry which has paid rich dividends both to cultivators as well as the industry.

17.3.4 The sugar producing states in the northern part of the country have their own Sugarcane Act to regulate the availability of cane to mills. In Uttar Pradesh, the responsibility for regulating cane supplies and cane development works is entrusted to Cane Growers Co-operatives Societies. In most of the states, there is a Cane Commissioner under whose control or advice the various quasi - official or official bodies and functionaries work. In Uttar Pradesh and Bihar all developmental work as well as liaison between the farmer and the miller lie in the jurisdiction of the cane commissioner. In some other States, the functions of the cane commissioner is performed by the Director of Agriculture. Efforts of the developmental staff have been concentrated largely on the side of regulating the harvest and supply of cane to the mills. In this process, actual developmental work relating to efficient crop production got neglected, which is reflected in low levels of average yield in several states of north India. In southern states, the millers and departments have taken relatively more interest in the development of sugarcane than in the north. Some of the sugar factories in Tamil Nadu, Maharashtra and Andhra Pradesh are in fact running their own research farm for testing of varieties and even manuring and cultural practices. At the official level, all kinds of activities relating to sugarcane development in these states are looked after by the Department of Agriculture.

17.3.5 It needs to be mentioned that for all the developmental work, the emphasis throughout has been in the factory areas where the sugarcane is exclusively grown for manufacture of sugar. In this process, other areas which presently produces nearly 40 per cent of the total cane stands neglected. Neglect of the developmental work implies non - availability of improved planting material, inadequate expansion of irrigation facilities and poor extension support in respect of fertilizer application and plant protection measures. The available planting material is many a times so degenerated and susceptible to pests and diseases that it acts as major drag in improving the unit yield.

17.3.6 The sugar factories in the sub tropics largely confine their activities to the procurement of cane. They have generally not taken due interest in development of cane to increase its production per unit of area as well as sugar content.

17.3.7 The varietal balancing is a very important factor in improving sugar recovery through crushing of sugarcane at right maturity time. Therefore, there should be a continuous supply of cane to the mills at the right maturity time otherwise it will be difficult to crush cane by the mills in time consequently causing losses in sugar recovery. It is generally considered desirable that at least 25% of sugarcane areas should be covered under early maturing varieties. Presently, less than 10% of area in Uttar Pradesh and Bihar is covered under such varieties. A joint action plan by the mills and cane growers for staggered sowing of various maturity types of varieties both under ratoon and planted crop as well as staggered harvesting based upon right maturity period will definitely increase sugar recovery.

Areas of Low yield

17.3.8 There is wide variations in yield from State to State, being as low as 45 tonnes per hectare in Bihar to as high as 110 tonnes per hectare in Tamil Nadu. The various constraints which have hampered desired growth in yield are as under:

(i) Inadequate production and supply of disease-free seeds of suitable varieties having high cane yield, sugar content, early maturity etc.

(ii) Prevalence of diseases/pests particularly red rot, pyrilla, stemborer etc.

(iii) Neglect of ratoon crops.

(iv) Inadequate transfer of production technologies including training of farmers and staff.

(v) Inadequacy and Improper use of irrigation facilities.

(vi) Deteriorating soil health including depleting level of micro nutrients.

Environmental Reasons

17.3.9 In sub-tropics, the sugarcane crop faces extremes of weather conditions. Low temperatures (3-5oC) in winter months and high (40-43oC) temperatures in summer months restrict the growth of sugarcane. In pre-monsoon period the crop is exposed to conditions of recurring drought because of higher evaporative demand due to excessively high thermal regimes. During monsoon period (July to September), high precipitation and inundation lead to water logging in sugarcane fields particularly in nothern Bihar and Eastern Uttar Pradesh and, in parts of Haryana and Punjab. Besides, the erratic rainfall pattern in this zone also adversely affects the crop performance. Such conditions not only lower the cane yield, but also the sugar recovery. As a consequence of climatic features and annual weather fluctuations in terms of temperature and rainfall, sugar content is affected. In spite of these situations, sugarcane in subtropics is a profitable crop. Prevalence of dry weather during May and June triggers good tillering and moderately hot humid monsoon accelerates the growth of cane. Besides, moderately low temperature during early part of winter season is the most conducive for accumulation of sugar and has direct bearing on sugar recovery in mills.

17.3.10 The specific constraints affecting yields in the various zones of sub-tropical areas are as under:

(A) North-Western Zone.

This zone comprises of the sugarcane growing areas in the States of Punjab, Haryana and North-Western U.P. The major constraints in this particular zone are:

(a) Pre/monsoon drought in the planting season (i.e. Spring)

(b) Salinity in pockets.

(c) Frost in the Northern regions of Punjab

(d) Prevalence of diseases and pests like red-rot, top borer and stem borer.

(B) North-Central Zone

This zone comprises of the sugarcane growing areas in the States of Bihar, Eastern U.P., parts of West Bengal and Northern tracks of Assam. The major constraints in this zone are:-

(a) Pre-monsoon drought

(b) Water-Logging

(c) Red-rot & Top borer.

(C) North-Eastern Zone

N.E. Zone comprises of sugarcane growing areas in Eastern West Bengal and Assam. The major constraints in this region are low productivity of laterite soil.

17.3.11 The research institutions have to develop suitable varieties and cultural practices for these areas taking into account the above constraints.

17.3.12 The major production constraints in the tropical zone are : limited availability of suitable soil, irrigation water, occurrence of diseases and pests. One of the major constraints is the poor recovery of sugar due to rains during winter season in certain parts of the peninsular region. Under these circumstances, the main attention is required for exploiting the scope of area and productivity increases in sub-tropical region of the country.

17.3.13 The comparison of data for the last five years indicates that the productivity of sugarcane has increased at a faster rate in sub-tropics than the tropics. The productivity level in sub-tropics, which was 54.9 t/ha in 1989-90, increased to 59.24 t/ha (4.34 t/ha addition), whereas in the tropics, it increased from 85.87 to 86.83 t/ha (0.96 t/ha addition).

17.3.14 Although sugarcane productivity has shown increasing trend, a wide gap exists between potential (competition plots) and existing (commercial plots) productivity levels. In sub-tropical zone, this gap is of 134 t/ha, whereas in the tropical zone, this gap is to the extent of 188 t/ha.

17.3.15 Ratoon crop is also generally neglected by farmers. Due to neglect, perpetuation of diseases/pests, and depletion of soil nutrients; ratoon crop yields less than plant crop. Research results have shown that there is significant increase in cane productivity when ratoon management practices are followed. The various factors of technology include gap filling, proper fertiliser dose, plant protection measures, stubble shaving etc., which contribute significantly in increasing productivity. In Mauritius and Hawai, where reportedly 2 to 6 ratoons are taken, it is cultivated with as much care as planted crop. As a result they reportedly record good yields and produce cane of high quality.

17.3.16 On the plant protection side, efforts for development of pests and disease resistant varieties have not met with full success. As a result, a number of pest - disease complexes have always existed in the field.

17.3.17 The major diseases of sugarcane like red rot and wilt have spread to newer areas. In the absence of any effective control measures, life span of high sugar varieties will be shortened. The increasing use of chemicals for the control of insect-pests is expected to change the beneficial fauna of the soil and also the bio-agents that may naturally control the pests.

Centrally Sponsored Scheme

17.3.18 Programmes for sugarcane development have been implemented in states during plan periods. To supplement the efforts of the state governments and to intensify sugarcane development around sugar factories, a centrally sponsored scheme was implemented during the fifth plan period. The programme envisaged intensive development of sugarcane in an area of 2000 hectare around each sugar factory in the sub - tropical states and 1000 hectares in tropical states. The development measures consisted of

i) healty seed production and its distribution for commercial cultivation,

ii) demonstration of improved practices of cane cultivation both for planted and ratoon cane,

iii) assistance for training of cane development workers at the state level,

iv) assistance for plant protection equipment, and

v) assistance for construction of link roads.

17.3.19 The scheme was transferred to state sector from 1979-80 as per the decision of National Development Council. However, for increasing the output of cane and its productivity, special fund is being released to the various sugar factories as loan from the Sugarcane Development Fund (SDF). There was no central or centrally sponsored scheme for development of sugarcane during the Seventh Five Year Plan.

17.3.20 During the Eighth Five Year Plan, a centrally sponsored scheme Sustainable Development of Sugarcane based Cropping System' was launched during 1995-96 and 1996-97 and continued in 1997-98 in 20 states (Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Manipur, Mizorum, Nagaland, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura and West Bengal) and the Union Territory of Pondicherry with a view to increase sugarcane production in the country.

17.3.21 The main thrust of the scheme is on the transfer of technology to the farmers through field demonstrations, training of farmers/extension workers, improving resource base of farmers through supply of farm implements, enhancing seed production and pest control measures etc.

17.3.22 The scheme is implemented in identified 191 districts of the above mentioned states/ union territory. Most of the components of the schemes are funded on 75:25 basis between the Government of India, and the state Government. The components of breeder's seed production and front-line demonstration through I.C.A.R., tissue culture and bio-pesticides are 100% funded by Government of India.

17.3.23 *The scheme has the following strategies:*

The basic objective of the scheme is to increase the productivity of sugarcane together with the production of other crops grown in cropping sequence, which will be done inter-alia by the propogation of improved production technology through field demonstration and motivating farmers to adopt improved production technologies. In order to achieve these objectives, the following strategies have been underlined -

(1) Propagation of improved crop production technologies through organisation of field demonstrations on farmers holdings and training of farmers including farm women and extension workers.

(2) Setting up the Heat Treatment Plant for multiplication of disease free seed and making available healthy seed material to the farmers.

(3) Encouraging the use of Integrated Pest Management (IPM) Technology.

(4) Introduction of Tissue Culture Technique for quicker multiplication of seed material.

(5) Replacement of low-yielding varieties with high yielding varieties having biotic and abiotic resistance.

(6) Planting and harvesting of sugarcane through use of improved farm implements.

(7) Promoting a sense of competition among farmers for maximising the productivity.

(8) Promoting the use of drip irrigation.

17.3.24 Subsidy @ 50% of the cost limited to Rs 1500 each on bullock drawn implement is being provided and on tractor drawn implements @ 25% the limit of the subsidy being Rs 10,000/- per unit. For quick spread of new varieties, 20 Tissue Culture Units were set up in 1995. An annual grant of Rs 5 lakh per unit is available for such units. For setting bio-pesticide units, an annual grant of Rs 5 lakh per unit is available. In 1995, 18 such units were established. Under Seed Production programme, a sum of Rs 20,000 per hectare as revolving fund is made available for multiplication of breeder's seed to ICAR. For next stage multiplication of seed, a sum of Rs 2000 per hectare is made available to as incentive to contract seed grower. For control of disease, subsidy @ of Rs 2 lakh per unit is made available for setting up of Heat Treatment Plant. Subsidy on drip irrigation equipment is also available for sugarcane farmers. Details are given in Annexure 17.3.

17.4 *Financing of Research and Development of Sugarcane from Sugar Development Fund (SDF):*

Loans for Cane Development:

17.4.1 As provided under the Sugar Development Fund Act, 1982, among others, the Fund has to be utilised by the Government of India for providing loans for undertaking of any scheme for development of sugarcane in the area in which any sugar factory is situated.

17.4.2 Loan is advanced from SDF to the Sugar Undertakings for the development of sugarcane, mainly for the followings schemes:-

(i) Setting up of moist hot air seed treatment plant in sugar factories;

(ii) Rearing of cane seed nurseries.

(iii) Incentives to cultivators to switch over to improved varieties of sugarcane

(iv) Small and minor irrigation projects like digging of wells, deepening of existing wells; Construction of Kolhapur Type Weir (k.t. Weir) and River Lift Irrigation (RIL) schemes.

(v) any other scheme or project as approved by Central Govt. The state of U.P. have included schemes like soil testing, Computerisation, Wireless Communication and provision of transport like motorcycle and jeep to staff.

17.4.3 The financial assistance is available for one or more of the above schemes. The main purpose is to make adequate cane available to the sugar undertakings so that production of sugar increases. Loan is advanced from SDF for undertaking various cane development schemes as per the following pattern of assistance:

(i) SDF : 90% of the cost of the schemes, subject to a maximum of Rs 3 crores.

(ii) Sugar Undertakings : 10% of the total cost of the scheme.

17.4.4 During the period from 1986-87 to 1997-98 (upto 30th Sept, 1997) 360 sugar undertakings have been sanctioned Rs. 496.16 crores and have been disbursed Rs. 295.28 crores for cane development. Annexure 17.4 indicates state-wise position of loans sanctioned and disbursed as on 30-09-97.

Grants-in-aid for Research

Views of the Committee

17.4.5 Grants are also provided from the fund for research in sugarcane. During the period for 1988-89 to 1997-98 (upto 30-09-97) total amount of Rs. 31.76 crores has been sanctioned to 4 organisations/ institutions. An amount of Rs. 16.54 crores has been disbursed to them during this period. The details are indicated in Annexure 17.5

17.5.1 The development of varieties combining a number of desirable characteristics such as early maturity, high yield, high sucrose content, resistance/tolerance to disease, water logging, soil salinity, drought etc. needs to be accorded high priority. This can be expedited by use of bio-technology methods. Adequate support for setting up of facilities for use of this method needs to be provided on priority basis and funds may be provided for the purpose from SDF liberally to the extent required. Germplasm from some other countries such as Israel has been imported to facilitate breeding programme. This needs to be further pursued so that the germplasm with various characteristics becomes available to the breeding institute.

17.5.2 The ICAR representative mentioned to the Committee that, at present, the facilities for induction of flowering and seed setting were available only at Sugarcane Breeding Institute, Coimbatore and fluffs have to be brought to the agricultural universities or the research centres for further breeding. This adversely affects the seed breeding programme in the sub tropical areas as fluffs get damaged in transit. It is necessary to develop facilities for induction of flowering and seed setting in

sugarcane in sub-tropical areas. Support for setting up of necessary facilities for the purpose may be provided from the SDF to the extent necessary.

17.5.3 It is also necessary that the varieties developed by the research institutes are made available to the growers expeditiously. For this purpose, the micro-propogation of these varieties through tissue culture holds considerable promise. The ICAR representative informed the Committee that the protocol for the same has been developed at SBI, Coimbatore and approved by ICAR. However, the cost of production of sugarcane plants through tissue culture is of high order and it does not, at present, seem to be economical to use this process for the purpose of production of seeds for plantation by the cane growers. At present, tissue culture may, therefore, be utilised mainly for production of foundation seed from the breeder seed, apart from its use in research. For the purpose, laboratories for tissue culture may be set up jointly by a number of sugar mills instead of one in each mill. Loan assistance from the SDF may be made available for the setting up of such joint laboratories. Since professional expertise of a high order is required for proper functioning of these laboratories, arrangements may also be made by such mills with the concerned agricultural universities or research stations for providing expert advice on any problem relating to the facility.

17.5.4 It was reported to the Committee that some State Governments, particularly, Uttar Pradesh (UP), have not been permitting the use of varieties recommended by the All India Co-ordinated Research Project and their varietal release committee have not been approving such varieties and have been approving the varieties evolved by the research stations set up by the State Govt. This is due to decision of the U.P. State Govt. that varieties to be recommended for cultivation in the different regions of the state should be based on the recommendations of the State Council of Sugarcane Research and normally those are based on the advice of the Sugarcane Research Station at Shahjahanpur. Such a parochial attitude in the matter would hamper the adoption of approved varieties and affect adversely the interest of cane growers and the sugar industry in the State concerned. The varieties recommended by the All India Coordinated Research Project should invariably be approved by the State Varietal Release Committee unless there are any peculiar circumstances in an area on account of which, for reasons to be recorded, it is not considered desirable to approve a particular variety.

All varieties should be evaluated irrespective of the location of the institute which sponsored it.

17.5.5 To expedite the spread of improved varieties in the field, varieties recommended for release by the All India Co-ordinated Research Project may also be made available to mills for multiplication pending their approval by the Central/State Varietal Release Committee.

17.5.6 A number of varieties deteriorate in the field after a few years due to attack of disease and pests. For protecting the cane seed from disease, its heat treatment is of considerable help. It has been reported to the committee that a large number of mills have heat treatment plants but these are not being adequately used. The main reason is reluctance on the part of the growers to bring their cane seed for heat treatment as there is a considerable damage to the seed buds during transportation. The experiment of having mobile seed treatment unit has also not been very successful as it is difficult to coordinate the visit of the mobile units with the programme of seed plantation of the farmers. It may, therefore, be desirable to concentrate for the present on the use of heat treatment plant by the farmers who are entrusted with seed multiplication by the mill. Heat treatment plant may be made available by the mill while its operation may be handled by seed growers and its expenses included in the premium which is allowed by the mill to the seed growers.

17.5.7 The research in sugarcane needs to be encouraged in the agricultural universities also besides the sugarcane research stations. Grants for the purpose may be given from SDF through ICAR against specific projects to be submitted by the concerned university.

17.5.8 The research in sugarcane takes much longer time than in other crops as the crop takes nearly a year for maturing and the effect on ratoons has also to be studied. There is consequently less interest amongst researchers in undertaking research in sugarcane. A scheme for grant of stipend for Ph.D/post Doctoral research in sugarcane may, therefore, be prepared by ICAR and funded out of SDF.

17.5.9 In general, the expenditure on research in sugarcane in India is very low. In this country, the research has been funded mainly by the Central Government, while in most other major sugar producing countries, the research is funded by the growers or jointly by growers and the industry. Due to budgetary constraints, the allocations for research have

not been adequate. The extent of support out of SDF also has not been adequate. As mentioned in Annexure 21.2, out of the total amount of Rs. 1189 crores sanctioned from 1985-86 to 1997-98 upto 30-09-97 only Rs. 32 crores have been sanctioned for research and similarly out of total disbursement of Rs. 881 crores during this period only Rs. 16.5 crores have been disbursed for research. The allocation of funds for research needs to be substantially stepped up. Necessary recommendations in this regard have been made in Chapter 21.

17.5.10 As mentioned above, in most other major sugar producing countries, the research in sugarcane is funded by growers or jointly by growers and the industry. Growers and industry also control the management committees of such institutes. This ensures proper interaction between the research efforts and the needs of the growers and the industry. While some efforts have been made in this country also to associate the representatives of sugar industry by inviting them to annual workshops held to review the research programmes, the interaction needs to be further strengthened. It is recommended that one representative each of the National Federation of Cooperative Sugar Factories Ltd. and Indian Sugar Mills Association may be appointed on the Cane Research Advisory Committees of various sugarcane research institutes to ensure better interface between the research institute and the industry. It was stated by the representatives of ICAR that growers' representatives are already nominated on these committees.

17.5.11 Sugar mills also need to take an active part in research and development efforts, particularly for multiplication of seed of improved varieties. Their efforts are at present hampered among other factors by the fact that they are unable to take, whether by ownership or by lease, adequate land for this purpose due to the operation of the land ceiling act. In some countries where there is a ceiling on land holding, exemption is provided to the sugar mills to the limited extent for enabling them to conduct research and development and develop seed nurseries. As mentioned in para 10.16.16, in Indonesia, there is ceiling on land holding but land can be rented by sugar mills to the extent of about 50 hectares of land against a ceiling of 5 hectares for raising the cane nurseries and for field trials. In Philippines, there is no ceiling on land holding by the sugar mills for R&D purpose. In Sri Lanka, the mills are allowed to have upto 250 hectares of land for the purpose of R&D, while the ceiling is 1 hectare for irrigated and 1.75 hectares for rain fed land. In Taiwan, there is ceiling on land holding but there is no restriction on

the size of the farms owned by the sugar mills for obtaining the cane for milling or by Taiwan Sugar Research Institute for R&D. In Brazil, E.U. and South Africa there are no ceiling on land holding. It is suggested that sugar mills in this country may also be allowed exemption from land ceiling for acquisition of land, either by purchase or lease, to the extent required for research and development on sugarcane, including trial demonstration and seed multiplication. It is considered that 40 hectares of irrigated land would be adequate for this purpose for factories with 2500 TCD capacity, with suitably larger area for mills with bigger capacity.

17.5.12 The mills in sub tropical area, particularly, U.P., are not devoting adequate attention to cane development, partly because the reserved areas for the mills is determined annually and they are, therefore, not sure whether the area in which development work is done by them would remain with them and, partly, because they have no direct dealing with the farmers. The co-operative sugarcane societies through which mills are required to obtain the cane supplies, barring a few new mills in respect of which exemption has been allowed, do not take adequate interest in cane development work and most of them do not have even the resources to do so. The mills are also required to obtain prior permission of the State Govt. for making any deduction from the cane price towards recovery of amounts advanced to the mills and this also hampers the flow of credit to the farmers. To induce the mills to take up the cane development work in their area, the cane area for the mills need to be reserved on a long term basis and no part of this area should be transferred to another mill unless the cane is surplus to the requirement of the mill as already recommended in Chapter 12. Disincentive against neglect of cane development work may also be introduced by providing that if a mill does not undertake development work in its area and as a result and yield of cane in its area is lower than in the similar areas in the State, the availability of cane may be determined on the basis of per hectare yield of cane in similar areas rather than in the area of the mill for the purpose of assessing whether it is surplus to the requirements. The mills may also be allowed to have direct dealing with the growers with regard to the supply of cane as well as cane payment and cane development work as already recommended in Chapter 15. A general permission may also be accorded to the mills for recovery from the cane price of dues of banks and other financial institutions disbursed to growers for supply of inputs under the agreement between the bank, the mill and the growers.

17.5.13 It has been pointed out that the yield in sub tropical is lower than that in tropics and the scope for increase in the yield in the former is larger. It is, therefore, recommended that the States, particularly in sub tropics, may utilise the proceeds of cess on cane for cane development work by setting up of Sugar Development Fund at State level. Where purchase tax is levied and no cess is levied, the purchase tax may be replaced by cess to achieve this purpose as recommended in Chapter 26.

17.5.14 The responsibility for cane development work is at present not clearly laid on the sugar mills. The responsibility for cane development in the reserved area of the mills should be mainly of the mills as they have direct interest in such development. The State Governments cane staff should concentrate on other areas and on use of mass media, for example, TV, Radio and newspapers for extension work and on schemes which require to be implemented at the State or regional level. In case of schemes financed by the Central and State Governments, the representatives of cane growers should also be associated with the cane development work. This will, of course, not preclude the Central or the State Govt: from implementing a cane development scheme through its own staff even in the reserved areas of a factory where the factory is either reluctant or unable to implement the scheme. As mentioned in para 17.3.3 cane development work in Maharashtra and Gujarat is entrusted to sugar mills, which has paid rich dividends.

17.5.15 The objectives of R&D effort should be to maximise profitability for farmers per hectare per unit time. However, since this depends on relative prices of various inputs of sugarcane and other crops (particularly where inter-cropping is recommended) which go on changing, it would not be possible to follow this criterion in the research programmes. The research programmes may therefore continue to be implemented with the objective of optimising cane yield, sucrose content, tolerance/resistance to pests and diseases etc. However, the State Department dealing with sugarcane may work out the economics of the adoption of new varieties or cultural practices vis-a-vis the existing varieties/cultural practices before recommending the same to farmers through their extension agencies. It is conceivable that in certain situations while the yield of sugarcane may increase with larger application of inputs like fertilisers, use of increased amount of inputs may not be in the interest of the farmers as revenue to be obtained from the additional

sugarcane output may be more than off-set by the additional cost involved in the use of increased input. Since the profitability of sugarcane will change with the change in relative prices of inputs and outputs, the State Department dealing with sugarcane may also review the profitability of various cultural practices on a regular interval on the basis of prevailing market prices and inform farmers about any change in the practices, such as optimum quantity of fertilisers to be used, which may be required as a result of change in relative prices.

17.5.16 The optimum mix of early-maturity, mid-maturity and late-maturity varieties is essential for obtaining the best sugar recovery from the sugarcane during the season. This optimum mix needs to be fixed by each sugar factory. As has already been recommended in Chapter 15, for this purpose mills may be allowed to make registration of cane variety wise. They may also use their seed multiplication facilities to make up the deficiency in any category. Similarly, optimum crushing season for each State, or each region in case of larger States, may be determined by a Committee comprising representatives of the cane department of the State Govt., sugar factories and the farmers and efforts should be made to ensure crushing of sugarcane within this period, which would be in the interest of both the growers and the mills.

17.5.17 It has been reported that some of the varieties released have very low sucrose content. The release of such varieties can have very detrimental long term effect. Once the farmers get used to cultivation of varieties which offer high yield but low sucrose content, it will be difficult to persuade them to change over to a higher sucrose content variety. It is, therefore, recommended that a minimum of 11.5 percent sucrose on maturity, with corresponding 8.5 percent of sugar recovery in the mills may be kept as the lower bench mark for release of new varieties.

17.5.18 In India, generally one ratoon is taken while in many other countries, a number of ratoons are taken. As mentioned in para 10.16.15 in Brazil, 4 to 5 ratoons are generally taken, in Indonesia 2-3 ratoons are taken but in traditionally cane areas more than 5 ratoons are taken, in Philippines about 3 ratoons and in Mauritius about 8-10 ratoons are taken. Larger number of ratoons reduces the cost of seeds and also cost of labour involved in land preparation and seed plantation. However, larger number of ratoons also has certain problems. It tends to increase the incidence of disease, pests and insects, requires larger use of

fertilisers, leads to larger depletion of micro nutrients, and makes it more difficult for the farmers to respond to relative changes in profitability of sugarcane and others crops. It is suggested that the sugarcane research institute may carry out the study of economics of number of ratoons in different areas and on the basis of their findings educate the farmers through the state extension agencies and the mills about number of ratoons which would be most economical for the farmers in different agro climatic areas.

17.5.19 Drip irrigation economises on the use of water and also leads to increased yield. However, it has been reported that the cost of drip irrigation system at present is quite high and it is not economical, particularly where sugarcane cultivation is followed by other crops, as the system in the field has to be dismantled after each crop and then relaid. It may, however, be economical where there is scarcity of water which does not allow adequate irrigation for the crops and sometimes even prevents the entire area being cultivated. The drip irrigation, therefore, may for the present be encouraged mainly in areas where water availability is low. Meanwhile research may be intensified to reduce the cost of drip irrigation and solve the problems faced by the farmers in its use.

17.5.20 If proper care is taken, the ratoon crop can yield as much as planted crop or sometimes even more and the additional expenditure involved would be more than offset by the increase in yield. The research institutes may carry out the requisite cost benefit analysis of the recommended practices vis-a-vis the existing practices followed by the farmers and state extension agencies and the mills should bring their findings to the notice of the farmers to motivate them to take proper care of the ratoon crop.

17.5.21 One reason why increase in the yield has been slow despite R&D efforts is the deterioration in soil quality. The facilities for soil testing are at present inadequate. Since soil testing is useful for sugarcane as well as other crops, the State Govts may augment these facilities and ensure their full utilisation so that the deficiency of nutrients in the soil is made up in time.

17.5.22 In some of the areas, shortage of labour at the time of plantation and harvesting is affecting the cultivation of cane and its economics. The cane planter has been developed by the Indian Institute

of Sugarcane Research, Lucknow. It is necessary to expedite the development of the cane harvester suitable for Indian conditions. This work is being carried out in a number of institutes such as IISR, Lucknow,Central Institute of Agricultural Engineering, Bhopal, VSI, Pune, Regional College of Engineering, Jullundar, Punjab Agricultural University, Ludhiana etc. It is necessary to have a coordinated programme for development of cane harvester to prevent duplication of efforts and to accelerate progress.

17.5.23 To improve the interaction between the State extension agencies, the mills and the growers, the system of annual review of working of the extension agencies involved in sugarcane extension by representative of the extension Department, mills and the growers at the district and State level may be introduced.

Chapter 18

Measures for Cost Reduction

18.1 Sugar Industry in India had in the past developed in a protected environment. Its initial growth had been ensured by statutory protection granted under the Sugar Industry (Protection) Act, 1932. Thereafter till March, 1994, imports were not permitted on private account and were only effected by Government agencies to meet shortages in supplies. After March, 1994, however sugar has been placed on OGL. Quantity restrictions will in any case not now be feasible under the liberalised regime of WTO. The Sugar Industry will, therefore, have to be competitive against the industry in other countries not merely to develop but even to survive. It is accordingly necessary that efforts are made to minimise the cost of production.

18.2 This chapter presents a comparison of field and factory production costs in India (distinguishing between the whole of India, Maharashtra, Uttar Pradesh and "Rest of India"-i.e., states other than Maharashtra and Uttar Pradesh) with those of the leading sugar producing countries. Based on an unpublished study undertaken by L.M.C. International Ltd, England; the costs are presented in an index form with 100 representing the world average cost in each of the respective comparisons.

18.3 *Field Costs:*

18.3.1 A comparison of field costs (i.e. cost of sugarcane per unit of sugar produced) in index form for the 16 seasons between 1979/80 and 1994/95 for leading sugar producing countries is presented in Annexure 18.1.

18.3.2 Five year averages given at the foot of the Annexure are indicative of the relationship between field costs in different countries, since the averages help to eliminate distorting effect brought about by the weather induced fluctuations or fluctuation in cost due to cyclical fluctuations in output.

18.3.3 The Annexure 18.1 reveals that India has succeeded in steadily lowering its field costs relative to world average costs. This is evident from the decline in India's indexed field costs from 71.0 to 61.9 between the five year period 1979/80-1984/85 and the period 1990/91-1994/95. Among the other countries, only Australia's, costs (56.5) are lower than India's while Brazil's (61.0) are equal. It may be mentioned that devaluation of the Rupee vis-a-vis American dollar has contributed to India's increasing competitiveness.

18.3.4 The Annexure further reveals that within India, Maharashtra is an outstandingly competitive producer of cane sugar, with the lowest average indexed field cost (52.2) over the five year period 1990/91-1994/95. The gap between Maharashtra and rest of India regions is largely the result of the high cane yields and relatively high sucrose content in sugarcane in Maharashtra.

18.4 *Factory Costs:*

18.4.1 A comparison of indexed factory production costs between all India, Maharashtra, UP and the rest of India and those in other major countries is presented in Annexure 18.2. Like field costs, a study of the five year average at the foot of the Annexure reveals that the Indian industry has achieved a considerable reduction in average factory costs over the same period of analysis. Here again, the devaluation of Rupee against the US dollar over the last five year has helped to maintain the competitiveness of the Indian sugar industry.

18.4.2 The Annexure further reveals that over the period 1990/91 to 1994/95 Indian factory costs were only 76 percent of the world average factory cost. An examination of other industries' factory costs over the same period reveals that the Australian, Brazilian and Thai industries were considerably more cost competitive than India. In all the three of these countries, it ranged from 37.7 to 52.1 per cent of the world's average cost. In these countries a major means of cost reduction has been the expansion of average factory capacity, the industries enabling these countries to exploit considerable economies of scale in capital and labour. This is perhaps the single most important factor accounting for the difference in factory costs between India and Thailand. In Australia, factory recovery rates are also significantly higher than they are in India which help to lower costs further. During the period 1989/90 to 1993/94, the average sucrose recovery rate in Australia was 89.8% as compared to 82.4% for India (Table 4.9).

18.4.3 Regional differences in factory costs within India are relatively minor. Although the sucrose content and factory efficiency tend to be higher in Maharashtra than elsewhere, a key determinant of unit factory costs is capacity utilisation. This apart, economies of scale also had its effect on costs. The considerable fluctuations in cane supply from season to season in India have been effecting capacity utilisation, as a consequence, unit capital and labour costs have also fluctuated greatly. This is reflected in the sharp reduction in indexed factory costs for India between 1993/94 (when the quantity of cane crushed by mills was 98 million tonnes) and 1994/95 (when Indian mills crushed about 140 million tonnes of cane) from 85.4 to 68.8. This holds good separately for Maharashtra, Uttar Pradesh and rest of India also where indexed costs fell from 100.3, 90.4 are 73.1 respectively to 61.6, 77.3 and 69.7.

18.5 *Total Costs:*

18.5.1 A comparison of indexed total (field + factory) production costs between India, different regions of the country and that for the major cane sugar producing countries is presented in Annexure 18.3. An examination of India's performance in the field and factory costs separately reveals that Indian factory has achieved a steady reduction in total costs over the period of analysis. This fact is also evident from a study of the five year average indexed total costs as presented at the foot of Annexure 18.3.

18.5.2 It may be seen from the Annexure that within India, the Maharashtra industry (61.1) is slightly more competitive than the national average (66.9), while the industry in Uttar Pradesh

(74.5) is considerably less competitive than the national average. An examination of field and factory costs separately revealed that reason for regional differences in total costs lies more in the field than in factory. The higher yields and superior cane quality in Maharashtra resulted in lower unit production costs in field and thereby in total costs.

18.6 The Incremental Costs of Producing Mill White Sugar rather than Raw Sugar

18.6.1 The indexed average cost of upgrading raw sugar to mill white sugar, using the world average cost of upgrading as the basis for index, is presented in Annexure 18.4. This cost represents the additional costs incurred by mills in producing mill white sugar rather than raw sugar i.e., it represents the additional costs associated with raising the quality of a mill's output from raw sugar to mill white sugar.

18.6.2 It may be seen from the Annexure that India's average cost (104.4) of upgrading raw sugar to white sugar is slightly higher than the world average cost for this purpose. However, on average, processing cost in India is lower than in Thailand (114.3), although the cost of upgrading raw sugar to mill white sugar is lower in Brazil (85.9) and Mexico (87.0) than what it is in India. In Brazil it is due to low capital costs as a result of high levels of capacity utilisation, while Mexican costs are lower than India costs owing to lower capital costs and slightly lower chemical costs.

18.7 *The Full Cost of Producing Mill White Sugar*

18.7.1 Annexure 18.5 presents an analysis of the form in which sugar is produced in the Indian industry and other selected countries. A study of the Annexure reveals that 100% of India's production of sugar is in the form of mill white sugar. Bulk of the Australian output is produced as raw sugar and same is the case in US cane sector, while in South Africa the output is split more or less evenly between raw sugar and refined sugar and in South Africa between raw sugar on the one hand and mill white and refined on the other. Other countries producing mill white sugar in significant quantities are Brazil, Mexico and Thailand. Thus, the costs of producing mill white sugars in India, Brazil, Mexico and Thailand has been analysed for a detailed study of the competitiveness of the Indian industry.

18.7.2 The Indexed total costs of producing mill white sugars in India, Brazil, Mexico and Thailand are given in Annexure 18.6. These costs have been arrived at by adding the cost of upgrading raw sugar to mill white sugar (Annexure 18.4) to the total cost of raw sugar production (Annexure 18.3) for each of the concerned industries.

18.7.3 Owing to the low cost of producing raw sugar in India as a result of low field costs (Annexure 18.1), the total cost of producing mill white sugar in India is substantially lower than the world average cost, even though the cost of upgrading raw sugar to mill white sugar in India is slightly above the world average cost as, the cost of upgrading raw sugar to mill white

sugar is a very minor component of total mill white sugar production costs. However, the total costs of producing mill white sugar in Brazil (58.3), Mexico (69.1) and Thailand (64.0) are also considerably lower than the world average costs and that the world average costs and the average costs in Brazil and Thailand are lower than those in India (67.5). The reason for this is that average raw sugar production costs (Annexure 18.3) are lower in these countries than in India. Further, in Brazil, the average cost of upgrading raw sugar to mill white sugar is also lower than it is in India. In Mexico, the average total cost of mill white sugar production is slightly higher than in India, reflecting the marginally higher cost of producing raw sugar in the Mexican industry.

18.8 *The Cost of Transporting and loading Sugar for Export*

18.8.1 The estimates of the average costs of transporting and loading bagged white sugar for export in the selected sugar producing countries are given in Annexure 18.7. The Annexure displays considerable variation in cost as a consequence of much manual work involved in loading bagged white sugar into vessels in many countries. Those countries, where labour is cheap and where the sugar industry is located relatively close to the port, tend to emerge with the lowest average costs associated with exporting sugar. India has the lowest cost of transporting and loading among these selected major countries. Within India, Maharashtra has lower costs than all India as the industry there is located close to the port. Tamil Nadu, included in the rest of India' category, also enjoys similar advantages. On the other end, Uttar Pradesh suffers from its land-locked position, which means that internal transport costs between the state's sugar mills and major ports are high. High internal transport costs and high port costs account for very high cost.

18.8.2 South African industry benefits from a favourable location and relatively low labour costs, while US and Australian cane sugar industries benefits from location and high degree of mechanisation in handling.

18.8.3 This analysis is significant because it indicates that, although the relative costs involved in growing cane and producing sugar in India and Brazil suggest that Brazil has a significant competitive advantage over India, the considerable difference between sugar transport and handling costs in Brazil where these cost are very high and in India where these costs are relatively low particularly in Maharashtra and Tamil Nadu, offsets a significant part of the difference in production costs between the two industries so far as exports are concerned.

18.9.1 The total cost of production including packaging and marketing depends mainly on (a) average cost of sugarcane per quintal of sugar produced, (b) average cost of conversion of sugarcane into sugar, (c) cost of packaging, (d) cost of storage and transportation, and (e) credit available from the utilisation of by-products like bagasse and molasses etc.

18.9.2 Cost of sugarcane accounts for bulk of the cost of production of sugar. The cost per quintal of sugar will depend on the price of sugarcane per quintal and its sucrose content. The conversion cost depends mainly on the size of the plant, its operational efficiency, number of labourers employed and their wage rates and productivity. The cost of packaging is influenced by the type of material used. Cost of storage depends to some extent on the type of storage, whether in bulk or in bags.

18.9.3 We have discussed in separate chapters many of these factors and made necessary recommendations in regard to pricing of sugarcane, measures for increasing the sucrose content of cane, for improvement in technical efficiency and better utilisation of by-products etc. In this chapter we, therefore, propose to consider only measures which have not been discussed elsewhere in the Report.

18.10.1 As indicated in Table 4.1 the average capacity of sugar factories in India has been increasing gradually. However as compared to the sugar factories in the other major sugar producing countries, the size of our plant is still very small. It will be seen from Table 9.3 that the average cane crushing capacity per day was more than 10,000 tonnes in Thailand, over 9000 tonnes in Australia and Brazil and about 7000 tonnes in South Africa. Factories in these countries are able to exploit considerable economies of scale with respect to capital and labour costs as the overhead costs per unit of output fall significantly as the size of the plant increases. In India emphasis had been laid in the past on horizontal growth of sugar mills to encourage development of rural areas around the mills. While this policy has contributed to the dispersed growth of the Industry and provided employment to rural population over large areas, it is now necessary to review this policy in the interest of strengthening the competitive position of the sugar industry in the country to enable it to face the competition from the Industry in other countries. It may be added that only an economically viable sugar mill can contribute to socio-economic development of the surrounding area and provide continuing productive employment to the workers. The optimum size of the sugar factory in India may not be as large as in these countries. In India sugar mills have to draw cane from a large number of small farmers and the intensity of cane cultivation is not high. A larger plant will need to obtain cane supplies from longer distance which will add to cost of transportation and reduction in sucrose content of cane. Nevertheless, the average size of plant in India is still much

smaller than the optimum even when the additional cost of transportation of cane is taken in to account. In many countries there is a trend towards merger of the existing units for deriving the economies of scale. We also now need to facilitate merger of uneconomic units. For this purpose the sugarcane area of the merging unit may be permitted to be transferred to the unit with which it is merging. However, in order to protect the interest of the growers this should be permitted only where the new mill to be formed after the merger has the capacity to crush the cane within the normal season and the farmers are either allowed to supply cane at the existing points of supply or they are compensated for additional cost involved in supplying cane to the new mills.

18.10.2 Some of the mills, particularly the older ones, have large surplus labour leading to high labour cost. Such mills may not have adequate resources to finance voluntary retirement scheme for reducing the surplus labour. In a competitive environment such mills may not he able to survive, thereby jeopardising the interests of both the growers and the workers. To facilitate voluntary retirement of surplus labour for making these units viable, loans may be granted from SDF to such units for financing voluntary retirement scheme.

18.10.3 At present sugar factories are legally required under Sugar (Packing and Marking) Order 1970, as amended from time to time, to pack sugar in 100 kg A - Twill bags, except for exports and for small consumer bags upto 5 kg. The Order has been issued to protect the interest of the Jute growers. The compulsory use of jute as a package material was introduced under an Act of Parliament enacted in 1987, which has stood the test of challenge to its legality in the Supreme Court. The representatives of Indian Jute Manufacturers' Association have stated before the Committee that cost-wise A - Twill jute bags are cheaper than other packaging material if their re-sale value is also taken into account. It has also been stated that plastic synthetic bags are non-biodegradable and because of their hard surface, particles may enter into sugar which is packed in plastic bags and render it unfit for human consumption. The representatives of Plastic Woven Sack Manufacturers' Association stated, on the other hand, before the Committee that the plastic industry in India is recycling used plastic and the industrial bulk packing is recycled and cost-wise HDP bags are cheaper.

18.10.4 While the interest of jute growers need to be protected, it should obviously not to be at the interest of the sugar industry and

eventually the cane growers. If the jute bags are competitive cost-wise they would obviously be used for packing and no compulsion is required. Again while the adverse effect of plastic bags on environment due to its non-bio-degradable nature is well recognised, any action that need to be taken to ban or reduce the use of plastic bags for packing need to be taken for all commodities and sugar need not be singled out. According to press Reports, environment friendly biodegradable plastics have been developed by Indian scientists and the technology is now being commercialised at the National Research Development Corporation. So far as the particles entering the sugar in plastic bags are concerned, this does not appear to be a sound objection as in most other countries sugar is being packed in plastic bags. The Committee after considering the various pros and cons, therefore, recommend that the sugar industry should be allowed freedom to use any material for packaging. However, so long as partial control continues, Government may continue to require levy sugar being delivered in jute packs. So far as the weight of the packing is concerned this will sooner or later have to be reduced to 50 kg for manual handling in accordance with ILO Convention. For 50 kg packs, A - Twill gunny bags may not be required and bags of cheaper specifications may be adequate. Representative of ISMA has reported that bags with inferior specifications for 50 kg packaging are already being tried at factory level. This trial needs to be expedited and necessary ISI specifications evolved for them. There need be no restrictions on packaging below 50 kg or heavier packaging where the mechanical handling is involved. So long as partial control continues, Government may, however, require levy sugar to be supplied in bags of prescribed weight viz 100 kg or 50 kg as the case may be.

18.10.5 Considering economies in handling and storage cost can be achieved by bulk storage of sugar. This is the practice in a large number of major sugar producing countries. This may, however, not be practical so long as partial control continues as it will be difficult to check compliance with levy and free-sale release orders in the case of bulk storage. If and when Government implements complete decontrol, there would obviously be no restrictions on the type of storage to be used.

Chapter 19

Imports and Exports

Production by Major Countries

19.1.1 A few countries account for a major share in world production of sugar. Production by the ten largest producers during the three years 1994-95 to 1996-97 is indicated in Table 19.1

Table 19.1 – Sugar Production by countries

Lakh/Tonnes Raw Values

S.No.	Country	1994-95	1995-96	1996-97
1	India	158.51	179.43	140.93
2	Brazil	127.14	151.90	146.36
3	U.S.A.	72.54	66.98	65.87
4	China PR	59.01	67.70	73.39
5	Thailand	55.13	63.23	60.98
6	Australia	47.91	56.32	57.66
7	Mexico	46.50	46.67	48.40
8	France	43.63	45.64	45.94
9	FR Germany	39.90	41.55	45.69
10	Cuba	34.19	44.60	43.20
11	World	1160.82	1252.24	1237.30

Source : (F.O. Licht World Sugar Balances 1997-98)

19.1.2 India is the leader in sugar production closely followed by Brazil. All the above 10 countries account for about 60% of world sugar production.

Import and Export by Major Countries

19.2.1 Export and Import would more or less match as it is a trade off between two sets of countries. In a global scale exports/ imports account for about 30% of production. Exports and Imports among some of the major countries in the world is given in Table 19.2.

Table 19.2 – Export/Import by Countries

Lakh/Tonnes Raw Value

Countries	Export			Import		
	94-95	95-96	96-97	94-95	95-96	96-97
1. South Africa	3.88	7.03	8.92	0.14	0.30	-
2. U.S.A.	5.72	4.50	5.28	16.17	23.99	30.23
3. Brazil	49.86	55.02	59.21	0.24	-	-
4. China PR	5.40	8.30	4.32	29.07	19.44	10.94
5. Thailand	37.29	48.50	38.16	-	-	-
6. India	0.31	8.47	5.41	9.87	2.83	0.39
7. Australia	42.46	45.27	40.33	0.01	0.03	0.01
World	354.42	388.78	389.08	347.20	387.44	375.81

Source: (F.O. Licht 1997-98)

Import/Export by neighbouring countires

19.2.2 Thailand, Australia and Brazil are prodominently exporters, whereas China and USA are net importers.

19.2.3 Substantial exports from India are for the neighbouring countries. Recently sugar was exported to Pakistan through Punjab out of 1996-97 production. Export/Import data of neighbouring countries is given in Table 19.3

Table 19.3 Export/Import of neighbouring countries

Lakh/Tonnes Raw Value

Countries	Export			Import		
	94-95	95-96	96-97	94-95	95-96	96-97
1. India	0.31	8.47	5.41	9.87	2.83	0.39
2. Sri Lanka	-	-	-	3.96	3.80	4.38
3. Indonesia	0.04	0.03	0.04	5.13	13.55	14.99
4. Pakistan	3.69	2.37	2.10	0.06	3.92	7.18
5. Iran	-	-	-	10.78	9.35	12.60
6. Bangladesh	-	-	-	1.08	1.60	2.36
7. Saudi Arabia	0.28	0.92	0.85	5.28	6.03	6.13
8. Syria	0.05	0.36	0.46	4.82	5.65	5.71
9. Malaysia	1.13	1.22	0.99	9.83	10.59	11.48
Rest of Asia	53.52	68.76	57.94	93.36	92.50	83.35

Source: (F.O. Licht 1997-98)

19.2.4 Even India was a net importer on account of poor production in 1994-95. All the neighbouring countries are major importers and countries in rest of Asia except Thailand are also similarly placed.

Import & Export India

19.3.1 Statement indicating the extent of import and export by India during last twelve years is shown in Table 19.4.

Table 19.4 – Export/Import-India during a 12 year period

Lakh/Tonnes

Sugar year	Export	Import	Net
1984-85	0.32	11.8	(-)11.48
1985-86	0.55	16.19	(-)15.64
1986-87	0.25	9.51	(-)9.26
1987-88	0.31	0.71	(-)0.40
1988-89	0.33	-	(+)0.33
1989-90	0.35	2.42	(-)2.07
1990-91	2.07	-	(+)2.07
1991-92	5.83	-	(+)5.83
1992-93	3.97	-	(+)3.97
1993-94	0.75*	13.97*	(-)13.22
1994-95	0.41*	7.21*	(-)6.80
1995-96	8.92*	0.42*	(+)8.50
Total	24.06	62.23	(-)38.17

*Provisional (Directorate of Sugar)

Note: The above figures are according to sugar year 1st October to 30th September.

19.3.2 The exports have been generally small, except in a few years when there was excess production. Over a twelve year period imports have far outstripped exports.

19.3.3 Despite being the largest sugar producing country in the world, due to its large consumption, India had to import sugar now and then whenever production suffered. Substantial quantities were imported from 1984-85 to 1986-87, so as to augment availability and check price rises when production in the country nosedived after achieving record levels in 1981-82 and 1982-83. There were no imports from 1990-91 to 1993-94 (Financial year). Due to fall in production in 1993-94 season,

Government allowed sugar imports on OGL with no duty. 9.77 and 9.84 lakh tonnes were imported by STC and private parties respectively in 1994-95 (Financial Year) and a small quantity was imported in 1995-96 (Financial Year) by individuals.

19.4.1 India is a party to the International Sugar Agreement (ISA) for several years as an exporting country. The current ISA 1992 has been extended from 31-12-95 up to 31-12-97 and India continues to be a member of the same.

Export

19.4.2 Indian exports are very insignificant in world market as these have been below 3 percent of global trading. In several years these were below even one percent. It is illustrated in Table 19.5.

Table 19.5 – Indian Versus Global Exports

Lakh/Tonns Raw Value

Year	Export Quantities	
	World	India
1990-91	348.43	1.86
1991-92	325.98	5.77
1992-93	326.10	4.51
1993-94	340.55	0.32
1994-95	354.42	0.31
1995-96	388.78	8.47
1996-97	389.08	5.41

(F.O. Licht 1997-98)

19.4.3 Sugar production has generally been just adequate to meet internal demands leaving very little for exports. Small quantities were exported to EEC and USA under a system of preferential quota. EEC quota is 10,000 tonnes per annum and that of USA varies from year to year. Under the agreement entered into with EEC for 6 years from 1-7-95 to 30-6-200, initially about 10,000 tonnes of raw sugar was exported. All these exports were executed by Indian Sugar General Industry Export Import Corporation (ISGIEIC), a joint body of cooperative and private sector of sugar industry. A small quantity of sugar was exported to Nepal by State Trading Corporation out of levy quota/free sale now and then.

Current Position

19.4.4 Export of sugar, other than the above, was governed by Sugar Export Promotion Act, 1958 under which exports were undertaken by ISGIEIC and State Trading Corporation upto the quota announced by Government and loss/profit was shared by all sugar factories as per their share of export quota. Exports were out of freesale. In reality exports to the extent of quota were made from factories in coastal belt. Due to transport bottlenecks and costs, factories in the interior were allowed to sell their export quota in the internal market. Exports were stepped up from 1990-91 onward due to surplus and were maintained upto 1992-93. Thereafter these declined to the extent of fulfilling preferential and Nepal quotas. Due to record production in 1995-96, about 9 lakh/tonnes were exported.

19.5.1 Sugar Export Promotion Act, 1958 was repealed by an ordinance issued on 15th Jannary, 1997 which led to decanalisation and obligation to share export profit/loss by all factories was no longer operative. Export of sugar is being monitored by Agricultural & Processed Food Products Exports Development Authority (APEDA) under Ministry of Commerce against export quotas announced by Ministry of Food from time to time. A quantity of 2.5 lakh tonnes of general quota and 36300 mt. of preferential quota has been entrusted to the organisation out of 1996-97 season production. Preferential quota would be handled by ISGIEIC and general quota has been thrown open to exporters. APEDA had issued 83 Registration cum Allocation certificates for about 2.39 lakh tonnes upto 31-8-97 including preferential quota, against which 1.32 lakh tonnes had been exported up to 31st October 1997.

19.5.2 Sugar Production capacity is adequate to take care of local demand and exports under general quota have been resorted to only when production is well in excess of normal levels, primarily to reduce the burden of prolonged stock holding by the industry. Because of transport costs, exports under prevailing international prices can only be undertaken by sugar factories in coastal belt of Maharshtra, Gujarat, A.P. and Tamil Nadu, and to some extent from Karnataka.

19.5.3 Preferential quotas fetch a good price whereas general quota exports are subject to prices dictated by demand and supply situation, and are well below the preferential quota prices.

Competitiveness of Indian Sugar Industry for export

19.5.4 Relationship between Indian sugar production costs and world white sugar prices is depicted in a diagram at annexure 19.1 as per the recent study by L.M.C. International Ltd., 1997. Relevant

extract, from page (iv) of Executive Summary of the Report are given below:

These costs and prices have been converted into real (inflation adjusted) values, thereby making it possible to see how India's costs and world sugar prices have evolved over time, without the distortionery influence of inflation. In the diagram, both the world sugar price and India's production costs are in index form, and are expressed relative to the average world white sugar price over the period 1979/80 to 1994/95. It should be noted, however, that diagram presents India's raw sugar production costs, i.e., they exclude the relatively modest costs of upgrading raw sugar to mill white sugar as well as the cost of bagging. Furthermore, no account is taken of the cost of transport either from Indian mills to the world market (which would be appropriate if India were making exports) or from exporting countries to India's principal markets (which would be appropriate if India were making imports). With this is mind, the diagram reveals that, since the late 1980s, India's costs have been below the world sugar price in most years, and have exceeded the world price only when sugar prices have been depressed.

19.6 The average actual domestic sugar prices in India, the import parity price (c.i.f. value of the imports) and the export parity price (f.o.b. value of sugar minus the cost involved in making exports) during 1990-91 to 1995-96 are indicated in the diagram. (Annexure 19.2)

19.7 It will be seen that the domestic prices lay between import and export parity values between 1990-91 and 1993-94 and, thereafter, they were below even the export parity values.

Import & Export Policies in other countries

19.8 Import of sugar is regulated in Indonesia, Mexico, Mauritius and Philippines. The ban on import of sugar has been removed in Thailand, but these are subject to high rate of tariff protection (104%) which will gradually fall to 94% by 2004-05. In Australia, import tariffs were removed from 01-07-97. In South Africa and Sri Lanka, there is no quantitative restriction, but import duties are levied. Brazil does not import sugar but has import tariff of 16%. The rates of import duty levied by different countries at present are indicated in Annexure 19.3.

19.9 The export of sugar is Brazil is liberalized and is made either by individuals or traders, but is subject to export licenses (quotas). Sugar which is exported without licence has to bear export tax at 40%. In Mauritius, all exports are made through Mauritius Sugar Syndicate

(MSS) and in South Africa through South Africa Sugar Association. In Taiwan, the foreign trade is regulated. In European Union, exports are subsidized by levy on domestic sale. Anyone who holds a licence can export. Licences are granted to companies which bid for the lowest subsidy rate. In Thailand, 50% of export quota under long term contract export (quota B) is marketed by Thai Cane and Sugar Corporation (TCSC) and remaining 50% through their licensed export companies. The balance exports (quota C) are made by mills through licensed export.

Position under W.T.O.

19.10 The legal position in the matter of imposing counterveiling duty as spelt out by the representative of Department of Commerce during discussion with the Committee is as follows:-

(i) India is bound by the terms of World Trade Organisation. In the case of the import of sugar, binding duty to the extent of 150% can be imposed. All nations which are members of W.T.O. can impose 150% binding duty without any problem.

(ii) There is also no problem to impose countervailing duty technically called Additional Custom Duty equal to excise duty on sugar and incidence of the purchase tax paid on the purchase of sugar cane on the cost of sugar.

(iii) As regards the levy sugar contributed by the industry at lower price, he pointed out that it amounts to imputed tax and it will not be covered by provision regarding contervailing duty. However as stated in (i) above import duty upto limit of 150% can be imposed to indirectly compensate the industry for the imputed tax burden bone by it.

(iv) Anti-dimping duty can be imposed in addition to the maximum rate of 150% mentioned in (i) above subject to proof of dumping before the designated authority. Additional Secretary in the Ministry of Commerce is the designated authority who is vested with the power under the customs Tariffs Act 1975 and Custom Tariff (Identification, Assessment and Collection of Anti Dumping Duty on Dumped Articles and for Determining Inquiries) Rules to take anti dumping action by way of extra duty and counterveiling restrictions.

(v) If the world prices of sugar go down steeply, impact duty beyond the maximum duty mentioned at (i) above can be imposed temporarily to protect the domestic industry if injury to the industry is proved, This would, however require consultation with other countries.

Views of the Committee

19.11.1 The imported sugar was placed under OGL with zero import duty in March, 94 to meet the then prevailing exigency arising out of the steep decline in sugar production and spurt in prices. Imports were allowed duty free to facilitate the import of maximum quantities of sugar to create a sobering impact on sugar prices. This provision has continued unchanged since then, and has not subsequently been re-considered although that exigency has passed.

19.11.2 The Indian sugar industry is generally competitive and given a proper policy environment should be able to face competition from foreign producers. The imports may therefore continue to be on OGL to protect the consumers against any undue rise in price and provide stimulus of competition to Mills to minimise costs. However, to allow the imports duty free places the domestic industry at a serious competitive disadvantage. The sugar industry has to bear Rs. 71 per qtl. as excise duty on freesale sugar (which is to compete against imports) and Rs. 14 per qtl. as cess. The total incidence comes to Rs. 85 per qtl. of sugar produced. The State Governments also levy purchase tax and cess on cane purchased by the sugar mills. Their present incidence in the coastal states viz., Maharashtra, Karnataka, AP and Tamil Nadu, which would be mainly affected by imports, is about Rs. 50 per tonne of sugarcane and assuming recovery at the average rate of 10 percent, its incidence on cost of sugar would be about Rs. 50 per qtl. Besides, under the present system of partial decontrol, the sugar mills have to supply 40 percent of sugar produced by them at levy prices which are below the cost of production as those are worked out on the basis of S.M.P. of sugarcane and not the actual cane price paid by the mills, which is much higher. They have to recover the loss involved in the sale of levy sugar from freesale quota. As a result, the freesale prices tend to be higher than what they would be under the system of complete decontrol. As the indigenous freesale sugar has to compete against the imported sugar, this amounts to implied tax on the domestic producers. A statement showing all India average weighted factory levy and free sale sugar prices during the years 1992-93 to 1996-97 is at Annexure 19.4. The average difference for the 5 years comes to Rs. 318 per qtl. Apart from above, sugar importers also enjoy many other advantages over the domestic producers under the existing system of partial decontrol. The sugar mills can only sell and despatch sugar, even the freesale quota, against monthly release orders issued by government. Sugar trade is also subjected to discipline with regard to stocking of sugar and turnover

of sugar stocks within a specified period. None of these restrictions apply to importers. They are free to sell sugar as and when they like. Further, domestic producers have to compulsorily pack sugar in more expensive gunny bags while imported sugar comes in cheaper polypropylene bags.

19.11.3 The unfair advantages allowed to the imports vis-a-vis. domestic production can have a very adverse effect on sugar industry which would undermine the long term interest of sugar mills and sugarcane farmers. It is, therefore, necessary that urgent steps should be taken to provide level playing field to the sugar industry, although it may not be necessary to provide any special protection.

19.11.4 We accordingly recommend that import under OGL may continue but in order to provide level playing field to the domestic industry, import duty at the rate of 40 percent of the average difference between the ex-factory price of levy and freesale sugar during the last 5 years may be imposed as the domestic industry has to sell 40 percent of its production at fixed levy prices which do not cover costs and the difference is to be recouped by higher prices for the freesale sugar. The freesale prices are consequently higher by this amount than they would be if mills had not to discharge levy obligation. This will amount to about Rs. 130 per quintal. Total duty will remain well within the binding rate of 150 percent allowed under WTO. This duty may be abolished if and when sugar prices are completely decontrolled and may be suitably adjusted if the ratio of levy free sale sugar is altered. In addition, countervailing additional duty at the rate of Rs. 85 per qtl. to cover excise duty plus cess and at the rate of Rs. 50 per qtl. to cover the incidence of purchase tax levied by the State Governments on sugarcane may also be imposed. It may not be possible to subject the imported sugar to the same restrictions in regard to maximum quantities to be held by the wholesale dealers and the turnover period, as the stock of sugar has necessarily to be imported in large bulk. The importers may, therefore, have to be allowed exemption from these provisions. We have in chapter 30 recommended abolition of all restrictions on sugar trade, including requirement for licensing of the wholesalers. However, so long as those restrictions remain, importers should be allowed to keep their stock in warehouses at ports only beyond these prescribed limits, and the wholesalers dealing in imported sugar should be subjected to the same regulations in regard to stock levels and turnover period as applicable to indigenous sugar.

19.12 The sugar sector has been largely left untouched by the Uruguay Round Agreement which was concluded in December, 1993. Heavy subsidisation of sugar sector consequently continues in the developed countries like US, European Union and Japan. It appears that sugar has been kept out of the trade reform process as the application of general WTO provisions would have hurt the protected economies of these developed countries. High level of subsidy for production of sugar by the developed countries not only exposes the Indian sugar industry to unfair competition from imports from these countries, but the high level of import duty in these countries also restricts the scope of export of sugar from India to those countries. We would, therefore, urge that at the next round of negotiations, efforts should be made to reduce the binding rate of import duty from the existing 150 percent to around 25 percent and to press the developed countries to reduce the level of subsidy for sugar industry.

19.13 There have been large imports of sugar on Government account in the past. If the sugar prices are completely decontrolled, there should be no need for imports on Government account and imports can be left to be arranged by the private trade as and when the need arises. Imports on Government account tend to be in large quantities which raise the level of world prices while import on the trade account can proceed in a phased manner. Importers may also be able to import at lower prices from different countries as the requirements of individual importer may be relatively smaller. Even when the system of partial decontrol continues, there is no need for any import on government account so long as production plus opening stocks are adequate to meet the consumption requirements of the year and to leave about 2½ months of consumption requirements as opening stocks for the next season. If there is no overall shortage but there is only shortage in levy account, then it should be met either by temporary loan from the freesale quota or purchased from the industry. The purchases could be made on the basis of global tenders in which Indian mills can also participate so that purchase is made from mills in India so long as cost of purchase from them is less than the landed cost of imported sugar including import duty, port handling charges and expenditure on transportation from the port to the place of consumption. Alternatively, the purchases can be made on the basis of the procedure followed by the banks for the valuation of the sugar stocks for the purpose of working capital financing which has also been followed by the Govt of India for the purpose of

valuation of sugar for buffer stocks viz., at the average price of last 3 months or the ruling market price, whichever is lower.

19.14.1 It will be seen from Table 19.4 that our exports have generally been insignificant and as mentioned in para 19.3.2 over 12 years period imports have far outstripped exports. This is partly because of the policy of partial decontrol, which makes the freesale price, out of which exports can be made, higher and partly because of the policy of Government under which only limited quota is issued for exports when sugar stocks are high and the same is abruptly withdrawn the moment prices show the slightest tendency to rise. This makes India an undependable exporter of sugar in the world market. No worthwhile efforts for development of export market can be made nor can the industry make any serious efforts for producing export quality sugar or for developing infrastructural facilities for exports unless there is an assurance of atleast minimum quantity of export. Logically, when imports are on OGL, there should be no quota requirements for exports also. However, it is conceivable that in certain situation when world sugar prices spurt, this may lead to unacceptable level of rise in the domestic price of sugar. We would, therefore, recommend that minimum one million tonne of quota should be allowed on a regular basis for export so as to enable the mills to plan their production and marketing arrangements and tie up with the foreign importers on a regular basis. This order of exports should be quite feasible as neighbouring countries for which we have transport advantage are substantial importers vide Table 19.3. Since the annual production is now around 15 million tonnes (which even exceeded 16.4 million tonnes during 1995-96), this is about 6 to 7 percent of annual production and this level of exports would not unduly affect the domestic price. In fact, if there is an assurance that upto one million tonne of sugar cane be regularly exported, the mills may be expected to install capacity and make arrangements for production of one million tonnes extra sugar over and above the quantity required to meet the domestic requirements. The sugar production in the country has in the past been increasing at a rate corresponding to the rate of increase in the sugar consumption. Export of one million tonne will lead to increase in the overall level of production of sugar. Since cane crop is profitable for farmers, this will lead to increase in their incomes, apart from enabling the country to earn valuable foreign exchange. It may be steressed that this minimum quota should be available even during the years when production is low. Since imports are on OGL, any excessive rise in

prices will automatically be checked by imports and prices will not rise above import parity level, (landed cost of import plus import duty). They will in fact not rise even above the lower export parity level (export price less cost of transportation) as exports will become uneconomic above this level. Additional quota may be released after end of April, when more or less firm estimates of production during the year would be available. The total quota, including the minimum one million tonnes released on a regular basis, could be determined on the basis of surplus of estimated production plus opening stocks over the estimated consumption plus requirements of 2½ months carry over stocks for internal consumption during the next season. This additional quota may be released in instalments not exceeding one million tonnes at a time so as not to disturb the export market prices. Since India is a large country, both imports and exports may take place simultaneously as is the case with some countries like China.

19.14.2 In order to provide some incentive for exports, mills exporting sugar may be exempted from levy on the production in excess of normative production based on their capacity and average length of the season in thier area, so long as partial decontrol continues. Exempting the whole exported sugar from levy could also be considered but it will place the inland factories at excessive disadvantage. In the event of complete decontrol, normal releases may be allowed over and above the quantity exported by a mill to provide some incentive for export, if control on releases is retained.

19.14.3 So far as agency for export is concerned, the practices in different exporting countries vary. In some countries like South Africa, Taiwan, Thailand, Australia and Mauritius, these are canalised through a single agency. In others, such as, USA, European Unin, Philippines and including the largest exporter Brazil, these are handled by individual millers, traders or export houses.

19.14.4 We have, in Chapter 13, recommended complete decontrol of sugar prices in a phased manner. However, until that is implemented fully, exports will kcontinue to be at a disadvantage as the price of free-sale sugar from which exports are to be made would be higher as the mills have to compensate their loss in supply of sugar under levy at below cost. There may be situations during this period when for maintaining stability of sugar prices in the over all interest of the industry and the cane growers, exports may be required to be made but individual

mills may not be able to undertake those because it may involve loss. Even during this period, the individual millers, traders and export houses should be free to export sugar on their own. However, if the sugar exported by them is not adequate and additional sugar exports are considered by Government to be necessary in the interest of industry as a whole, it should be possible for exports to be made compulsory for all mills through ISGIEIC as was permissible under the Sugar Export Promotion Act, 1958 repealed by Government through the ordinance dated 15.1.97 and to recover the loss involved from all the mills in proportion to their production as was the practice before repeal of this Act. The repealing ordinance has not been subsequently placed before Parlliament for ratification. The legal position as to whether the original Act now survives or stands repealed is not clear. In case the original Act still survives, it may be allowed to continue till the sugar prices are completely decontrolled. In case the legal opinion is that the earlier Act stands repealed, a fresh law on the lines of the original Act may be enacted for the temporary period till the complete decontrol of sugar prices to enable such exports being made through the Corporation whenever found necessary.

Chapter 20

Sugar Cycle And Buffer Stocks

20.1 As brought out in Chapter-2, sugar production has increased considerably during the last four decades. This long-term increase, however, is not steady and on it is superimposed cyclical fluctuations in production. The position during the last 30 years from 1965-66 to 1996-97 is indicated in Table 20.1.

Table 20.1 – Production of sugar from 1965-66 to 1996-97

Year	Total Sugar Production (in lakh tonnes)
1965-66	35.41
1966-67	21.51
1967-68	22.48
1968-69	35.59
1969-70	42.62
1970-71	37.40
1971-72	31.13
1972-73	38.73
1973-74	39.48
1974-75	47.97
1975-76	42.62
1976-77	48.40
1977-78	64.61
1978-79	58.41
1979-80	38.58
1980-81	51.50
1981-82	84.37
1982-83	82.29
1983-84	59.17
1984-85	61.44
1985-86	70.16
1986-87	85.02
1987-88	91.10
1988-89	87.52
1989-90	109.90
1990-91	120.47
1991-92	134.05
1992-93	106.09
1993-94	98.33
1994-95	146.43
1995-96	164.52
1996-97	129.05

It will be seen that the sugar production fell during 1966-67 and 1967-68. Thereafter, it increased during 1969-70 and 1970-71. There was a fall in production during 1972-73 which was followed by increase during the next three years. In 1975-76, the production again fell and thereafter increased during the next two years. During the subsequent two years viz. 1978-79 and 1979-80, the production fell again. It rose during the next three years, fell again in 1983-84, rose during the next four years, fell again in 1988-89, rose during the next three years, fell during 1992-93 and 1993-94, rose again in 1994-95 and 1995-96 and has subsequently fallen in 1996-97. The rise and fall in production i.e. fluctuations from 1977-78 was quite pronounced and was suggestive of repeated sugar cycles.

20.2 The fluctuations in sugar production follow a more or less similar pattern of fluctuations in sugarcane as will be seen from Table 20.2.

Table 20.2 – Fluctuations in production of sugar and sugarcane Over the Years

Year	Product-ion of sugarcane (in million tonnes)	Increase decrease over last year	Increase decrease Product year in %	Total Sugar over on (in lakh tonnes	Increase /decrease over last previous year	Increase /decrease overlast year in %
1965-66	123.99	2.08		35.41	3.09	
1966-67	92.83	(-) 31.16	-25	21.51	(-)13.90	-39
1967-68	95.50	2.67	3	22.48	0.97	4
1968-69	124.68	29.18	31	35.59	13.11	58
1969-70	135.02	10.34	8	42.62	7.03	20
1970-71	126.37	(-) 8.65	-6	37.40	(-)5.22	-12
1971-72	113.58	(-)12.79	-10	31.13	(-)6.27	-17
1972-73	124.87	11.29	10	38.73	7.60	24
1973-74	140.81	15.94	13	39.48	0.75	2
1974-75	144.29	3.48	2	47.97	8.49	21
1975-76	140.60	(-) 3.69	-3	42.62	(-) 5.35	-11
1976-77	153.01	12.41	9	48.40	5.78	12
1977-78	176.97	23.96	16	64.61	16.21	33
1978-79	151.66	(-)25.31	-14	58.41	(-) 6.20	-9
1979-80	128.83	(-)22.83	-15	38.58	(-)19.83	-34
1980-81	154.25	25.42	20	51.50	12.92	25
1981-82	186.36	32.11	21	84.37	32.87	64
1982-83	189.36	3.00	2	82.29	(-) 2.08	-2
1983-84	189.51	0.15	-	59.17	(-)23.12	-28
1984-85	174.08	(-)15.43	-8	61.44	2.27	4
1985-86	170.32	(-) 3.76	-2	70.16	8.72	14
1986-87	186.09	15.77	9	85.02	14.86	21
1987-88	196.74	10.65	6	91.10	6.08	7
1988-89	203.04	6.30	3	87.52	(-) 3.58	-4
1989-90	225.57	22.53	11	109.90	22.38	25
1990-91	241.05	15.48	7	120.47	10.57	10
1991-92	254.00	12.95	5	134.05	13.58	11
1992-93	228.03	(-)25.97	-10	106.09	(-)27.96	-21
1993-94	229.66	1.63	1	98.33	(-) 7.76	-7
1994-95	275.54	45.88	20	146.43	48.10	49
1995-96	282.95	7.41	3	164.52	18.09	12
1996-97	267.48	(-)15.47	-5	129.05	(-)35.47	-22

20.3. The fluctuations in production of sugarcane has been largely associated with fluctuations in area under sugarcane as will be seen from table 20.3.

Table 20.3 – Fluctuations in area and production of sugarcane

Year	Area under Sugarcane (in lakh hectare)	Increase/Decerease over last last year	Production of sugarcane (in million tonnes)	Increase/ decrease over last year	Yield of cane (tonne per hectare
1965-66	28.36	2.33	123.99	2.08	43.70
1966-67	23.01	(-) 5.35	92.83	(-) 31.16	40.30
1967-68	20.46	(-) 2.55	95.50	2.67	46.70
1968-69	25.32	4.86	124.68	29.18	49.20
1969-70	27.49	2.17	135.02	10.34	49.10
1970-71	26.15	(-) 1.34	126.37	(-) 8.65	48.30
1971-72	23.90	(-) 2.25	113.58	(-)12.79	47.50
1972-73	24.52	0.62	124.87	11.29	50.90
1973-74	27.52	3.00	140.81	15.94	51.20
1974-75	28.94	1.42	144.29	3.48	49.90
1975-76	27.62	(-) 1.32	140.60	(-) 3.69	50.90
1976-77	28.66	1.04	153.01	12.41	53.40
1977-78	31.51	2.85	176.97	23.96	56.20
1978-79	30.88	(-) 0.63	151.66	(-)25.31	49.10
1979-80	26.10	(-) 4.78	128.83	(-)22.83	49.40
1980-81	26.67	0.57	154.25	25.42	57.80
1981-82	31.93	5.26	186.36	32.11	58.40
1982-83	33.58	1.65	189.36	3.00	56.40
1983-84	31.10	(-) 2.48	189.51	0.15	56.00
1984-85	29.53	(-) 1.57	174.08	(-)15.43	57.70
1985-86	28.50	(-) 1.03	170.32	(-) 3.76	59.90
1986-87	30.79	2.79	186.09	15.77	60.40
1987-88	32.79	2.00	196.74	10.65	60.00
1988-89	33.29	0.50	203.04	6.30	61.00
1989-90	34.39	1.10	225.57	22.53	65.60
1990-91	36.86	2.47	241.05	15.48	65.40
1991-92	38.44	1.58	254.00	12.95	66.10
1992-93	35.72	(-) 2.72	228.03	(-)25.97	63.80
1993-94	34.22	(-) 1.50	229.66	1.63	67.10
1994-95	38.67	4.45	275.54	45.88	71.30
1995-96	41.39	2.72	282.95	7.41	68.40
1996-97	40.11	(-) 1.28	267.48	(-)15.47	66.70

20.4 It will be seen that generally the yield per hectare has also gone down where area has fallen. This is presumably because the same factors that influence the farmer to reduce his area under cane also lead him to use less inputs which leads to reduction in yield.

20.5. It appears that one of the key factors which leads the farmers to reduce area under cane is the accumulation of arrears of cane payments during the previous year. Table 20.4 illustrates the position in respect of three sugar cycles:-

Table 20.4 – Cane area and arrears of cane payments

Year	Area under cane (L/hectare)	Cane price arrears of previous year (Rs/Lakhs)
1977-78	31.51	855.91
1978-79	30.88	4082.63
1979-80	26.10	1666.23
1980-81	26.67	374.10
1981-82	31.93	450.41
1982-83	33.58	5627.69
1983-84	31.10	7407.80
1984-85	29.53	3078.05
1991-92	388.44	8064.68
1992-93	35.72	21279.68
1993-94	34.22	6878.77
1994-95	38.67	5575.17
1995-96	41.39	12931.99
1996-97	40.11	50823.04

20.6 Impact of cane arrears on area under cane is discernable in 1979-80, 1984-85, 1993-94 and 1996-97.

20.7 Apart from sugar mills substantial quantities of sugarcane is also crushed by khandsari and gur industry. Separate figures for the cane utilised by khandsari and gur industries are not available. The figures of cane crushed by khandsari and gur industries combined is a derived one by substracting from the total estimated cane production the total cane crushed by the mills and cane assumed to be used for seed and chewing purposes. On the basis of the available data the position in regard to utilisation of cane by the khandsari and gur industry combined is indicated in table 20.5.

Table 20.5 – Sugarcane crushed by Gur/Khandsari sector

Year	Product-ion of sugarcane (in million tonnes)	Increase decrease over last year	Increase decrease Product year in (%)	Sugarcane utilised by Khandasari Gurindustries (in million tonnes)	Increase/ decrease over last previous year	Increase/ decrease overlast year in (%)
1965-66	123.99	2.08		71.42	(-) 1.85	
1966-67	92.83	(-) 31.16	-25	60.15	(-)11.27	-16
1967-68	95.50	2.67	3	61.50	1.35	2
1968-69	124.68	29.18	31	72.19	10.69	17
1969-70	135.02	10.34	8	73.32	1.13	1
1970-71	126.37	(-) 8.65	-6	72.99	(-)0.33	-
1971-72	113.58	(-)12.79	-10	69.04	3.35	-5
1972-73	124.87	11.29	10	69.46	0.42	1
1973-74	140.81	15.94	13	81.73	12.27	18
1974-75	144.29	3.48	2	78.67	(-) 3.06	-4
1975-76	140.60	(-) 3.69	-3	82.03	3.36	4
1976-77	153.01	12.41	9	85.87	3.84	5
1977-78	176.97	23.96	16	88.61	2.74	3
1978-79	151.66	(-)25.31	-14	74.00	(-)14.61	-16
1979-80	128.83	(-)22.83	-15	74.68	0.68	-1
1980-81	154.25	25.42	20	84.48	9.80	13
1981-82	186.36	32.11	21	77.21	(-)7.27	-9
1982-83	189.36	3.00	2	84.53	7.32	9
1983-84	189.51	0.15	-	94.28	8.75	10
1984-85	174.08	(-)15.43	-8	90.16	(-) 4.12	-4
1985-86	170.32	(-) 3.76	-2	81.88	(-) 8.28	-9
1986-87	186.09	15.77	9	78.66	(-) 3.22	-4
1987-88	196.74	10.65	6	82.48	3.82	5
1988-89	203.04	6.30	3	93.26	10.78	13
1989-90	225.57	22.53	11	87.74	(-) 5.52	-6
1990-91	241.05	15.48	7	90.21	2.47	3
1991-92	254.00	12.95	5	93.37	3.16	3
1992-93	228.03	(-)25.97	-10	97.96	4.59	5
1993-94	229.66	1.63	1	104.35	6.39	6
1994-95	275.54	45.88	20	95.24	(-) 9.11	-9
1995-96	282.95	7.41	3	75.00	(-)	-21
1996-97	267.48	(-)15.47	-5			

20.8 It will be seen that the quantity of cane crushed by gur and khandsari industries has generally followed the pattern of production of sugarcane rising with the increase in production of cane and falling with the decline in its production. The percentage increase/decrease in the cane crushed by gur and khandsari industries is however less than the corresponding percentage increase/decrease in total cane production so that in percentage terms their share in total cane production increases when the cane production falls and vice-versa. In certain years, for example, 1971-92, 1974-75, 1975-76, 1981-82, 1983-84, 1986-87, 1989-90, 1992-93, 1994-95 and 1995-96, there has also been an absolute increase in the quantity of cane crushed by gur and khandsari industry when cane production fell or it declined in absolute terms when cane production rose. The decline in utilisation of sugarcane by gur and khandsari during the years when production of sugarcane increased is, however, to some extent also accounted for by the secular decrease in the utilisation of cane by gur and khandsari industry.

20.9 On the basis of the above analysis, the course of a typical sugar cycle from onset to termination may now be summarised. Starting from a normal year when factories are able to crush the cane within the normal season and there are no major arrears of cane price, the farmers tend to plant larger area under sugarcane since the sugarcane is relatively a more profitable crop and also use more inputs. This leads to increase in sugarcane production. The mills tend to get larger share of these increased supplies. Sugar production, therefore, goes up. After two or three years of good sugar production, the production with the carry-over stocks outpaces the demand for internal consumption. Although the Government through its mechanism of release for freesale sugar tries to cushion the impact of this higher production it does lead to lowering of freesale market prices. Excessive production of cane relative to the cane crushing capacity leads to lengthening of the crushing period. A large number of farmers have to wait till hot months of May and June before their cane can be crushed. A large accumulation of stocks with the mills leads to accumulation of cane price arrears. The farmers thus tend to suffer both because of driage of cane and delays in receipt of their payments. They, therefore, tend to switch over to alternative crops. Non-payment of cane price by the mills also adversely affects their financial resources and they have to reduce the use of inputs. The resultant reduction in yield coupled with reduction in area leads to reduction in sugarcane production in the subsequent years. Since about 50% of area is under ratoon, the effect is spilled over two years as farmers would pull out ratoon only under extreme situations. Since the gur and khandsari industry tend to maintain their crushing and in some cases even increase it during the period of shortage, because production of khandsari/gur become more remunerative due to increase in price of khandsari and gur in line with increase in price of sugar, the sugar production falls more than proportionately due to the fall in sugarcane production. The accumulated stocks then get used up for free sale and prices tend to firm up. The cane arrears are gradually liquidated and the conditions are thus created for another round of expansion in sugarcane and sugar production.

20.10 Based on the data regarding production of sugarcane, sugar, gur and khandsari in Tables 20.1, 20.2 and 20.5, coefficients of variation (average of percentage variation during each year over the mean production during the period) have been worked out and are shown Table 20.6. It will be seen that the variation in production of gur and khandsari is considerably less than that of sugarcane while variation in production of sugar is almost double than that of variation of production in sugarcane. The production of sugar fluctuates much more violently than that of sugarcane.

Table 20.6 – Coefficient of variation (%) in production of Sugarcane, Sugar & Gur/Khandsari

Year	Sugarcane	Sugar	Gur/Khandsari
1970-80	12.22	22.40	8.24
1980-96	14.06	26.16	8.92

20.11 The cycle is largely self-correcting. Increase in sugarcane production itself create condition which leads to reduction in area. The fall in output of cane similarly leads to condition for expansion in area and production of cane. However, the impact of this cyclical fluctuation has adverse impact on industry, cane growers and the general economy. So far as the industry is concerned, its costs in the short term are determined largely by recovery percentage and duration of season. Higher recovery leads to a lower cane cost per tonne of sugar production, particularly since in most of the States the actual cane price received by the farmers is not related to recovery. The extension in the length of crushing season results in an increase the total sugar production for the same capacity and thereby reduces the overhead cost. The length of the crushing season is generally associated with fall in recovery as would be seen from Table 20.7.

Table 20.7 – Seasonwise Recovery Percent Cane and Duration of Crushing

Year	Maharashtra		Tamil Nadu		U.P.		All India	
1985-86	11.22	137	9.56	192	9.59	107	10.24	116
1986-87	10.99	127	9.56	184	9.43	162	9.98	141
1987-88	10.83	157	9.23	182	8.90	171	9.71	152
1988-89	11.05	134	10.19	197	9.47	135	10.23	132
1989-90	10.72	202	9.37	175	9.04	171	9.90	158
1990-91	10.76	193	9.11	206	9.08	164	9.86	166
1991-92	11.20	177	9.33	205	9.19	193	10.02	174
1992-93	11.32	136	9.41	154	9.68	128	10.31	123
1993-94	11.14	109	8.96	174	9.37	114	10.01	111
1994-95	10.93	181	8.68	290	9.42	148	9.93	161
1995-96	10.49	201	8.34	249	8.71	178	9.43	182

20.12 Since the price of sugarcane accounts for about 65-70% of the cost of production of sugar the net effect of lengthening of crushing season would be higher cost particularly if it is much beyond the normal season extending to the hot months of May and June. The increase in cane cost is not likely to be offset by reduction in overhead cost and the total cost would tend to increase. At the same time, accumulation of sugar stock imposes higher burden of storage and interest costs on the mills. Conversely a very short season would lead to excessive increase in per unit overhead cost which is likely to be offset only to some extent by the saving in cane cost due to higher recovery percent cane.

20.13 The effect on the growers is much more serious. During years of over production, many of them have to wait till the hot summer months for their cane to be lifted thereby incurring loss due to driage of cane as well as loss in the yield of subsequent kharif crop. This also causes excessive delay in the payment of cane price by the factories. As a result, they shift to other crops of short duration, which are generally less profitable than sugarcane. Thereby also they tend to suffer loss of income.

20.14 The consumers are to some extent cushioned against the adverse effect of the cycle due to the Government's policies which tend to prevent excessive rise in sugar price during year of shortage by resorting to imports. Such imports now and then are the result of cyclical imbalance in sugar production and demand and impose avoidable burden on foreign exchange. Excessive fluctuation in production also tend to make it difficult for the industry to make any substantial efforts at exports.

Views of the Committee

20.15 Sugarcane crop like other agricultural products is subject to the vagaries of climatic conditions. The fluctuation in sugar output arising out of the fluctuation in cane production due to climatic conditions can not be avoided. However, in view of the adverse effects of the cycle as mentioned above, measures need to be taken to ensure that the magnitude of this fluctuation caused by natural climatic factors is not accentuated to the extent possible.

20.16 As would be seen from the analysis of a typical sugar cycle in para 20.9, the seeds of cyclical fluctuation are sown during the period when excessive area is planted under cane relative to the cane crushing capacity and the likely consumption demand. This leads to accumulation of cane arrears in the case of private and public sector mills and lowering of cane price in case of cooperative mills, due to fall in free-sale market price and accumulation of sugar stocks. In order to reduce the magnitude of the fluctuations, it is, therefore, necessary to prevent excessive planting of cane at that stage. In many sugar producing countries the growers can grow cane only upto the specified area. While we cannot restrict

the freedom of growers to grow the crop that they wish, it is necessary in the interest of the growers as well as the industry to regulate the area to be planted with cane that has to be supplied to the mills. Growers, therefore, may be required to get the area intended to be planted with cane registered with the mill before planting it. This is even now the practice in some of the States like Tamilnadu and Andhra Pradesh and the same needs to be followed in other States as well. Suitable provisions in this regard may be made in the Sugarcane (Control) Order. Where likely production from the area sought to be planted is more than the cane that can be crushed by the mill within the normal season, preference will need to be given in the matter of registration to the growers who had supplied the cane to the mill in the past. The mill should thereafter be obliged to enter into bond in respect of all the cane that would be produced in the registered area. In case the mill refuses registration on account of constraint of milling capacity and growers still plant cane, the cane produced in unregistered area and unbonded cane should be taken only after entire quantity of bonded cane is milled. If as a result the crushing season extends beyond 30th April, the price for the unbonded cane crushed during that period may only be SMP and not the cane price determined by Cane Pricing Board. In States like, Tamil Nadu and Karnataka where the normal crushing season goes beyond 30th April, this would apply only to the unbonded cane crushed beyond the normal date of close of the crushing season in those States. This will to a considerable extent discourage excessive planting of cane during such periods. It may be clarified that this applies only to the unbonded cane. So far as bonded cane is concerned, its price will have to be paid as determined by the Sugarcane Pricing Board even if it is crushed beyond the normal crushing season.

20.17 Cooperative sugar mills in Maharashtra and Gujarat in Maharashtra and Gujarat at present distribute the entire sales realisation amongst the growers, though part of it is in the form of interest bearing deposit. They maintain no funds from which the fluctuation in cane price may be reduced. At present the hesitation to establish this fund is on account of liability to pay income tax on the profits from which the fund would be created. In order to encourage the cooperative mills to maintain the Price Equalisation Fund they may be allowed to deduct the amount credited to the fund from the income as it is to be used only for payment of additional cane price during the years when the price would otherwise be low and is not a distribution of profit. The amendment will, of course, have to be made for all industrial

cooperatives, so far as creation of fund for equalisation of payment of price for the raw material supplied by the growers members is concerned. Till such amendment in law is made, cooperative sugar factories may deduct a suitable amount from the cane price in years of higher price for crediting to Price Equalisation Fund, out of which some amount may be paid to the growers in years of low cane price. This will help in reducing the fluctuation in the cane price received by the growers.

20.18 In years of excess stocks higher level of exports may be allowed to enable the mills to reduce the cane arrears. This is in consonance with the recommendation already made in Chapter 19.

20.19 Maintenance of adequate level of buffer stocks can also contribute significantly to reduction in fluctuations in sugar price and thereby in cane price and sugar production. This is considered in detail in the subsequent paras.

Buffer Stock

20.20 Due to the operation of sugar cycle, adequate availability of sugar over years is not guaranteed. Prices move in sympathy with releases and to smoothen the impact of such fluctuations, creation of a buffer stock and its utilisation in lean years would be a worthwhile solution. Dr. Sen's Commission report of 1964 stressed this point and recommended a buffer stock of 12 lakh tonnes of sugar. This was not acted upon for the next eighteen years.

First creation 1982-83

20.21 In 1977-78, production rose to around 65 lakh tonnes from 48 lakh tonnes in the previous season. Proposals for creation of buffer stock were under consideration. Thereafter, production declined for next five years and imports had to be resorted to. Production crossed 80 lakhs mark in 1981-82 and 1982-83. Buffer stock of five lakh tonnes was created from 1-10-82 out of free sale quota. This was raised to 10 lakh tonnes and the entire quantity was released from 1983-84 season and beyond. Cess was raised from Rs. 5/- to Rs. 14/- per quintal in 1982 and SDF Act was amended to include buffer stock financing. Banks provided 100% finance on buffer stock. Sugar factories were paid the storage, insurance and interest charges on quarterly basis. The buffer stock was released in subsequent years at appropriate time to stabilise prices and about Rs. 72 crores were paid as subsidy.

Second creation 1992-93

20.22 Sugar production started to go down from 1983-84 onwards and heavy imports were made from 1984-85 to 1986-87 and question of creation of buffer stock did not arise. Production rose to about 120

lakh tonnes in 1990-91 and 134 lakh tonnes in 1991-92. Buffer stock of 5 lakh tonnes was created from 1st April 1993. It was liquidated by 30th September 1993 in view of fall in production in 1992-93 to 106 lakh tonnes and factories were paid the charges for this period.

Third creation 1995-96 and 1996-97

20.23 Production in 1993-94 was only about 98 lakh tonnes and imports were resorted to. Thereafter, it started picking up and rose to about 146 and 164 lakh tonnes during the next two years. In order to give relief to the factories for huge sugar inventory they would be holding, due to monthly release control by Government, buffer stock of 5 lakh tonnes was created out of 1995-96 production, covering the period from 10th January 1996 to 9th January 1997. Sugar factories were paid subsidy on quarterly basis. The buffer stock created on 1.12.96 was allowed to lapse on 30.11.97. The other buffer stock created on 10.1.97 has been extended upto 9.7.98.

20.24 The concept of keeping continuous buffer stock over years was recommended by Dr. Sen's Commission and by CACP in 1995-96. This has not been acted upon. Buffer stocks were created in years of plenty and liquidated thereafter. At present, buffer stock scheme contemplates relief to the industry by way of subsidy for holding huge inventory in years of plenty so as to improve their financial position thereby enabling payment of cane price to the growers.

Views of the Committee

20.25 In order to reduce the magnitude of fluctuations in sugar production, it is necessary to place the system of bufferstocks and its operation on a permanent footing. We would, however, recommend that the buffer stocks should be built only out of surplus domestic production in a good year and not out of imports. The quantity to be taken to bufferstocks should be determined on the basis of surplus of domestic production during the year plus opening stocks over estimated requirements for the sugar season plus two and half months consumption requirements as closing stock for the ensuing season.

20.26 Since the purpose of the bufferstock is to moderate the fluctuations in production and excessive stocks involve unnecessary expenditure on interest and storage charges, it is necessary to fix a maximum limit for the bufferstock. It is suggested that this limit should be equal to the deficit of the minimum production in any year during the last 5 years plus opening stock for the current season, as compared to the estimated consumption for the current sugar season plus two and

half months consumption requirement as closing stock for the ensuing season. This will be enough to meet any likely shortfall in production for one year. In the event of large shortfall in production during two consecutive sugar seasons, it would be more economic to meet the requirement by import as such contingencies are likely to arise only rarely.

20.27 The buffer stocks may be released when wholesale price of sugar rises at a rate substantially higher than rate of increase in general wholesale price index or it exceeds the import parity price (i.e., landed cost of imports + import duty + handling charges at the ports.). Since the purpose of buffer stock is to augment supplies during period of lower output, there need be no minimum limit for the bufferstock.

Chapter 21

Sugar Development Fund

21.1 Sugar Cess Act, 1982 - Conditions under which it was passed

The plant and machinery of large number of sugar factories had outlived its normal span of life, and the factories required rehabilitation. Further, capacity of many plants was less than 1250 TCD, which was uneconomic for operation. Due to paucity of funds, development of sugarcane had not been possible on modern and scientific lines. In this background, the Sugar Cess Act, 1982 was passed w.e.f. 01-06-82 and it was stipulated that there shall be levied and collected as cess for the purpose of Sugar Development Fund Act 1982, a duty of excise on all sugar produced by any sugar factory in India, at such rate not exceeding Rs. 10/- per quintal of sugar, as the Central Government may specify from time to time. Till such time a rate is specified, the duty was to be levied and collected at Rs. 5/- per quintal. The proceeds of the duty levied were to be credited to the Consolidated Fund of India. Subsequently, the Sugar Cess Act 1982, was amended w.e.f. 01-11-82 so as to provide for raising the limit upto which the cess on sugar could be levied from Rs. 10/- to Rs. 15/- per quintal, and also providing for raising the rate of cess actually charged from Rs. 5/- per quintal ro Rs. 14/- per quintal. Thus, the total amount of cess payable on all sugars, levy and non-levy, became Rs. 14/- per quintal of sugar.

21.2 Sugar development Fund Act, 1982

The final has been established with a view to providing assistance to help financially weak and old sugar undertakings for the purpose of rehabilitation and modernisation of their plant and machinery, for development of sugarcane in areas in which sugar factories are situated and for encouraging research aimed at development of sugar industry. An amount equivalent to the proceeds of duty of excise levied and collected under the Sugar Cess Act 1982, reduced by the cost of collection as determined by Government, together with any money received by the Government, for the purpose of this Act, is to be credited with Sugar Development Fund.

21.3 Application of Fund

The fund is to be applied by the Government for

(a) making loans for facilitating the rehabilitation and modernisation of any sugar factory or for any scheme for development of sugarcane in the area in which any sugar factory is situated.

(b) making grants for purpose of any research projects aimed at development of sugar industry.

(c) defraying any other expenditure for the purpose of this Act.

21.4 Procedure for grant of loans

Every application for loan or grant shall be made to the Committee in the prescribed form. The Central Government may constitute a Committee of officers for the purpose of speedy consideration and disposal of applications, and for considering any problems arising in the course of administration of the Act.

21.5 Loan for modernisation / rehabilitation

21.5.1 Any sugar undertaking which is approved by any specified financial institution viz., IFCI, IDBI, ICICI, Industrial reconstruction Bank of India or sponsored by Technology Information & Forecasting Council (TIFAC), in respect of Mission Mode Project on Sugar Production Technologies of Department of Science & Technology, for modernisation / rehabilitation of its plant and machinery (including pollution control), shall be normally be eligible for loan.

21.5.2 Any eligible sugar undertaking may make an application to the Standing Committee. It is open to the Committee before taking a final decision on the application to

(a) call of any further information from the applicant, or

(b) appoint a Sub-Committee or expert to make an investigation and report on any aspect relating to the application.

The final decision of the Committee on any application is to be submitted to the Government in this form of recommendations.

21.5.3 The Central Government may, after consideration of the recommendations of the Committee, authorise payment to a sugar undertaking of such amount of loan, not exceeding the amount required by financial institutions, to be contributed by such sugar undertaking as promoters' contribution, as may be determined by the Central Government. The amount of loan that can be allowed will be limited to 80% of the promoters' contribution or 40% of the total eligible cost of the project, whichever is less. For projects sponsored by TIFAC, the loan should not exceed 60% of the eligible project cost.

21.5.4 *List of ineligible items for SDF assistance for modernisation is at Annexure 20.1.*

21.6 Conditions to be satisfied

21.6.1 The scheme of loan to be sanctioned for projects sponsored by TIFAC is to be coterminus with the duration of 'Mission Mode Project Scheme on Sugar Technologies' of Department of Science & Technology.

21.6.2 The loan from the find is to be granted only if the sugar undertaking contributes a minimum of ten per cent of the loan applied for from its own resources as promoters' contribution, subject to the financial appraisal of the project sponsored by TIFAC.

21.6.3 Payment of said loan is to be authorised only to such undertakings which have fully repaid all their sums due in respect of Sugar Development Fund and Levy Sugar Price Equalisation Fund. Amount shall be disbursed by the Central Government to the sugar undertaking or to the financial institution for disbursement to the sugar undertaking either in lump sum or in two or more instalments.

21.6.4 Every disbursement of loan shall be preceded by a bilateral agreement between the Central Government and the sugar undertaking concerned, or by a tripartite agreement between the Central Government, sugar undertaking and the financial institution. The agreement shall contain the terms and conditions with regard to the period of repayment including the number and amount of instalments, manner of such repayment and any other matter incidental to the loan.

21.6.5 A sugar undertaking must have been in operation for a minimum of three crushing seasons including trial crushing season.

21.6.6 Sugar undertakings which have availed of SDF loan for modernisation of plant and machinery will be considered for grant of another loan only after the sugar undertaking has been operational for a minimum of seven crushing seasons after the earlier project has been completed relaxation regarding the minimum stipulated period of seven crushing seasons can be considered on merits in individual cases, priority being given to application of factories below the minimum economic level of 2500 TCD to reach the minimum economic level.

21.6.7 Sugar undertakings in cooperative sector and public sector and public sector will get priority for grant of loans over those in the private sector.

21.6.8 Sugar undertakings of sub-optimal capacity will get priority for grant of loan.

21.6.9 Any benefit already received/availed of from the SDF under the rules would be taken into account before sanction of loan.

21.6.10 Factors such as age of the mill and the year when it was set up, when last expansion/ improvement in installation were undertaken etc., will be taken into consideration for grant of loan.

21.6.11 Sick units declared as such by BIFR will be considered for assistance under the scheme, provided the unit has not become sick on account of deliberate negligence/mismanagement or disposal of assets etc.

21.6.12 Units taken over by State Governments under relevant Acts will be eligible for assistance from SDF, subject to the condition that the concerned State Government would provide upto 20% of the promoters' contribution, as may be decided in each case.

21.7 **Interest and repayment**

21.7.1 The loan from the fund will carry a concessional rate of interest at 9% p.a. in respect of projects approved by a financial institution and 6% p.a. for projects sponsored by TIFAC. In case of any default in repayment of the amount of the loan or payment of any instalment thereof or interest thereon, an additional interest @ 2.5% p.a. on the amount of default shall be payable by the undertaking. The amount of loan authorised as above is to be disbursed by the Central Government to the sugar undertaking in two equal instalments. Subsequent instalment will be released on production certificate of the first instalment.

21.7.2 The repayment of loan together with interest thereon is to commence after the expiry of one year from the date of repayment / payment of institutional loan and interest thereon in full or on the expiry of a period of eight years reckoned from the date of disbursement of loan, whichever is earlier, and loan from the fund alongwith interest due thereon, is to be recovered in annual instalments not exceeding five in number.

21.7.3 In case of projects sponsored by TIFAC, the repayment of loan under this rule, together with interest thereon, is to commence after the expiry of such period as may be decided by the Government, after due verification by financial institution subject to a maximum of five years taken from the date of disbursement of loan, and the loan alongwith interest due thereon, is to be recovered in annual instalments not exceeding five in number.

21.7.4 Within thirty days of receipt of any amount from the loanee sugar undertaking, by way of repayment of loan from the fund, payment of interest thereon or any other receipts, the amount will be credited to the fund by the financial institution.

21.8 **Security**

The scheme for grant of loans for modernisation, having been approved by Financial Institutions, first charge on the assets of the sugar undertaking is held by such Financial Institution which has approved the scheme. Sugar Development Fund has the second charge on the assets of such sugar undertaking.

21.9 **Loan for Sugarcane Development**

21.9.1 The Central Government may, after taking into consideration the recommendation of the Committee, accord sanction to the payment of a loan from the fund to a sugar undertaking in connection with development of sugarcane in its area for the purpose of -

(a) setting up of heat treatment plants

(b) rearing of nurseries

(c) pest control measures

(d) incentives to cultivators to switch over to improved varieties of sugarcane

(e) irrigation schemes

(f) any other scheme or project as may be approved by the Central Government.

21.9.2 Loans are to be granted only if the Central Government is satisfied on the basis of the information given that no financial assistance is available for the purpose from any agency, and if available, the amount thereof, in the opinion of the Central Government, is inadequate and needs to be supplemented by loans from the fund.

21.10 **Other conditions to be satisfied**

21.10.1 The loan from the fund is to be granted only if the sugar undertaking or the State Government contributes a minimum of 10% of the loan applied for from its own resources as margin money.

21.10.2 The government is to authorise payment of the loan from the fund only to such sugar undertakings which have fully repaid all sums due in respect of SDF and Levy Sugar Price Equivalent Fund.

21.10.3 Loan to a sugar undertaking shall be disbursed only through the Government of the State in which the sugar factory is situated, upon the sugar undertaking executing an agreement on such terms and conditions as the Central Government may decide including provision for monitoring by the State Government, of utilisation of loan progress of the scheme, repayment of loan with interest and remittance to the credit of the Fund.

21.11 **Interest and repayment**

21.11.1 Loan is to be disbursed normally in three annual instalments. Second and subsequent instalments are disbursed on receipt of utilisation certificate / progress report from the concerned State Government, which acts as monitoring agent for these schemes.

21.11.2 The loan is to carry a simple interest rate of 9% p.a. and repayment shall commence on expiry of moratorium of three years reckoned from date of disbursement Repayment is to be made in equal instalments not exceeding four in number. Interest on the loan is to be paid annually after the expiry of one year from date of drawal of loan.

21.11.3 In case of default in repayment of the amount of the loan or payment of any instalment thereof or interest thereon, in accordance with the provisions of the agreement, an additional interest @ 2.5% p.a. on the amount of default, is to be paid by the sugar undertaking.

21.12 **Security**

In case of units in cooperative sector/public sector, the State Government concerned being a major shareholder in such units, furnishes guarantee towards repayment of principal and interest, in the event of default by the sugar unit.

In case of private sector units, the borrower unit has to furnish a Bank Guarantee to the Central Government, to be kept valid till the entire dues along with interest are paid by the unit.

21.13 **Defrayment of other expenses for development of sugar industry**

The Central Government may, after consultation with the Committee, defray expenses and/authorise payment of amounts for establishment and maintenance of institutions at the national level for training, extension and research programmes connected with development of sugar industry.

21.14 **Grants for Research**

The Central Government may, after consultation with the Committee, authorise payment of grants to established institutions connected with the sugar industry for carrying out research aimed at the promotion and development of any aspect of sugar industry.

21.15 **Buffer Stock**

21.15.1 The Central Government may decide from time to time, the quantity of buffer stock of sugar to be maintained by any sugar undertaking, keeping in view the stock already held, prospects of sugar production, consumption within the country and exports. The sugar maintained as buffer stock should conform to the grade laid down by the ISS, and shall be of such grade as may be decided by the Central Government. The Central Government or the Chief Director may, from time to time, require the sugar factory to set apart such quantity and grade of sugar, pertaining to such sugar year or years, as may be necessary for purpose of stock. The share of each unit shall be on the basis of production in a particular sugar year. The sugar unit should set apart the quantity earmarked as buffer stock (as determined by the Central Government) and shall store it in separate and distinctly identifiable lots and in separate godowns within the premises of the undertaking. However, in exceptional cases, the Central Government may grant exemption to a sugar factory from operation of this rule for reasons to be recorded in writing.

21.15.2 Each sugar factory should provide safeguards against damage and deterioration in quality of sugar stored as buffer stock and against mixing of other stock. The stock so set apart should be insured against fire, explosion of boiler, lightning and floods. In case of deterioration, damage or loss to the buffer stock, every unit should send a detailed report indicating reasons for the same. The sugar factory should make available to the Central Government or the Chief Director, access to the buffer stock of sugar for inspection regarding quality and quantity including grade, sugar year relevant to its production and also all books, records and accounts relating with buffer stock. No sugar factory should remove, despatch or replace or dispose of any buffer stock without obtaining prior written permission of the Central Government of the Chief Director. The Central Government or the Chief Director may, at any time require a sugar factory to release such quantity / quality / grade of sugar out of buffer stock for sale, consumption, replacement of old or sugar not as per ISS.

21.15.3 *Maintenance of funds received by way of additional credit and utilisation thereof*

Every sugar factory should set apart the amount, if any, received from its bankers by way of additional credit on the quantity of buffer stock of sugar and credit the amount so set apart to a separate account with the same banker. The amount credited to the separate account should not be used by the unit, other than for payment of price, including arrears of price, payable for the sugarcane purchased by the sugar factory.

21.16 **Subsidy towards interest, storage and insurance**

21.16.1 The Central Government may authorise payment of subsidy towards storage, insurance and interest charges for every quarter year or part thereof to every sugar factory which has

(a) set apart the required quantity of sugar as buffer stock.

(b) pledged the buffer stock with any scheduled bank or any State Cooperative bank or Central Cooperative bank.

(c) maintained the buffer stock as per requirement of the rules.

21.16.2 *Manner of calculating subsidy*

(i) The amount of subsidy payable on account of interest charges shall be the amount calculated at the actual rate of interest availed of by the sugar unit subject to a ceiling of 18%, whichever is lower, on the advances received by it on pledging with the Bank the quantity of sugar maintained by it as buffer stock.

(ii) The amount of subsidy on storage and insurance charges shall be calculated at the actual rate of 1.5% of the value of sugar set apart as buffer stock, determined with reference to the average actual realisation per quintal of sugar made by the claimant sugar undertaking on the sale of non-levy sugar in the open market during the relevant period.

21.16.3 *Subsidy is to be calculated in accordance with the following formulae-*

(a) Subsidy towards interest $= B \times V \times I \times \frac{N}{365 / 366}$

(b) Subsidy towards storage & insurance charges $= B \times V \times S \times \frac{N}{365 / 366}$

where

B - quantity of sugar in qunitals held as buffer stock

V - value per quintal of sugar (other than levy sugar)

I - rate of interest

S - rate of storage / insurance charges

N - number of days for which quantity of buffer stock is maintained during the relevant period divided 365/366 days.

21.16.4 Payment of interest charges on additional credit if availed, I.e., 20% over an above the normal advance of 80% would be made from 01-02-96 onwards subject to the following:-

(a) Every sugar factory shall set apart the amount received from bankers by way of additional credit on the quantity of buffer stock of sugar and credit the amount so set apart to a separate account with the same banker;

(b) The amount credited to the separate account shall not be used by the sugar undertaking for any purpose other than for payment of price, including arrears of price payable for the sugarcane purchased by the sugar factory.

21.16.5 *Claim to be submitted*

A claim for amount due to a sugar undertaking is to be preferred by the undertaking in Form V to the Central Government, after the end of the preceding quarterly period.

21.16.6 The Central Government may waive the requirement of production of certificate required in Form V.

21.16.7 In case the Bank concerned or the State Government officer certified to a separate account as to the deposit and utilisation thereof for the purpose required, then it is not necessary to furnish certificate from the State Government officer to the subsequent claims, so long as no further additional bank credit is received by the undertaking.

21.16.8 Vide notification dated 21-11-1997, Government have now made provision for grant of loans from SDF for providing inputs for sugarcane development. The main features of the scheme are as under:-

Government may accord sanction of loan for a period of two years from SDF to sugar undertaking in connection with development of sugarcane in its area for the following purposes, viz.,

(a) Purchase of seeds

(b) Purchase of fertilizers

(c) Purchase of pesticides

The loan thus sanctioned shall be passed on to the sugarcane growers in the command area of the mill under a scheme formulated by the mills. The quantum of loan under this scheme will be as under :-

Limit (Rs)	Installed capacity
Upto 50 lakhs	Upto 2500 TCD
Upto 75 lakhs	Between 2500 - 3500 TCD
Upto 100 lakhs	Between 3501 - 5000 TCD
Upto 150 lakhs	Between 5001 - 10000 TCD

The loan together with interest shall be repaid in four half-yearly instalments, that is, in a total period of two years from the date of disbursement. (Source : SDF Section, Ministry of Food)

21.17 Sanction and disbursement of assistance from the Fund

21.17.1 Amount of loan and grant-in-aid sanctioned and disbursed for the period 1985-86 to 1997-98 (upto 30.9.97) from SDF is indicated in Annexure 21.2. It also indicates total amount transferred to SDF, amount disbursed from the Fund upto 30.9.97 and balance funds available in the Fund. Summary of amount sanctioned and amount disbursed for cane development, modernisation and grants-in-aid is given in Table 21.1.

Table 21.1 – Amount sanctioned and disbursed from SDF from 1.4.85 to 30.9.97 (Rs/crores)

Purpose	Amount sanctioned	Amount disbursed
Cane development	496.15	295.28
Modernisation	660.99	569.26
Grants-in-aid	31.76	16.54
Total	1188.90	881.08*

* This excludes subsidy on buffer stock, Administration of SDF and expenditure on National Sugar Institute & Sugar Technology, MAU to the extent of 232.51 crores.

21.17.2 Annexure 21.3 gives Statewise breakup of the loan sanctioned and disbursed for modernisation / rehabilitation and cane development.

21.17.3 Schemes for which the grant-in-aid was sanctioned is given in Annexure 21.4

21.18 **Subsidy for buffer stock**

The position of disbursement of subsidy (Rs/crores) is as under :-

1995-96	1996-97	1997-98
(as on 31.3.96)	(as on 31.3.97)	(upto 30.9.97)
7.72	69.99	67.63

(Source : SDF Section, Ministry of Food)

21.19 The position of recovery of loans sanctioned from SDF as on 30.9.97 is given below:-

(A) **Modernisation / Rehabilitation (Rs/crores)**

Amount disbursed	569.26
Total amount due as on 30.9.97	
Principal	30.02
Interest + penal interest	15.83
Total due	45.85
Total amount received upto 30.9.97	
Principal	21.12
Interest + penal interest	10.82
Total receipt	31.94
Balance due as on 30.9.97	
Principal	8.90
Interest + penal interest	5.01
Total balance	13.91

$$\text{Recovery \%} = \frac{\text{Total amount received}}{\text{Total amount due}} \times 100 = \frac{31.94 \times 100}{45.85} = 69.66\%$$

(B) **Cane Developemnt (Rs/crores)**

Amount disbursed	295.28
Total amount due as on 30.9.97	
Principal	177.71
Interest + penal interest	54.03
Total due	231.74
Total amount received upto 30.9.97	
Principal	121.65
Interest + penal interest	40.04
Total receipt	161.69
Balance due as on 30.9.97	
Principal	56.06
Interest + penal interest	13.99
Total balance	70.05

Recovery % = Total amount received x 100 = $\frac{161.69 \times 100}{231.74}$ = 69.77%

Total amount due

(Source : SDF Section, Ministry of Food)

21.20 **Transfer of collections under the cess to SDF**

Details of yearwise cess collected and transferred to SDF are given in Annexure 21.5. Out of Rs. 2045.32 crores of cess collected upto 31.7.97, Rs. 1936 crores had been credited to the Fund. Out of this, Rs. 1188.99 crores had been sanctioned as loan / grant and Rs. 1113.59 crores had been sanctioned upto 30.9.97.

21.21 **Views of the Committee**

The Sugar Development Fund (SDF) has served very useful purpose by assisting the mills in modernisation and expansion of capacity and cane development. However, the utilisation of resources available in the Fund needs to be further stepped up and its scope further enlarged. The amount utilised out of the fund for research is very inadequate. In the over twelve years' period from 1.4.85 to 30.9.97, only Rs. 32 crores were sanctioned for Grant-in-Aid against which only 16.5 crores were disbursed as Grant-in-Aid for research as against the total amount of Rs. 1189 crores sanctioned during this period and Rs. 881 crores disbursed. If the sugar

industry has to meet the challenge of global competition and modernise itself, the research efforts need to be considerably stepped up. In India, the research in sugarcane and sugar industry is funded mainly by the Central Government in contrast with the position obtaining in most of the major sugar producing countries where such research is mainly funded by the sugar mills and the growers. The research institutes are at present handicapped due to paucity of funds. Liberal grants, therefore, may be allowed from the SDF for projects for research and development of sugarcane and sugar industry. Apart from grants to the Government institutions, the setting up of research institutes by the growers, the mills and the State Governments individually or jointly should also be encouraged by making matching contribution to the extent of 50% of the expenditure. This may apply even to Vasantdada Sugar Institute, Pune which is at present being financed wholly by contribution from the growers. The existing rules / instructions may be modified to allow grants to be given to institutes at regional / State level and the same need not be limited to only the institutes at the national level.

21.22 While enhancing the availability of funds for research, a mechanism should also be evolved for monitoring the progress of research projects financed from the Fund. The projects should clearly indicate the milestones to be achieved on an yearly or half-yearly basis and the progress may be monitored against those milestones so that a mid-term correction may be made in the scope and direction of the project where necessary and, in extreme cases where the project is unlikely to lead to worthwhile results even after modification, the question of discontinuing may also be considered. Where the research institutions are given grants from the Fund on matching basis, adequate representation of the Central Government and the Industry (both ISMA & NFCSF) should be ensured in their management bodies to ensure that the funds are properly utilised for conducting research on matters that would benefit the industry. Department of Sugar & Edible Oils, Ministry of Food & Consumer Affairs, vide its letter dated 29.10.97, has conveyed the decision to set up Committees for periodic evaluation of Grant-in-Aids Scheme financed by SDF as detailed hereunder :-

Typeof units(s)	Cane development projects	Other projects
1. R&D units of sugar factories	A committee of experts from ISR/SBI/STM/NSI/ISMA/NFCSF	A committee of experts from NSI/VSI/IIT/STM/ISMA/ NFCSF/Deptt. of Science & Technology/CSIR
2. Technical institutions, scientific research association, ICAR	A committee of experts from ICAR/STM/ISMA/NFCSF/ State Govt.	A committee of experts from NSI/VSI/IIT/ any reputed individual expert in the concerned field/ISMA/NFCSF/ STM/Deptt. of Science & Technology/CSIR

These Committees may also be entrusted with periodic monitoring as suggested above.

21.23 At present, under Rule 18(1) of the SDF Rules, only such research schemes are to be considered for Grant-in-Aid as are recommended by the Standing Research Advisory Committee of the Development Council for Sugar Industry established under Section 6 of Industries (Development & Regulation) Act, 1951. In actual practice, this is not being done as the Development Council meets very infrequently. The Rules may, therefore, be modified to bring them in conformity with the prevailing practice. The proposals for grants for research may, in future, be referred to two apex organisations of the industry, namely, NFCSF and ISMA for their comments in a time-bound period, say within a month, before these are considered by the Standing Committee of the Fund so that the views of the industry in regard to suitability and usefulness of the proposed research are taken into account before the project is sanctioned. Such proposals which have not been sponsored by ICAR, may similarly be referred to ICAR also for its comments in a time bound period.

21.24 Sick units as declared by BIFR are already considered for assistance from SDF provided the unit has not become sick on account of deliberate negligence / mismanagement or disposal of assets etc. as mentioned in para 21.6.11 above. Since cooperatives are not covered by BIFR and we are recommending in Chapter 29, a mechanism for determining the sickness in the cooperative sugar mills and evolving a package for rehabilitation of potentially viable sick or closed sugar mills in the cooperative sector, after the mechanism has been set up, the assistance from SDF may also be provided to potentially viable sick cooperative sugar mills as a part of the rehabilitation package, provided the sickness has not been due to deliberate negligence / mismanagement or disposal of assets etc.

21.25 It is necessary to provide adequate pollution control measures in the interest of health of the population and conservation of land and water resources. These measures are, however, expensive and are non-productive for the mills and also involve recurring expenditure for their maintenance and operation. Loans for pollution control measures to the extent of 75% of the estimated cost may, therefore, be advanced from the Fund, even if these are not part of a comprehensive modernisation scheme. These loans should carry a concessional rate of 6% p.a. interest which is applicable at present to projects sponsored by TIFAC.

21.26 According to earlier guidelines, a sugar factory had to be operational for a minimum of seven crushing seasons, including trial crushing season, before it became eligible for loan for modernisation / rehabilitation of their plant and machinery. This period has been reduced to three years (including trial crushing season) as a result of recommendation of the Standing Committee meeting held on 8.10.97, vide Ministry of Food & Consumer Affairs' letter dated 29.10.97. The period of three years appears to be too short a period after installation of a mill to consider it for a concessional loan from SDF for its modernisation. It can lead to misuse by initially installing a factory with lower actual capacity and then expanding it by taking concessional loan from SDF. The earlier provision for considering a unit for loan for modernisation after minimum of seven years of its installation appears to be more reasonable and needs to be

followed and loans from SDF after the expiry of three years may be allowed only in exceptional cases, for example, for adoption of technology which was not available when the plant was set up or for introducing new innovations like schemes sponsored by the Sugar Technology Mission (STM).

21.27 At present, cane development loans are not available to factories which are under construction. Considerable expenditure on cane development work often needs to be done during the construction phase so that adequate cane of proper varieties becomes available when the factory is completed. In the absence of requisite funds for the purpose, many factories do not have adequate cane when they start crushing and it takes considerable time before they can obtain cane for full utilisation of their capacity. This involves them in losses in the earlier years and often results in sickness. Cane development loans may, therefore, be sanctioned for the factories under construction also. However, the items of capital nature which can be financed as a part of the project cost and thus which can be financed by the normal banking / cooperative institutions need not be covered by such loans. These loans may be advanced only when the machinery has been ordered and the civil works have been started to avoid their misuse. Necessary provision for the same may be made in the Rules.

21.28 The sugar factories are finding it difficult to obtain loans for the cane development work on account of insistence on bank guarantee or guarantee by the State Government. It has been reported that the banks are generally unwilling to stand guarantee for the loans unless 100% funds are kept with them as lien and the State Governments are also now reluctant to offer guarantee even in the case of cooperative sugar factories. In any case, it has not been possible to enforce the guarantees by the State Governments for recovery of such loans. At the same time, it is necessary to have adequate security to ensure recovery of these loans. It is, therefore, suggested that these loans may be granted on the security of second charge on the assets provided the value of the assets is more than the amount of loan due under the first charge and sufficient balance is available to provide security for the SDF loan.

21.29 The mills are at present allowed moratorium of three years for repayment of cane development loans. During tour of the teams of the Committee to various States, the growers had stated that in most cases, this benefit is not passed on to the growers. There may be practical difficulties in the mills allowing the period of moratorium to the growers as some of the growers may stop supplying the cane to the mills during this period and it may then become difficult for the mills to recover the loan advanced to them. The Committee would, therefore, suggest that it should be provided in the condition for grant of this loan that the amount of principal and interest received during the moratorium period will be utilised only for the purpose of cane development by the mills.

21.30 In some of the areas, cane development and supply of cane by the growers to the mills is hampered because of non-availability of infrastructure facilities such as road, culverts,

bridges, means of irrigation such as wells and tanks etc. The factories would normally not be able to undertake this expenditure and may also not be willing to do so as its benefit would also go to the farmers in the area other than the cane growers. Loans from the Fund may, therefore, be sanctioned on priority basis for such infrastructure development schemes, wherever these are needed.

21.31 The loans from SDF may also be utilised for trying out innovations which may be helpful to the entire industry. For instance, loan assistance may be provided for setting up of laboratory for cane testing by the mills which may be willing to introduce the system of payment of cane price on the basis of sucrose content as determined by the test or setting up of such laboratory by an independent agency. We have also recommended in Chapter 23 loan assistance from SDF for purchase of baling machines for baling of cane trash by the sugar mills who may make these available to the growers for baling of surplus trash.

21.32 It was represented to the Committee during visits of its teams to the States that some of the factories do not utilise the loans advanced for cane development and instead use these for other purposes. It is also suggested that a Committee comprising of representatives of the growers, the mill and the State Government may be set up at the factory level to ensure that the funds advanced from SDF for cane development are utilised only for this purpose. The representatives of the growers may be selected by the State Government. After their representative associations are set up as suggested in Chapter 15, these may be selected by such associations.

21.33 There is no justification for advancing loans from the Fund for setting up distilleries, paper mills etc., as these are separate industries although these utilise the by-products of the sugar industry. Even when these units are set up by sugar mills, they should not be given this concessional assistance in the interest of fair competition with other units in those industries.

21.34 There are large unutilised balances in the SDF amounting to Rs. 822 crores vide Annexure 21.2. These do not include repayment of principal amount of SDF loan and interest thereon by sugar mills. These amounts should also be included to arrive at a correct position about the total amounts which are available in the Fund. These balances at present do not earn any interest. Interest on these balances at the rate paid by the Government of India on its borrowings may also in all fairness be credited to the Fund.

Chapter 22

Sugar Incentive Schemes

Introduction

22.1 There had been steady increase in the installed capacity of the industry since 1950-51 (Ist Five Year Plan) and at the beginning of the Fifth Plan on 01.04.74, 229 factories were in position with an installed capacity of 43.06 lakh tonnes. As against a licensed capacity of 55.67 lakh tonnes as on that date, capacity to the extent of 14.61 lakh tonnes remained unimplemented. In order to meet requirements due to rising consumption and export, the target of production at the end of the plan period was fixed at 60 lakh tonnes. Additional capacity to the extent of 18.52 lakh tonnes comprising new factories and expansion in existing units was licensed, adding upto a licensed capacity of 74.19 lakh tonnes. There was a sharp rise in cost of plant and machinery, and under the policy of partial control, viability of projects was not assured. There was apprehension that aditional capacities may not fructify in the absence of loans from financial institutions. In order to find a solution to the problem, Government constituted a Committee under Chairmanship of Shri S.V. Sampath, the then Joint Secretary in the Department of Food, Ministry of Agriculture, on 5th April, 1974.

Sampath Committee, 1974

22.2.1 The Committee examined the issue as per the terms of reference covering costs of establishing new factories of 1250 TCD, minimum economic size of a new sugar factory and suggest incentives and other measures to make new factories economically viable. After examining the issue, the Committee recommended the following incentives:-

(i) New sugar factories may be allowed a rebate of excise duty at Rs. 40/- per quintal upto a particular production ceiling as per formula given in the report.

(ii) State Governments may be persuaded to exempt new factories from payment of purchase tax on quantum of cane crushed to achieve production eligible for excise duty rebate.

22.2.2 The Committee did not recommend any incentives for expansion projects. The report of the Committee was not acted upon by the Government.

1975 Incentive Scheme

22.3.1 Government constituted an Inter-Ministerial Group to recommend an appropriate incentive scheme. The group assessed the profitability of new/expansion projects over a period of 15 year under partial control policy. Because of steep project costs leading to high depreciation and interest liability on loan component, deficits were projected. The deficit/profit over 15 years was converted into current value by discounting them. By diversion of levy into free sale quota and excise duty concession, additional income representing difference between levy and free sale price and corresponding excise duty was created and after discounting to current value, was matched with deficit. Incentive free sale quota was so decided that discounted deficit and income matched. The Group recommended an incentive scheme as summarised below :-

(i) Diversion of part of levy sugar quota as free sale so that extra income by way of difference between levy and free sale price is available to the unit.

(ii) Collection of excise duty by the mills as applicable to free sale and payment of duty to Government as applicable to levy and retention of difference by the mills.

22.3.2 The above incentives would generate additional income to the units and the same could be used to repay the term loans taken, so that they become viable eventually. Based on the recommendations of the Group, Government announced the first incentive scheme by a circular dated 6th December, 1975. The salient features of the scheme are given in Table 22.1.

Table 22.1 - Salient features of Incentive Scheme, 1975

Serial #	Operative parameters	New factories	Expansion project
1	Duration of incentive	5 years	6 years
2	Classification of States		
	i) High Recovery Area	5 year average recovery before 1975-76 above 10%	
	ii) Medium Recovery Area	9% and above but below 10%	
	iii) Low Recovery Area	Below 9%	
Note : Where any zone had average duration of more than 180 days, it would be fitted in higher recovery area. Tamil Nadu was placed in Medium Recovery Area.			
3	Period of coverage of incentive	Commencing production between 1st November 1975 and 31st October 1980 for new and at expanded capacity for expansions. (5th Five Year Plan period)	

4	Eligibility	Basic cost of plant & machinery including excise duty on FOR basis to be between Rs. 200 to 400 lakhs.	
5	Incentive freesale quota	Distinct for each recovery area and linked to plant cost in slabs of 20 lakhs from 200 to 400 for 5 years	Distinct for each recovery area for 6 years
6	Applicability of freesale quota	On entire production in a season.	On excess production, assessed as difference between current production and base production (average of 3 years' production prior to completion of expansion
7	Excise duty rebate	Collect excise duty as applicable to freesale on incentive quantum, remit as applicable to levy and retention of difference.	

(Source : Directorate of Sugar, GOI)

22.3.3 The 1975 scheme was partially modified vide circular no. F 27(6) 78-PC dated 7th February 1976 as per details given below:-

(i) Eligibility to incentive was advanced to 01.10.73 from 01.04.74 for factories which commenced production prior to 1st November, 1975.

(ii) A minimum limit of Rs. One crore for the cost of expansion project was introduced.

(iii) Second hand plant and machinery were debarred from being taken as part of cost for new and expansion projects.

(iv) Incentive period for expansion was reduced from 6 to 5 years.

22.3.4 The incentive scheme could operate only under policy of partial control. When sugar was decontrolled from 16th August 1978, the scheme lapsed as a consequence thereof.

1980 Incentive scheme

22.4.1 Policy of partial control was reimposed from 16th December 1979 and it was possible to resume the incentive scheme. Government appointed an Inter-Ministerial Group on 26th February 1980 to review the scheme of incentives. The Group submitted its report in May 1980,

more or less following principles earlier adopted by the first Group. Government announced a revised incentive scheme on 15th November 1980, covering Sixth Plan licences. It was more or less similar to the earlier 1975 scheme in regard to key operational parameters. The coverage of new and expansion factories was as per Table 22.2.

Table 22.2 - 1980 Scheme Features

	NEW/EXPANSION	COVERAGE
1.	Commencement of production at new/expanded capacity	On or after 1st October 1980. Already licensed and commencing production within 39 month from December 1980. Licences issued in 6th Plan period starting production within 39 months from date of issue of letter of intent/licence.
2.	Fitment of factories covered under 1975 scheme	Those who have not availed of 1975 incentive scheme would be covered. New units commencing production between 01.10.73 and 01.10.75 would get incentive for balance period. Those who availed of incentives partially under earlier scheme would be fitted in new scheme and given incentive for balance period.

22.4.2 All the other operational conditions of earlier schemes and subsequent modifications were made applicable here also.

Sliding scale of incentive

22.4.3 Under the original scheme, factories failing to commence production as new or at expanded capacity within 39 months were denied incentives totally. In several cases, due to reasons controllable or non-controllable, factories could not adhere to the time schedule. Government, vide circular dated 11.11.85, introduced a sliding scale of incentives. By this procedure, incentive period was reduced progressively for one year, two years etc. linked to extent of delay.

Third Inter-Ministerial Group, 1984

22.5 The incentive scheme announced in November 1980 was reviewed and found to be adequate. From 1981-82, free sale prices declined, reducing the value of incentives and project cost for a new unit rose to Rs. 10 crores as against Rs. 6.5 crores assumed earlier. Government constituted an Inter-Ministerial Group on 27th July 1983 to review the current scheme. The Group finalised its report and submitted it to Government on 30th

June 1984. While the report was under consideration, there were changes in levy free sale ratio and further increase in project costs. It became necessary to review the report and hence this was not acted upon.

Fourth Inter-Ministerial Group 1986

22.6 Government constituted the Group on 7th March 1986. The Group submitted its report in September 1986. This was accepted by the Government for appropriate action.

Incentive Scheme 1987

22.7.1 Government announced an incentive scheme covering licences issued during the Sixth Five Year Plan period (1980-85). The scheme was similar to earlier one except for some modifications in a few conditions, introduced subsequently. They are summarised below.

(i) Sliding scales of incentives for new units linked to project cost has been replaced by a uniform incentive with a minimum project cost stipulation.

(ii) Incentives were allowed at 100% for the entire incentive period for new licences.

(iii) For entitlement to incentives, a ceiling limit of 27,500 tonnes was prescribed and production beyond it was subject to normal levy free sale ratio in force.

(iv) Achievement of efficiency norms in operation as prescribed was made a precondition for full incentives with graded reduction for non-achievement of norms from 1988-89 season.

(v) An alternative sliding scales of incentive for delay linked to date on which loans were granted by financial institutions was introduced.

Fifth Inter-Ministerial Group & Incentive Scheme, 1988

22.8 Government reviewed the minimum economic capacity of sugar industry and raised it from 1250 TCD to 2500 TCD for licences to be issued during the Seventh Five year Plan period (1985-90). Consequently, the project costs rose very sharply and earlier incentives scheme needed a revision. A fresh inter-ministerial group was constituted to study the then current situation and recommend a suitable incentive scheme. The Group submitted its report in February 1988 to Government. Government analysed the report and announced a new incentive scheme for 7th Plan licences vide circular dated 26th December 1988. While the earlier three schemes of 1975, 1980 and 1987 were inter-related, the 1988 incentive scheme was a new one without any linkage with past schemes. The scheme of incentives essentially remained the same. There were some important departures from earlier scheme and they are shown in Table 22.3.

Table 22.3 - Major departures of Incentive Scheme 1988 from Incentive Scheme 1980

	Features	Provisions of 1988 scheme
1.	Restructured unit	
	i) Below 1250 TCD as on 01.10.85 but expanding to 1750 TCD and above	They were granted incentives as applicable to new units on entire production at applicable percentages as it was considered that these were virtually new factories with major additions.
	ii) Between 1250 TCD and 1500 TCD set up before 01.10.62 and not carried out any modernisation/ expansion upto 01.10.85, expanding to 2500 TCD and above.	
	Both after obtaining licence or endorsement on licence under Press Note 15 of 1986	
2.	Recovery Area	Instead of 3 tier system, country was fitted into two Recovery Area - High and Others
3.	Excise duty relief	Incentive in the form of excise duty was withdrawn.
4.	Ceiling	Incentive was available on production upto 55,000 tonnes per annum.
5.	Efficiency	Full incentive entitlement was subject to achieving norms of efficiency as laid down with graded reduction for non-achievement.
6.	Simultaneous incentive for expansion projects	Sugar factory availing of incentive as a new unit under 1987 scheme was entitled to this as well as expansion incentive and both incentives were concurrent.

(Source : Directorate of Sugar, GOI)

Incentive Scheme 1993

22.9 By a Press Note, Government withdrew the 1988 incentive scheme from 7th September 1990, even though it was applicable to letters of intent/licences issued upto 30th September 1990. It was also mentioned that a fresh incentive scheme would be announced. A new incentive scheme covering licences issued / to be issued during the period 07.09.90 to 31.03.94 was announced on 10th March 1993. A copy of circular incorporating subsequent amendments is given in Annexure 22.1. The basic feature of the scheme was more or less identical to 1988 scheme, except for enhancement of free sale quota to 100% for new and expansion projects. Benefits of the scheme was extended to cover units licenced from 01.10.85 to 06.09.90 as an

alternative, provided they went into production on or after 7th September 1990.

Incentive Scheme 1997

22.10 Government requested Bureau of Industrial Costs & Prices (BICP) to recommend an incentive scheme for licences to be issued during 8th Plan period from 01.04.94. BICP submitted a report in November 1995. This was reviewed by Government and a new incentive scheme was announced on 28th February 1997 and it is reproduced in Annexure 22.2. The basic features continued to remained unaltered. Important features are shown in Table 22.4.

Table 22.4 - Important features of 1997 Incentive Scheme

Features	Provisions of 1997 scheme
1. Restructured unit	Omitted. These category of units will get incentive as expansion.
2. Expansion limit	Incentives allowed for the first time to expansion from 2500 TCD to 5000 TCD
3. Option	Units covered under 1993 scheme could opt for that of 1997, provided projects are completed by 31.12.99.
4. Project implementation	All units should complete the project within a period of 3 years from the date of letter of intent/licence.
5. Sliding scale of incentive	Curtailment of incentive for delay beyond specified period has been deleted and factories will lose incentives in toto for delays beyond three years.
6. Ceiling on incentive for expansion	Ceiling quantities of sugar eligible for incentive would be linked to excess production on which incentive quota is granted.
7. Scale of incentives in terms of free sale quota	New units : 100% for 5 years in High Recovery Areas and 8 years in Other Recovery Area Expansion projects : for 5 years in all cases - 85% for expansion upto 2500 TCD & 80% beyond 2500 TCD in High Recovery Area. 100% for expansion upto 2500 TCD & 90% beyond 2500 TCD in Other Recovery Area.

(Source : Directorate of Sugar)

22.11 The earlier incentive schemes - 1975, 1980 and 1987 have run their course. 1988 incentive scheme is also at the end of its tether with a handful of factories availing of incentives as on date and 1997-98 season could be the terminal year. 1993 incentive scheme is in active stage of utilisation by sugar factories. 1997 scheme is yet to take off.

22.12 Normally no special incentives are required to be provided for attracting investment in a particular industry. Investment flows into the industry to meet growth in demand which provides the necessary return on investment. The incentive scheme had been started in the Sugar Industry because the industry did not offer adequate return on investment in view of the policies followed by Government although there was steady rise in demand due to increase in population and per capita income. The financial health of the industry continues to be poor as a result of those policies. The incentive scheme has, therefore, had to be continued all this time since 1975 to attract investment for setting up of new units and even for expansion of the existing units. The scheme has, however resulted in a number of adverse consequences.

22.13 The scheme permits the sale of 100% production in the free sale for specified periods in case of new units (5 years in high recovery areas and 8 years in other recovery areas under the present scheme), while the existing factories have to supply 40% of its sugar in levy at price which is below the cost of production. The policy thus discriminates against the older mills which already have higher costs due to old machinery and outdated technology. The new mills are thus able to offer unhealthy competition to the existing factories and divert cane from them on the strength of the additional freesale quota enjoyed by them under the incentive scheme. The scheme thus adversely affects all the existing units and particularly those in the vicinity of the new units. It is for this reason that the Standing Committee on Food, Civil Supplies and Public Distribution (1995-96 - 10th Lok Sabha) in its 15th Report on Sugar observed in para 28 under part 'B' that "the Committee are of the view that old / unexpanded / unstructured units are already under stress due to uneconomic viability conditions and even then they are required to meet the levy conditionality of Public Distribution System. On the other hand, the new units / restructured units etc., which are technologically far more superior have been given such exemption. The Standing Committee have thus come to the conclusion that much of the distortions in the sugar industry has been on account of liberal incentive of free sale quota." The Standing Committee has accordingly

recommended that Government should not exempt any sugar mill from levy obligation under any circumstance and instead give excise rebate as an incentive to new and restructured and expansion projects.

22.14 The incentive scheme has been drawn up so as to bridge the gap between the funds required for repayment of interest and principal of the loans from financial institutions and the amounts that would be generated without any incentive. This has led to higher rate of incentives being offered for new mills in lower recovery areas as compared to the new units to be set up in high recovery area as the deficit in the case of the former, which has higher cost, would be greater than in the case of the latter. Under any rational economic policy, the setting up of new units should be encouraged in areas where the cost of production would be lower. The incentive schemes have deliberately tried to do just the opposite, that is, they have deliberately encouraged setting up of new units in areas where the cost of production of sugar is comparatively higher. This has resulted in higher overall cost of production of sugar in the country.

22.15 The cost of creating additional capacity by expansion is much lower than of creating additional capacity of the same magnitude. ISMA has estimated in the above mentioned memorandum the cost of expansion of existing factories to be nearly 50% of the cost of setting up of the new sugar factories. The existing size of sugar plants in the country is much lower than those in other major sugar producing countries. Even when allowance is taken of the difference in the conditions, the size of plants in India is much lower than the optimum size and considerable economies of scale can be availed of if the size of the plants is increased. The World Bank has estimated* that the milling cost can go down by about 40% if the size of the plants in India is increased to economic size. Even if this estimate may be somewhat exaggerated, it is obvious that considerable reductions in cost of production can be achieved if the existing units are encouraged to expand. The incentive schemes by offering higher incentives for setting up of new units rather than expansion of capacity (again on the same principle of trying to bridge the gap between requirements of funds for repayment of loans and the likely generation of such funds) tend to encourage the setting up of new units instead of expansion of the existing units. In the absence of the incentive scheme, in the normal course, the increase in demand would be met by increase in expansion of the existing units rather than setting up of new units as the former would be more

economical leading to the development of a more efficient industry in the country.

22.16 The incentive schemes have all along provided for a minimum expenditure to be incurred on setting up of the new unit or expansion of an existing unit to qualify for grant of incentive. This had obviously been done to prevent fraudulent claims. However, these conditions also ensure that the entrepreneurs were not even free to attempt reduction in cost as they would thereby lose the incentive. Similarly, the limitation of the incentive to units only upto a certain prescribed size prevented the setting up of units of larger capacities or expansion of existing units beyond the prescribed limits. The scheme has thereby tended to encourage the setting up of a large number of smaller capacity plants and prevented the industry from fully utilising the economies of scale.

* World Bank Unpublished Draft Report on 'India's Sugar Industry - Priorities for Reforms' Vol I, April 1997 Executive Summary para 4.

22.17 Instead of providing artificial props for investment, the proper policy would be to create conditions for improving the financial viability of the industry so that investment is automatically attracted into the industry. The need for such a review of the policy framework has been obscured for so long because of the investment attracted into the industry through the incentive scheme.

22.18 The incentive schemes have played a useful role in the past in attracting investment for setting up of new sugar mills and expansion of capacity of existing mills. However, in view of the adverse effects of the scheme as mentioned above, we recommend that the scheme should be abolished in case of letters of intents / licences to be issued in future. Efforts should, instead, be made to make the industry financially viable by adopting suitable policies, which have been recommended at appropriate places in this report.

22.19 A number of units have been established on the basis of incentives. Some of the units previously set up have not yet completed the period for which they were entitled to incentives under the scheme on the basis of which the unit have been set up. Some of those who have obtained letters of intent may also have started construction work or taken other action for implementation of their LOI on the understanding that they would be entitled to incentives on completion

of their units. On ground of equity, incentives should be allowed to all those units which are enjoying such benefits for the balance period of their entitlement and also to new units where letters of intent / licences are issued before the issue of Government orders for discontinuance of the incentive scheme, provided they are implemented within the period allowed in the incentive scheme. We have recommended total decontrol of sugar prices in a phased manner in chapter 13. After the decontrol, these units may be compensated for the loss of the incentive by grant from the SDF at the rate of difference between the ex-factory price of free sale and levy sugar, on eligible quantum of production for the period provided in the present scheme in case of new units and expansion projects, or for the balance period under the relevant scheme in case of units which have already availed of incentives for some time. The necessary amendment in the SDF Rules may be made to provide for such grant. If there is any difficulty in compensating this loss from the SDF, either because of inadequacy of funds available in the SDF or any legal complication, the expenditure on this compensation may be met by levy of a specific cess for the purpose for a limited period during which the grant would be payable. This cess money should remain under direct control of Department of Sugar and Edible Oils, Ministry of Food & Consumer Affairs, to ensure expeditious disbursement of compensation to such units.

Chapter 23

Policy Towards Khandsari and Gur

23.1 As observed in Chapter-6, khandsari and gur industries play a vital role in terms of providing traditional sweeteners to poorer sections of population, for providing outlets for disposal of cane to cane growers in areas where sugar mills have not been installed or have inadequate capacity and for providing seasonal employment to a large proportion of rural population. In areas where sugarcane availability is not adequate to sustain a modern sugar mill of economic size, these may be economically appropriate means of meeting the demand for sweeteners.

23.2 At present, the quantity of sugarcane crushed by khandsari and gur units is not directly estimated but is derived by deducting the sugarcane utilised by the sugar mills and the quantity estimated to be used for seed, feed and chewing from the total estimated sugarcane production during the year. In view of the importance of this sector, it is recommended that direct estimate of cane crushed by khandsari units may also be made once in five years to obtain more realistic figures.

23.3 On the basis of present estimates sugarcane utilised for production of gur and khandsari has steadily come down from about 55% of total sugarcane production in 1980-81 to 26.5% in 1995-96 (Table 6.28). The estimated per capita consumption of khandsari and gur has likewise declined from about 15 kg per annum in 1960-61 to 9.2 kg in 1995-96 (Annexure-7.4). With growth in income and urbanisation the consumption of gur and khandsari is likely to come down further.

23.4 Crushing of cane by khandsari units involves lower recovery i.e., around 7% (vide Table No.6..12) as against about 10% in case of sugar mills (Para 3.6.1). The khandsari units may nevertheless be able to function profitably due to various concessions allowed by Government viz., exemption from levy, lower excise duty on molasses and exemption from the provision regarding payment of SMP for cane. Khandsari units are also exempt from excise duty on sugar Sales Tax is levied on khandsari sugar but its incidence is much less. No new licence for khandsari units should therefore be allowed within the reserved area of a sugar mill and within 25 kms from the site of a sugar mill including a mill for which licence has been issued, so that the sugarcane produced within the reserved area of the mill is available to the mill for crushing and the loss in sugar production involved on account of its crushing by khandsari units is avoided.

23.5 While the installation of new khandsari units within the reserved area of the mill may not be permitted, efforts should also be made to modernise the khandsari units which are already in existence. There may be some justification for not permitting the existing khandsari units located within the reserved area of sugar mill to instal vacuum pans as that would involve

utilisation of larger quantity of cane by the khandsari unit thereby depriving the sugar mill of adequate availability of cane. Khandsari units located outside the reserved area of the sugar mill may, however, be allowed to instal vacuum pans and boilers and modernise and expand without any restrictions. No permission should be necessary for the purpose. The units which instal vacuum pans will be covered by the definition of sugar mills and will, therefore, need a licence as required for the setting up of a new sugar mill. However, no levy may be imposed on these units up to crushing capacity of 500 TCD as their cost will be high and they may not be able to bear the burden of levy. Obtaining levy from such small units may not even be administratively feasible apart from its placing excessive burdens on such small units. In order to prevent understatement of capacity to avail of this concession, ceiling of 60,000 tonnes of cane crushing in a season may also be imposed. The units with crushing capacity in excess of 500 TCD may be required to supply sugar under levy subject to the incentives available to new units. These may also be required to pay excise duty at 50% of that imposed on the mills in view of their smaller size. The sugar produced by such units will, of course, become exempt from payment of sales tax which is at present levied on khandsari.

23.6 In order to aid the modernisation of the existing khandsari units, Khandsari Development Fund should be set up at the State level out of cane cess paid by khandsari unit. We have recommended separately in Chapter-26 that where purchase tax is levied on cane by a State Government particularly in the subtropical region, it may be converted into a cess so that its proceeds can be utilised for development of sugarcane. The cess may be utilised, among other things, for advancing soft loans to khandsari units for meeting part of the equity requirements for obtaining term loans for modernisation and expansion of these units. In order to provide incentive to units in reserved areas of the mill to move outside this area, which will remove the conflict of interests between the khandsari units and the sugar mill, this assistance may be provided only to units located outside the mills' reserved area. The Technology Mission on Sugar Industry, set up by the Government of India, may be asked to help khandsari units also in adoption of improved technology. The representatives of khandsari units in their discussion with the Committee have stated that IIT, Kanpur and Jawaharlal Nehru University (JNU) have made certain researches for technological upgradation in the khandsari industry. Sugar Technology Mission should interact with them to use this technology for the benefit of khandsari units.

23.7 We have recommended separately in Chapter-14 that SMP should apply to sugarcane purchased by khandsari units also so that the growers are assured of the minimum price whether they sell the cane to the sugar mills or the khandsari units. As recommended in Chapter 14 (para 14.10.5) this may, however, be enforced only during the normal crushing season.

23.8 The representatives of the khandsari units have represented that many vertical power crushers installed ostensibly for manufacture of gur also produce khandsari and they offer unfair competition to the khandsari units as they are not subjected to any control or taxation although they produce khandsari on commercial scale. There is merit in this contention. Units which use

more than one vertical power crusher in a premise or close proximity should be treated as commercial and be liable to pay sales tax on khandsari.

23.9 The gur industry suffers from three main deficiencies - (i) There is much lower recovery of juice as the method of production continues to be outmoded and conventional, (ii) Gur has short shelf life and (iii) It is highly sensitive to moisture. There is, therefore, imperative need to adopt better equipment for juice extraction and packaging of gur. Negligible efforts have been made by the State Government and the Central Government to improve the industry which is a source of income for a large number of farmers, is rich in nutritional value (Table 6.30) and also has export potential. The representatives of Khadi and Village Industries Commission (KVIC) stated during discussion with the committee that the main obstacle which is being faced by the gur manufacturers is the extreme difficulty in obtaining licences for vertical crushers and some States have put restrictions even for grant of licence for horizontal crusher. Khandsari and Village Industries Commission has a scheme to provide loan upto Rs.10 lakh to an individual for bringing about improvement in the production of gur by using better methods and improved equipment. 25% of it is interest-free loan for two years which is converted into grant on establishment of unit. In case of SCs/STs/OBCs, 30% of the loan is interest free for two years and the same is converted into grant on establishment of the unit. For cooperative societies loan is sanctioned upto Rs.25 lakhs. KVIC in their discussion with the Committee have stated that the major problem is that loan can be advanced only to mills possessing power crushers and the State Governments normally do not grant licence for these crushers in the absence of which they cannot obtain power connection and KVIC is unable to advance any loan under the Scheme. In view of this position, we recommend that the gur units using only one vertical crusher with upto 5 horse power connection may be delicensed.

23.10 There is heavy national loss on account of lower extraction of juice from cane in the process of manufacture of gur. Representatives of the Department of Small Scale Industries in discussions with the Committee stated that high capacity crushers, for example, six roller hydraulic crushers have been developed which can bring much better results and improve the percentage of juice extraction. The colour of gur can also be considerably improved by using crushers made of stainless steel. There is need to educate the farmers about the improved methods of gur manufacture and financial assistance available from KVIC. It is suggested that the extension work for educating farmers about the improved methods of gur production and storage and facilities available from KVIC should be undertaken by Block Development and Panchayat Officers of the State Government and the village level workers under them. Research efforts by the coordinated research project on khandsari and gur coordinated by the Indian Sugarcane Research Institute Lucknow also needs to be intensified and it should cover the improved extraction of juice, increasing its shelf life and, improvement in the quality of gur on priority basis.

23.11 In order to avoid loss of sugar during juice extraction in the process of gur manufacture, sugar factories may also be permitted to manufacture jaggery or sell juice to

jaggery producers. They may, however, be required to pay excise duty on this jaggery or juice at the same rate as levied on sugar to prevent evasion of excise duty. This would also provide requisite protection to gur manufacturers against competition from mills.

23.12 Ministry of Food & Consumer Affairs issued notification dt. 27-10-97 which required that only a licensed dealer could purchase sell or store Gur and imposed limit of 250 qtl. on stock holding and of 10 days for turnover. This order was subsequently rescinded. Like sugar, Gur is manufactured during 4-5 months in a year and has to be consumed throughout the year. However, while sugar mill can store Sugar, Gur manufacturers have no capacity to do so and Gur to be necessarily stored only by dealers. Imposition of restriction on stock holding of Gur by dealers would, therefore, seriously affect the producers of Gur, and make it impossible for them to carry on their operation. It is therefore suggested that in order to avoid hardship to Gur manufacturers, who are generally farmers themselves, no limits on the stocks of Gur to be held by dealers or period of its turnover may be imposed in future.

23.13 The information base for the gur industry at present is very weak. Most of the information available is based on the study carried out by National Council of Applied Economic Research during 1994-95. However, as stated in para 6.2.1, the field surveys of that study were organised at the end of 1994-95 crushing season when the gur units run by the farmers themselves for making gur out of their own sugarcane had generally stopped functioning. It is, therefore, suggested that another study on the gur industry may be got conducted now which apart from indicating the comparative position about the condition of the industry during this period of four years will also be more dependable for the position of the industry as a whole. It needs to be ensured that the study now should be conducted during the course of the season so that bulk of the gur manufacturing units operated by the farmers for crushing their own cane are also studied.

Chapter 24

Utilisation of by-product

24.0 The value addition to by-products can be an important route for improving the economy of the sugar industry.

The main by-products of the sugar industry are the following :

i) Bagasse

ii) Filter Cake

iii) Molasses

The other minor by-products are :

i) Green tops

ii) Cane trash

iii) Spent wash

iv) Flue gas

v) Furnace ash

Adiagramatic presentation of various by-products of sugar industry is shown in fig. 24.1

Production of sugar in India shows large cyclical fluctuations. This creates unhealthy imbalance which not only affects economy of the sugar industry directly but availability of by-products like bagasse and molasses touches extreme law and high levels. For the healthy growth of the by-product utilising industries, stability of the Sugar Industry is very important. Necessary measures to reduce the cyclical fluctuations in sugar production have been suggested in Chapter 20.

In this chapter, potential of various by-products in making useful financial contribution to the sugar industry is discussed.

24.1 *Characteristics of by-products*

24.1.1 *Bagasse*

Bagasse is the fibrous residue of the sugarcane stalk left after crushing and extraction of juice. It consists of cellulose of woody fibre, water and small quantity of soluble solid, mostly sugar. Average composition of mill-wet bagasse is as under :

—	Fibre (including ash)	—	48-49%
—	Moisture	—	49-50%
—	Soluble Solids	—	1.8-3.0%
—	Minor Constituents	—	0.5-0.6%

Main constituents of the fibre are Cellulose, Potosans, Lignins and Inorganic salts.

Bagasse consists mainly of the following constituents on bone dry basis :

i)	Cellulose	—	45.0%
ii)	Pentosans	—	24.0%
iii)	Lignins	—	20.0%
iv)	Sugar	—	5.0%
v)	Minerals	—	1.0%

Bagasse constitutes 30 to 33% of the cane crushed. For the crushing season 1996-97 total cane crushed is around 130 million tonnes generating about 40 million tonnes mill-wet bagasse. The bagasse is being used as a main fuel to meet the steam requirements of the sugar industry. Only 5-6% bagasse on cane (about 8 million tonnes) is available as surplus to meet the requirements of paper/particle board industry and co-generation.

24.1.2 *Filter Cake*

When cane juice is clarified and filtered, the resulting cake is known as Filter Mud of Filter Cake. The Filter cake contains most of the colloidal matter precipitated during clarification and some occluded non-sugars. The percentage of the filter cake and its characterists and analysis will very depending upon quality of cane and clarification process adopted, which will in turn decide its end use. The filter cake is about 5 to 8% on cane in case of the Carobonation Process and about 3 to 5% on cane in case of Sulphitation Process.

Almost all the sugar factories in India are now adopting Sulphitation Process with continuous filtration except a new Carbonation factories in West U.P. The cake moisture is to the extent of 70 to 80%.

The Sulphitation Process filter cake is more use-ful as a manure due to its Nitrogen. Phosphate and Potash content. its analysis is given on air dry basis as under :

Moisture		—	13-14%
Organic matter		—	63-63.5%

Ash%	—	20-21%
Nitrozen	—	1.5-1.7%
Phosphates	—	4.0-4.2%
Potash	—	0.7-0/8%
CaO	—	10.3-10.6%
Fe_2O_3 & Al_2O_3	—	4.2-4.5%
Sulphates	—	4.3-4.5%

24.1.3 *Molasses*

Molasses is a very important and valuable by-products. it is obtained in the process of sugar manufacture involving repeated crystallisation and centrifugation. The quantity of molasses produced is to the extent of 4.2 to 4.5% on cane. The composition of molasses is ranging as under :

Water	—	18-21%
Sucrose	—	32-35%
Glucose	—	6.8%
Fluctose	—	8-9%
Other reducing sugars	—	2.5-3.5%
Other Carbohydrates	—	3-4%
Ash	—	11-12%
Nitrogenous matter	—	4-5%
Non-nitrogenous acids	—	4-5%
Others	—	0.5-0.6%

There are three different grades of molasses on the basis of percentage of sugar contents in terms of reducing sugar known as Fermentable Sugars.

Grade I	—	50% and above
Grade II	—	47-49.99%
Grade III	—	44-46.99%

The utility value of molasses will depend on the fermentable sugar contents.

24.2 *Other Minor by-products*

24.2.1 *Green Tops*

Cane tops, Tonnage wise, is quite an important. lignocellulosic substrate and a useful material, when green, as good quality roughage and is primarily used for animal feed. The green top forms 8-10% of the millable cane.

24.2.2 *Cane Trash*

The cane trash, depending upon the cane variety, period of the season and the method of harvest varies from 8-12% of the millable cane. At the moment it is being used for the purpose of mulching in the sugarcane fields. However, baling machines have been developed to collect cane trash, bale it and use as fuel in the sugar mill boilers, thereby replacing equivalent quantities of bagasse for its more remunerative use. The economy of its use as fuel has to be worked out.

24.3 *Roots and Stubbles*

The roots and stubbles form 2-3% of the cane crop. These are ploughed back in the soil, where these decompose and add to the much needed organic matter.

24.2.4 *Spent Wash or Effluents*

The residual liquid left after alcohol distillation is called spent wahs. It is very high in BOD and COD contents. However, sugar Mill effluent contains about 1500 mg/1 BOD. Spent wash and sugar mill effluent have however to be treated before discharge on surface or river and should meet various state pollution control board norms.

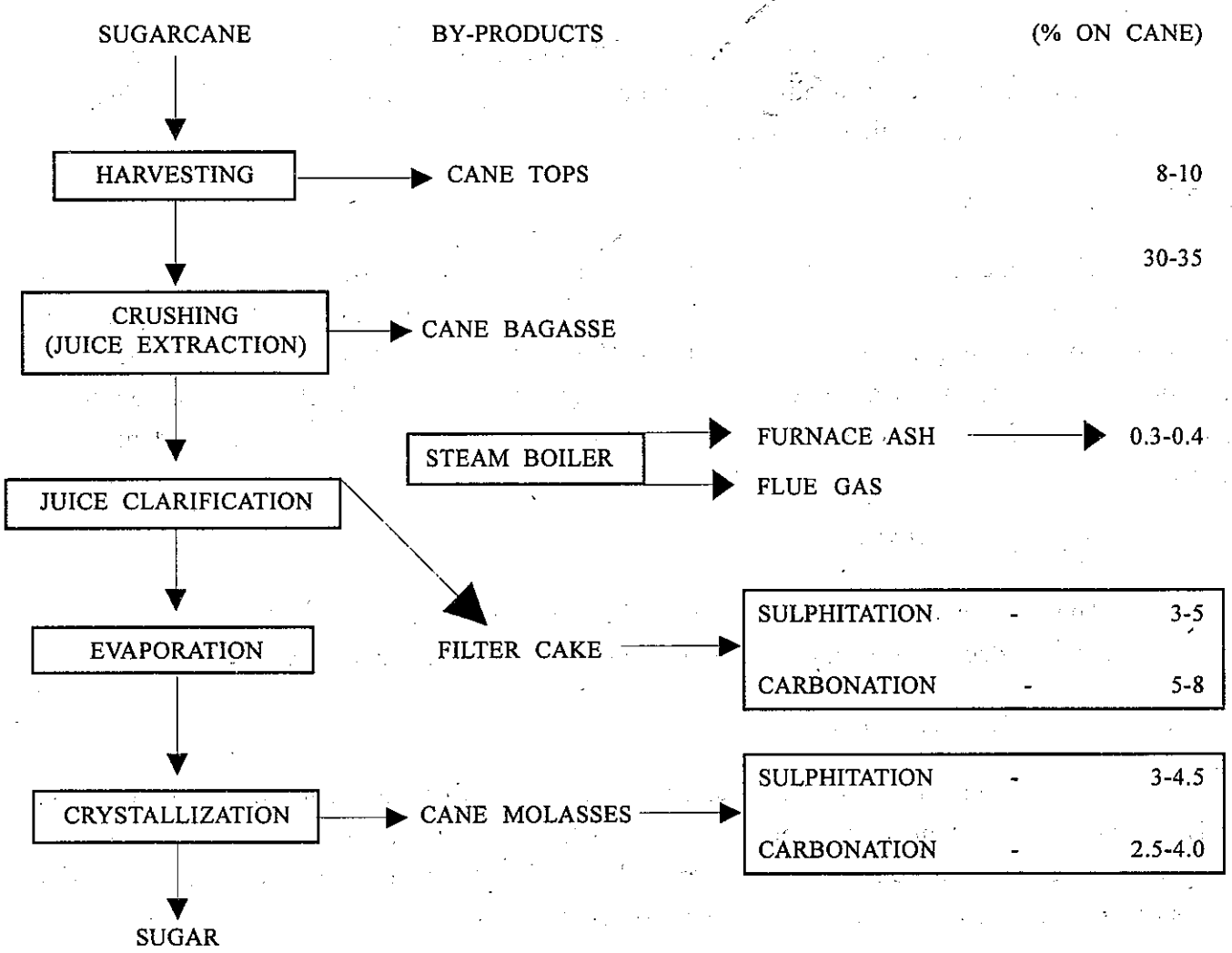
24.3 *Utilisation of bagasse*

It is commonly known that bagasse can be used for producing paper, particle board and for the purpose of co-generation of power. Other products that can be produced from bagasse are Cellulose Acetate, Activated Carbon. Furfural and even Cattle Feed.

In the early 50's technology for pulping bagasse was developed in countries like Peru. Argentina, Mexico, Cuba, U.S.A. etc., for using it as fibrous raw material in the pulp and paper industry. Subsequently technology was also developed for manufacture of particle board., fibre board and furfural from bagasse. In view of these encouraging alternate uses of bagasse, sugar factories started saving bagasse.

Bamboo and hardwoods have been traditionally used in India for the manufacture of various grades of paper. However, with the depletion of these raw materials, non-wood fibres which include bagasse and straws have been playing an important role in meeting the fibrous

BY-PRODUCTS OBTAINED DURING PROCESSING OR SUGARCANE TO SUGAR



requirements of the industry. Per capita consumption of peper in India is at dismally low level of 4 Kgs. compared to average of Kgs. of Asia Pacific. Even high population country, China enjoys a per capita consumption of 24 kgs paper, Table-24.1 indicates current and projected demand for paper, paper-board and newsprint upto the year 2010-11. The projections indicate that there is going to be a widening gap between demand and projected production of various varieties of paper in the country.

Table 24.1 – Demand for paper, Paperboard and Newsprint

(in lakh tonnes)

Year	Paper and Demand	Paper board Projected production	Newsprint		Total	
			Demand	Projected production	Demand	Projected production
1994-95	32.78	24.08	6.00	4.02	38.78	28.10
2000-01	49.50	32.58	9.0	8/21	58.50	40.79
2005-06	67.00	41.61	11.16	—	78.16	—
2010-11	85.50	49.10	13.84*	N.A.	99.34	—

* Projected @ 4.4% p.a.

Source : Development Council for Pulp, Paper and Allied Industries Report 1990

Captive Plantation—not yet Permitted

The raw material scenario for manufacture of paper is not encouraging. There is a long standing demand of the forest raw material based paper industry utilising bamboo and hard woods and forming large sized (over 100 tonnes per day capacity) manufacturing sector. to allocate them part of wasteland (more than 130 million ha. available) for captive plantation. However, strong opposition from NGO's on behalf of large rural/tribal population fearing prevention of access to the forest for animal grazing and firewood collection is a major reason for reluctance on the part of Government in granting permission to this sector for captive plantation. Table 24.2 presents a picture of the present/projected usage of indigenous fibrous raw material and possible production of paper. The figures indicate that the paper industry is banking heavilyon sugar industryfor meeting its future raw material requirements. There is a long gestation period of 7.10 years to utilize captive plantation. So far no tangible decision seems to be in sight for permission to allow such plantation to the private sector. Bagasse is therefore projected to meet 25% of the raw material requirement for paper production by the turn of century as the availability of conventional forest based raw materials has already stagnated.

Table 24.2 – Usage of Indigenous fibrous Raw Material and Possible Production of Paper

(In lakhs tonnes)

Year	Forest based raw material		Mill wet bagasse		Straws Waste paper		Total Possible Production	
	RM	Paper	RM	Paper	RM	Paper	RM	Paper
1994-94	32.10	12.35	21.60	3,606.75	2.25	3.69	2.77	20.97
2000-01	32.10	12.35	36.00	6,007.50	2.50	6.34	4.75	25.60
2005-06	32.10	12.35	43.20	7,207.50	2.50	7.43	5.57	27.62
2010-11	32.10	12.35	50.40	8,407.50	2.50	11.05	8.29	31.54
2015-16	32.10	12.35	50.40	8,407.50	2.50	13.33	10.00	33.25

Source : Development Council for Pulp, Paper and Allied Industries Report 1990 R.M. : Raw Material

The distribution of paper mills in the country according to usage of raw materials for production of pulp and paper for the year 1994 has been stated in Table 24.3. The figure of 36% production from agro-based raw materials consists mainly of bagase with minor quantities of wheat and rice straw and other annual crops.

Tabel 24.3 – Distribution of power mills based on raw material usage

Capacity (lakh tonnes)

	Operating	Lying closed	Total	Prodn.	% Prodn.
Wood based	11.11	3.00	14.11	9.7	38%
Waste paper based	7.96	4.31	12.27	6.7	26%
Agro based	9.11	2.91	12.02	9.3	36%
Total	28.18	10.22	38.40	25.7	100%

Figures for the year 1994

A large number of paper mills widely spread in the country are using bagasse in varying percentages. Annexure 24.1 appends a list of paper mills in various states utilising bagasse with their capacities and quality of paper being manufactured by them.

24.3.1 *International Scenario*

Worldwide cultivated area under sugarcane is estimated at 18 million ha in over 100

countries with 3.8 million ha in India during the year 1994-95. World production of sugarcane is estimated at about 1400 million tonnes generating about 420 million tonnes mill wet bagasse. Assuming only 10% surplus availability and 1:6 ratio of mill wet bagasse to paper, about 7 million tonnes paper can be manufactured. However there are certain specific problems of transportation, handling and storage of bagasse from economic distance for a paper mill. Annexure 24.2 gives a world list of known bagase pulp mills.

According to a recent survey done by Food and agriculture organisation (FAO), the percent growth in the use of bagasse for paper making has surpassed that of all other raw materials over the last decade and the same trend is expected to continue in the years to come. From a pulp capacity level of only 120,000 metric tonnes in 1950, the bagasse pulping capacity in 1992 is expected to be 2.6 million tonnes. Actual bagasse pulp production is expected to reach a level of 2.3 million tonnes. (Atchison Tappi Journal December 1992)

FAO statistics (1990) indicate that the total world pulp capacity was 187.4 million tonnes in the 1988-93 period. (Atchion 1990). Annual fibres account for 15.5 million tonnes per year or 8.27% of the market. China with 8.9 million tonnes and India with 2 million tonnes are among the major users of annual fibres viz. bamboo, bagasse, straws etc. In Latin America bagasse predominates.

There is, therefore, a good scope for the growth of bagasse based paper industry in the countries which are deficient in forest resources but which produce large quantity of bagasse. However, means to finance high capital cost of a project of economical size need serious consideration. Current cost for a 100,000 tonnes per annum project is estimated at about Rs. 6500 million.

24.4 *Problems and prospects in India*

During the early seventies fiscal incentives were provided by the Government to encourage establishment of medium scale paper units (20-30 T/D capacity) based on agricultural residues to be located in remote rural areas to boost employment opportunities for local people. The incentives have since been withdrawn and norms in regard to discharge effluent made more stringent. It is not economically viable for these medium sized units to install chemical recovery plants to meet the treated effluent parameters stipulated by various State pollution Control Boards.

On the other hand large scale successful utilisation of bagasse as main raw material by Tamil Nadu Newsprint and Papers Ltd. (TNPL) which is currently manufacturing 100000 tpa newsprint and 80,000 tpa writing and printing papers has focused new hopes on bagasse as a potential raw material. Another success story of large scale utilization of bagasse for paper manufacture is at Mysore Paper Mills in Karnataka. paper projects are highly capital intensive. The cost of setting up a greenfield paper project is around Rs. 65,000 per annual tonne. Thus

a new unit with a current minimum economic size of 1,00,000 tpa would cost around Rs. 6500 million.

In smaller paper mills, recovery of chemicals is not being practiced as on viable technology is available so far. International and local pressures are building up for cleaner environment. Paper mill effluents without recovery of chemicals will normally be high in BOD and COD contents. A number of larger mills are even preparing to meet the international ECF (Elemental Chlorine Free) and TCF (Total Chlorine Free) norms. Under these circumstances small and medium sized mills may have either to close down or to switch over to the use of waste paper which does not discharge any harmful chemical pollutants.

As discussed earlier. industrial plantation of wood by the large paper, mills is finding opposition from various pressure groups and smaller mills based on agricultural residues like bagasse may become non-competitive. The furture therefore lies in large scale utilisation of bagasse on the lines of successful mills like Tamil Nadu Newsprint and Paper Ltd., and The Mysore Paper Mills Ltd., Bhadrawati incorporating latest state-of-theart technology to meet global competition. However there are certain problems involved in the large scale utilisation of bagasse for the manufacture of paper which have been highlighted as under :-

- Paper industry considers bagasse as a waste by-product of the sugar industry and in reluctant to have suitable practice sharing arrangements on the basis of value addition.
- Paper projects are highly capital intensive compared to the investment in sugar factories supplying bagasse to sustain the paper mill.
- A paper project of an economic size can only be sustained by a substituted fuel concept for which assured availability of an alternative fuel will have to be guaranteed.
- paper projects are capital intensive and should be given permission to import duty free plant and machinery to reduce cost so as to make them an attractive investment proposition.

There are a number of pulp and paper mills in India which use bagasse as raw material and a list of these is given in Annexure 24.1. A number of sugar factories also have attached paper mill listed in Annexure 24.3.

24.5 *Particle Boards*

In countries like India with very low forest cover, fibrous raw materials such as bagasse, straw and husks are playing an important role in the manufacture of particle boards. With the last developments taking place in housing and furniture industry, there is an even increasing demand for would substitutes and particle boards are meeting these requirements.

Particle board manufacturing process is very simple and consists of bagasse drying to a suitable moisture level, mixing urea–formal dehyde resins followed by pressing and finishing. A number of particle board mills are also laminating particle boards with attractive decorative laminates resulting into a product which compares very well with plywood and other wood substitutes.

Western Bio-system Ltd., is successfully running a 60 t/day bagasse based particle board plant near Sangli in Maharashtra. The mill is in the process of doubling its capacity. In the Co-operative sugar sector, two factories namely, Daulat SSK Ltd., in Kolhapur Distt. and Satpuda Tapi parisar SSK Ltd., in Dhule Distt. both in Maharashtra have recently commissioned 40 t/day (60 m^3/day) and 60 t/day (80 m^3/day) continuous particle board plants respectively. There is also a bagasse based particle board manufacturing plant DSM Boards Ltd., in Moradabad, U.P. with a capacity of 15 t/day using batch process. There are a new particle board plants in the north-eastern part of the country based on wood-waste and it has been observed that, the quality of bagasse-based and wood-based particle boards compared well in mechanical properties. physical appearance and other qualities.

24.5.1 *International Scenario*

Like India other major sugarcane rich countries worldwide have strong base in the manufacture of bagasse-based particle boards.

China

There are 24 bagasse-based particle board plants in China. 14 of them are of 5000 m^3. 10 to 10,000 m^3 per annum capacity each distributed over the provinces of Guangdong, Guangxi, Fujian, Yunnar, Hunan and Hubei. Generally bagasse-based particle board plants are situated in provinces rich in sugarcane production. Total production capacity of particle boards, has reached 150,000 m3 annually (densities of particle board range from 0.6 to 0.9 majority being 0.8tm^3).

Cuba

A number of units in Cuba are successfully producing particle board using bagasse as raw material. List of some of these plants are given below along with their capacity in tonnes per annum.

i)	Pro-Cuba (Roman Baloa)	22500
ii)	Maderas Tecnicas (M. Fajardo)	13500
iii)	Camilo Cienfuegos	36000
iv)	Iro de Enero	36000
v)	Jesus Menendez	36000

Pakistan

There are 18 particle board plants based on bagasse with a total capacity of 200,000 tonne per annum which are being operated successfully and profitably. Most of these plants like the one known as Crescent Particle Board are attached to sugar mills, Shakarganj, Fauji and Cresent in the province of Punjab.

A typical process involves depithing of the mill wet bagasse in the plant. The separated pith is used in the sugar factory boiler. Depithed fibre is pneumatically blown to a cyclone close to the bagasse drier and conveyed through belt convey or to a rotary drier using thermic fluid, at about 200°C for drying. This drier rotates at about 4 rpm and the retention time is about 30 minutes. The inlet moisture of the fibre is about 48% and the fibre at the outlet has moisture content of about 3.5%. The thermic fluid is heated in oil heater using natural gas. Three different fractions of the dried fibre are mixed in required proportion with urea formaldehyde as a binder and this mixture goes to hydraulic presses to get the particle board of desired thickness and density. This particle board is based on 100% bagasse and the finished product comprises about 10% glue. 7% moisture and 83% fibre. The factory has also a lamination section and about 30% of the total particle board production is laminated. Nevertheless, lamination sheets are being imported.

The particle board has a good domestic market and finds extensive use in interior decoration and furniture manufacture.

Manufacture of particle board is a dry process and is therefore, free from any environmental degradation. Requirements of such wood substitutes is increasing worldwide including in India. The industry, therefore, needs encouragement and in turn can play an important role in contributing to the depleting financial health of the sugar industry.

24.6 *Co-generation*

Sugar Industry alone could contribute as much as 3,000 MW to the national power grid through co-generation using bagasse as fuel.

A 2,500 TCD sugar plant, could generate as much as 9 MW of surplus power for 5-6 months every year, with an incremental investment of only Rs. 20-30 million per MW. The bio-mass raw material viz. bagasse is incinerated to generate steam. Conventional power systems currently cost up to Rs. 50 million per MW.

The main problem with the Indian sugar mills is that most of these units had installed low pressure boilers. This is the reason why most of the mills can generate only 25-30 KWH of power per tonne of cane in comparison to those abroad which produce anything between 70-100 KWH of electricity.

Indian sugar mills together could produce at least 3000 MW of power during the crushing season if only they installed the right boilers and turbines.

It the co-generation potential of other industries is taken into account, conservative estimates suggest an extra capacity of 10,000 MW. Co-generation may be an alternative to deliver results much faster that the installation of conventional thermal or hydel power plants.

Ministry of Non-conventional Energy Sources (MNES) has issued guidelines regarding co-generation. Based on these guidelines, certain state Governments have already determined the rate at which power from the sugar mills will be purchased by their State Electricity Boards (SEBs). Some mills have already set up co-generation units. A list of Bio-mass Power Projects already commissioned is given in Annexure 24.4. Most of the Mills, however, find the price not economical to justify the investment required for co-generation. Moreover most SEBs are operating at heavy losses and the mills are, therefore, apprehensive of timely payment of power purchased by them. The SEBs are also reluctant to accept co-generated power as it is seasonal in nature and not available during summer months when it is required most. Sugar industry being seasonal requires supplementing fuel if power throughout the year is to be generated. Technology to ensure preservation of bagasse for longer period is available and this could enable sugar mills to preserve bagasse and use the same to generate power throughout the year. Some mills have also represented that subsidy from MNES is available only for 60 bar boilers which are quite costly and add to the cost of producing power.

24.7 *Molasses*

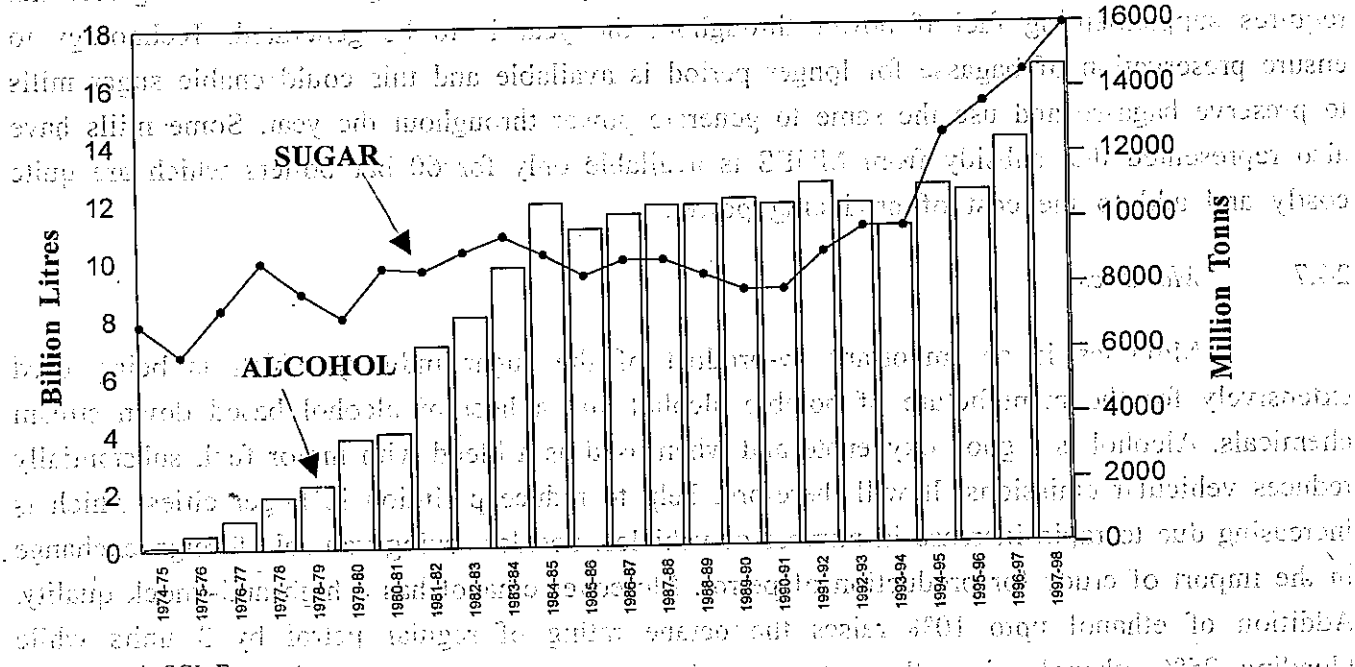
Molasses is an important by-product of the sugar industry which is being used extensively for the manufacture of potable alcohol and a host of alcohol based down stream chemicals. Alcohol is a good oxygenate and when used as a blend with motor fuel, substantially reduces vehicular emissions. It will therefore, help to reduce pollution in larger cities which is increasing due to rapid increase in number of vehicles. besides saving valuable foreign exchange in the import of crude for production of petrol. Moreover ethanol has a high anti-knock quality. Addition of ethanol upto 10% raises the octane rating of regular petrol by 3 units while blending 25% ethanol raises the octane number by 8 units. thus, eliminating the need for environmentally harmful lead additive to raise the octane number of petrol.

The Ministry of Petroleum and Natural Gas, Government of India, vide its Office Memorandum No. P-38022/96-CC, dated 18th march 1996, has mentioned that low level blending of ethanol upto 5% in gasoline (petrol) is generally acceptable. However, the quality of ethanol has to be free of water as presence of water in ethanol would create problem of phase separation when added to petrol.

Brazil is the world's largest producer of ethanol from sugarcane for use as motor fuel. Of the 305 million tonnes of sugarcane expected to be harvested in the marketing year that began May 1, 1997, about 190 million tonnes is earmarked for fuel alcohol production and the remaining 110 million tonnes for sugar.

The alcohol production in Brazil during 1997-98 is expected to reach 5 million litres produced from 190 million tonnes of sugarcane. A comparative data of production of sugar and ethanol in Brazil for the last 23 years and estimate for the year 1997-98 is shown in Graph 1.

Brazil : Sugar and Fuel Alcohol Production



* SCI Forecasts

To foresee what could be the future of ethanol production, it is necessary to turn to the main producer and consumer, Brozil and USA.

Brazil produces two types of fuel alcohol : hydrous and anhydrous. Hydrous alcohol production totalled 9.6 billion litres. or 68 percent of total fuel ethanol production in 1996-97. Hydrous alcohol is used in cars requireing pure-alcohol fuel. Currently, there

are about 4.2 million pure alcohol powered vehicles in Brazil. Anhydrous alcohol production totalled 4.5 billion litres in 1996-97. one third of the total production. Anhydrous alcohol is mixed with gasoline at a 22 percent ratio. There are currently approximately 10.2 million gasoline-fuelled vehicles in Brazil. Meanwhile, the pure-alcohol fuel cars that were popular in the 1980s (hydrous alcohol was available to motorists at a 20 percent discount to gasoline) are now on decline. Over time, it si expected that the need for hydrous alcohol will decline and will be offset by growth in the need for anhydrous alcohol.

With current production of both hydrous and anhydrous alcohol, Brazil is by far the world's leader in fuel alcohol production (the US is a distant second producing 1.4 billion gallons or 5.3 billion litres in 1995). Influenced by the run-up in world oil prices in 1974, brizil launched the world's first major biomass-based ethanol programme in 1975. This decision was reinforced by the further rise in oil prices that began in 1979 and peaked in 1981. By constructing distilleries "annexed" to existing sugar mills and stand-alone "autonomous" distilleries devoted strictly to converting cane to fuel-alcohol, Brazil increased its ethanol production from less than one billion litres annually in the mid-1970s tocover 14 billion in 1996-97.

In USA, on the other hand, the environmental Protection Agency Programme for reformulated gasoline permits the use of upto 30% ethanol in automotive fuels in nine cities. This programme aimed to solve the problem with ozone. will boost alcohol consumption in the USA to 3.42 billion litre in 1992 to 5-7 billion litre in 1997 and upto 7.6 billion litre in 2000.

24.7.2 *Alcohol-Indian Scenario*

Molasses is the main source in India for the manufacture of 'Ethanol', a versatile organic feed stock for manufacture of scores of chemical.

Other products which can be manufactured from molasses are Baker's yearst, Citric Acid, Oxalic Acid, Glycerol, Mono Sodium Glutamate, Acetone etc, Molasses can also find use in cattle feed and as a binder in the road surfacing material etc.

According to a study of the Alcohol based Chemical Industry, about 85% of the available molasses in the country is presently utilised for the manufacture of ethanol. About 45% of the ethanol, so produced is being diverted to potable liquor industry and the balance is available for the manufacture of alcohol based chemicals and other usages.

Among the other uses of ethanol, the most important one is as an admix in motor fuel where by, it not only substitutes motor fuel, (which is imported in large quantities by many countries including India) but acts as a means of pollution abatement by reducing exhaust emission from vehicles.

Ethanol therefore, has emerged as an important oxygenate. A large number of developed nations are coming out with legislations making the use of ozygenates in fuels compulsory, to reduce the increasing vehicular pollution. A number of countries are also providing fiscal incentives. As the world's largest producer of molasses, India may have to take the initiative to use bio-fuels to overcome the mounting pollution problems in its metros.

The proposal to make use of alcohol as admixture with petrol is therefore under active consideration of the Government of India.

The cost of producing various derivatives obtained from molasses by fermentation are shown in Table 24.4. The Specific molasses consumption and participation of molasses in the cost of producing relevant bio-technology derivatives are given in Table 24.5.

Table 24.4 – Cost of producing Selected Derivatives from Molasses

Products	Cost (US$/t)
Fodder yeasts	500-600
Citric Acid	1400-1700
MSG	4000-5000
Eghyl alcohol	300-400
L-lysine	1800-2000

Source : Proceedings XXII Congress (ISSCT)

Table 24.5 – Specific molasses consumption and participation of molasses in the cost of producing some derivatives

Product	Molasses consumption (t/t)	participation in production cost 9%)
Ethanol	4.3	45
Fodder yeasts	4.2	41
MSG	4.9	20
L-lysine	7.6	16
Citric Acid	3.2	14

Source : Proceedings XXII Congress (ISSCT)

24.8 *Distillation Capacity in India*

Against an installed capacity of almost 27,000 lakh litres per annum, the distillery industry has been producing alcohol to the extent of 11,000 lakhs litres per annum, thereby having a capacity utilisation of only 41%. Therefore, enough distillation capacity is available in the country to process additional molasses which is likely to be produced till the year 2002.

However, it may be mentioned that the installed capacity appears to have been deliberately exaggerated by the units for obtaining higher allocations of molasses and even in a year of surplus availability of molasses, this level of production has never been achieved. Moreover, distilleries attached to sugar mills normally work only during sugar crushing season while their capacity is worked out on the basis of a whole year working.

All India production as consumption of Ethanol for the period of 1987-88 to 1991-92 is shown in Table 24.6 and the imports of various alcohol based chemicals for the years 1992-1995 have been stated in Table 24.7.

Table 24.6 – All India Production and consumption of ethanol for the period 1987-88 to 1991-92

(Lakh litres)

Sl. No.	Year	Alcohol Production	Consumption				
			Potable	Industrial	Others	Exports	Surplus
1.	1987-88	6362	32432	2626	329	36	Nil
2.	1988-89	7973	4165	3127	245	615	Nil
3.	1989-90	9278	4367	3876	244	446	(+) 345
4.	1990-91	9380	4351	4198	321	389	(+) 131
5.	1991-92	10157	4156	4629	347	268	(+) 748

Sources : All India Distiller's Association

Table 24.7 – Imports of Alco-Chemical products

Imports (Tonnes)

Product	1992-93	1993-94	1994-95
Acetanilide	968.80	421.50	116.00
Acitic Acid	1088.90	5571.00	20434.00
Acetic Acid & its Salts NES	619.20	389.30	541.70
Acetic Acid Esters & derivatives NES	1495.70	899.50	1226.90
Acetoacetanilide	968.80	421.50	116.00
Acetophonone	71.00	125.20	256.60
Acetyle Chloride	602.60	714.70	455.80
Benzyl Acetate	2.50	1.20	2.10
n-butyl Acetate	41.40	199.40	120.90
n-Butyl Alcohol	171.80	2907.70	1351.00
Cinnamic Acid	12.40	—	—
Cinnamic Alcohol	5.50	0.80	17.90
Cinnamic Aldehyde	32.90	69.40	37.00
Crotonaldehyde	—	—	13.90
Dibutyl Phthalate	1.00	Neg.	2.60
Dichloro Acetic Acid & its Salts etc.	—	2910.10	18.20
Diethyl Amine & Salts	44.20	85.60	313.10
Diethyl Aniline	598.50	333.40	475.40
Diethyl Ether	1.00	1.10	9.60
Eiethyl Oxalate	—	—	72.00
Diethyl Sulphate	181.40	169.50	597.40
Diethyl Toluidine	13.00	2.20	16.10
Ethyl Acetoacetate	33.20	19.30	259.00
Ethyl Acetoacetate	94.60	671.50	365.90

Source : (AABIDA Directory)

The production of molasses and production and consumption of ethanol estimated for the year 1992-2002 is given in Table 24.8.

Table 24.8 – Production of Molasses and Ethanol (estimated for the period of 1992-93 to 2001-2002)

Sl.	Year	Molasses Production (lakh tonnes)	Ethanol Production (lakh litres)	Ethanol consumption (lakh litres)
1.	1992-93	43.50	8134	—
2.	1993-34	42.20	7891	8500
3.	1994-95	64.96	12147	9000
4.	1995-96	82.84	15491	9450
5.	1996-97	57.00	10659	9922
6.	1997-98	67.55	12632	10418
7.	1998-99	70.60	13202	10939
8.	1999-00	73.80	13801	11486
9.	2000-01	77.15	14427	12060
10.	2001-02	80.67	15085	12663

Sources : STAI's 59th Annual proceeding

24.8.1 *De-Control of Molasses/Alcohol*

The production of molasses and alcohol were controlled by the Government under the Molasses Control Order 1961 and the Ethyl alcohol (price control) order 1971.

The Government of India decontrolled molasses and alcohol on 10th June 1993 by rescinding the Molasses Control under 1961 and Ethyl Alcohol (price control) Order 1971.

The reasons for de-control were two fold.

- It was felt that excessive regulation of allocation and prices of molasses and alcohol were the main constraints impeding the rapid growth of the sector. The current atmosphere of & liberalisation offered a good opportunity for this important industrial sector to come on its own.
- Price control on molasses has inhibited the creation of modern storage facilities for them.

After de-control of molasses as mentioned above a number of a states particularly U.P. and Maharashtra which produce large quantity of molasses and alcohol, still impose various retrictions on the inter statemovement as well as on export. These states are also imposing various levies in order to safeguard the interests of ta particular section consuming large percentage of molasses alcohol. Basic price of these by-products, therefore, very considerably in different states which results in unhealthy competition between chemicals based on alcohol manufactured in different states owing to varying price of basic feed stock. Some times it is more viable to manufacture a particular chemical using petro-route. For instance large quantities of Acetic Acid are being manufactured through petro-route by Gujarat State Fertilizer Corporation Ltd., (GSFC). With an initial capacity of 50,000 tonnes per annum GSFC has since expanded the capacity of its Acetic Acid plant to 100,000 tonnes per annum. This has resulted in competetion between its manufacturer from alco/petro routes.

Prices of molasses had come down to a low level of Rs. 50 to Rs. 80 per tonne in the year 1995-96, when the country produced maximum quantity of sugar (about 164 lakh tonne) and current prices are in the range of Rs. 1500 to 1800 per tonne. Sugar mills have to dispose off their molasses stocks before the crushing season starts in October/November. Many a time this situation of the industry is exploited by the consumer of the molasses and very low prices are offered to them. Prices of alcohol, therefore, also vary widely in view of price fluctuations in its raw material viz. Molasses. Excise duties have also been imposed at dis-proportionate levels. At a time when price of molasses was Rs. 500-1000 per tonne, it was 20% ad-valorem but currently irrespective of basic price of molasses, excise duty is Rs. 500 per tonne.

24.8.2 The installed capacity of various alcohol based Chemical Industries in India is given in Table 24.9. These Chemicals are not manufactured through perto-chemical routes in India.

Table 24.9 – Capacities of Alco-Chemicals

Sl. No.	Product	Capacity (TPA)
1.	Acetaldehyde	2,20,000
2.	Acetic Anhydride	68,000
3.	Pentaerithritol	27,000
4.	Glyoxal	8,000
5.	Cellulose Acetate/Triacetate	7,800
6.	Mono-chloro Acetic Acid	20,000

7.	Styrene	29,000
8.	Poly Vinyl Acetate	42,000
9.	Poly Vinyl Acetate	9,500
10.	Poly Vinyl Alcohol	4,000
11.	Ethyl/Buty/2 Ethyl hexyl Acetate	50,000
12.	Ethyl Amines	5,000
13.	Ethyl Acrylate	5,000
14.	Ethyl Vanillin	500
15.	Di-ethyl Sulphate	5,000
16.	DDT (Pesticide)	1,500
17.	2.4 D (Pesticide)	1,500
18.	Crotonaldehyde	1,000
19.	Ethyl Benzene	34,000
20.	Acetanilide	19,000
21.	Vinyl Sulphone (Acetaldehyde based)	N.A.
22.	Di-ethyl Oxalate	10,000
23.	Dy-ethyl Phthalate/Malonate	N.A.
24.	Glycol Ethers	N.A.
25.	E D T A	N.A.
26.	Glycine	N.A
27.	Aceto Acetate/Aceto Acetamides/Aceto Acetanilides	5,000
28.	Pyridines	2,000
29.	Picolines	3,000
30.	Acetic Acid	2,64,000

Sources : All India Alcohol-based Industries Development Association (AABIDA Directory)

24.8.3 A comparison of capacities of chemicals produced by both alcohol and petrochemical route is given in Table 23.10.

Table 24.10 – Capacities of Alco-Chemicals Vs Petrochemicals

Sl. No.	Product	Capacity (TPA) 1.11.1995 Alcohol route	Petrochem route	Total
1.	Acetic Acid	218,00 (81.4)	50,000 (18.6)	2,68,000
2.	Ethylene	100,000 (17.1)	483,000 (82.9)	583,000
3.	n-Butanol	11,000 (64.7)	6,000 (35.3)	17,000
4.	Ethylene Oxide	21,000 (32.2)	44,000 (67.7)	65.000
4.	Ethyline Glycol	80,000 (34.8)	150,000 (65.2)	230,000
6.	Butadiene	(*) (0)	27,000 (100)	27,000
7.	Acetone	10,000 (28.6)	25,000 (71.4)	35,000
8.	Ethylene Dichloride	14.8%	85.2%	100%
9.	Vinyl Chloride Monomer	14.8%	85.2%	100%
10.	P V C	60,000 (14.8)	346,00 (82.2)	406,000
11.	L D P E	(*) (0)	160,000 (100)	160,000
12.	PS	56,000 (40.9)	81,000 (59.1)	137,000
13.	P S Foam	5,000 (66.6)	2,500 (33.4)	7,500
14.	S B R	40,000 (91.7)	3,600 (8.3)	43,600

Source : (AABIDA Directory)

(*) Alcohol based butadiene capacity of 22,000 TPA of total butadiene capacity closed down. Similarly 32,000 TPA LEPE capacity closed down (20% of total LEPE)

% Capacity shown in brackets.

24.9 *Utilisation of Green Tops and Cane Trash*

Cane agricultural waste (CAW) has great potential as a yearly renewable bio-mass,

CAW is made up of green and dry leaves, tops and unrecoverable cane. Historically, this residue is burnt in the field and/or spread over the field during mulching in absence of appropriate technologies for its alternate use.

Since the 1970s some countries such as the Dominican Republic, Brazil and Mauritius have started the industrial use of CAW. In Cuba interest began as far back as 1960s for use of CAW for animal feed and fuel purposes.

The vegetative structure of cane consists of clean cane and CAW, or simply extraneous matter (EM). Its composition is interrelated with agricultural yield, for as yield decreases the percent CAW increases, generally ranging from 18-20%.

The amount of dry (whole cane moisture, 68%) in cane fields ranges form 13-27 t/ ha. of which 25-30% is CAW. This translates into 4-7 t/ha yield which is in the range of an energy tropical forest with avg. management. This means that some 82 + 22 million t of CAW are produced globally every year – an inexhaustible energy source considering its renewable character and the energy features explained below :

Table 24.11 present distribution of the energy available from cane plantations with an agricultural yield of 60 t/ha.

Table-24.11 – Energy Distribution in a Cane Plantation of 60 t/ha Yield (84,016 Meal/ha)

Product	Weight (t/ha)	Energy (Meal/ha)	Distribution (%)
Sugar	7110	28,440	33.85
Bagasse	6754	31,063	36.98
CAW	5478	24,508	29.17

Source: Proceedings XXII Congress (ISSCT)

The energy content of CAW amounts to 29.2% of the total (84,016 Meal/ha), close to one-third the energy accumulated during plant growth-not a negligible figure for any country in the present energy situation if the technology required is at hand.

Another equally important aspect to be considered when dealing with renewable fuels is the contribution to environmental protection brought about by fossil fuel replacement, eliminating the effluence of toxic substances. A comparative analysis of the features of some solid fuels Table 24.12 with CAW shows the usefulness of CAW and represents a very attractive alternative energy source for cane-growing countries considering its renewable nature and its fuel characteristics. The use of CAW to replace fossil energy sources contributes considerably to

environmental protection, avoiding the emission of large amounts of toxic and corrosive substances from fossil fuel being sent into the atmosphere.

Table-24.12 – Features of Some Solid Fuels

Fuel	Characteristics (%)				
	Moisture	Ash	Fixed C	Volatiles	UCV' (MCal/kg)
CAW	25.3	7.0	91.0	83.9	2982
Bagasse	50.0	2.5	13.9	83.6	1974
Peat	56.7	13.8	25.9	60.0	550
Lignite	34.5	11.1	35.0	53.9	2212
Anthracite	2.8	8.1	90.7	1.2	7067

Source: Proceedings XXII Congress (ISSCT) UCV' Useful Calorific Value

Vast Untapped Energy Sources

As one of the world's, largest producers of sugarcane, enormous quantity of bio-mass is currently going waste in our country. Certain portion of trash is currently being used to build huts in the sugarcane fields and preserve fodder/cow-dung in rural areas. However, large amounts of CAW are still being destroyed by burning in the fields. New Holland Company – a subsidiary of Ford Tractors has manufactured and done demonstration of a bailing machine in India. The bailing machine can be operated coupled to the enging of a tractor. A comprehensive study and possibilities of using this vast energy potential needs to be done. In view of its calorific value at par with mill-wet bagasse, every tonne of CAW used as fuel in the boilers can replace one tonne mill-wet bagasse which can be profitably used for the manufacture of Paper, Particle Board and/or Co-generation of power.

24.10 *Utilisation of Spent Wash or Effluents*

Ethanol fermentation industry produces large amounts of distillery slops called as spent wash (13 litre/litre ethanol produced) with a very high BOD content (40,000 ppm). Its disposal poses a serious problem and needs eleaborate treatment.

The components of ethanol distillery slops are given in Table 24.13

The slop when concentrated to 50-60^0 Bx by vacuum evaporation, contain approx. 35% Organic Matter (OM), 6% K_2O, 1.5% MgO, 1.0% CaO and other minor elements.

Table-24.13 – Components of Ethanol Distillery Slops

Item	Analysis
Brix	11.5^0 to 12.5^0
Colour	Reddish Brown
pH	4.0 to 4.8
Smell	Caramel Smell
Temperature	80^0 C
Oxygen absorbed (OA)-ppm	28000 - 36000
Chemical Oxygen Demand (COD)-ppm	88000 - 124000
Biological Oxygen Demand (BOD)-ppm	30000 - 45000
Total Nitrogen-ppm	70
Phosphate (P_2O_5)-ppm	250 - 370
Potash (K_2O)-ppm	8000 - 10000
Total Solids - ppm	1,03,000 - 1,10,000
Volatical Solids - ppm	65,000
Ash - ppm	34,000 - 40,000

Source : Industrial Utilisation of Sugarcane and its Co-products: By P.J. Manohar Rao

Study of different methods for the disposal of distillery slops, show that the economics are in favour of bio-methanation of spent wash followed by secondary treatment to make it suitable for disposal on surface or in river water. In countries where energy is not expensive use of drying and incineration method to recover valuable components (N.P.K.) for use as fertiliser is practiced.

In Taiwan, the slops are solidified to prepare organic fertilizer. A large amount of bagass pith (20% to 30%) produced and discarded during pulping is used as raw materials for compost making because of easy decay. Bagasse pith is used as a carrier for concentrated slops because of its high liquid absorption. Four parts of concentrated slops and one portion of bagasse pith are mixed and dried using routine drying processes. Table 24.14 gives composition of the de-hydrated slops powder.

Table 24.14 – Composition of Slops Powder

Item	Analysis
pH	4.78
Moisture (%)	2.66
OM (%)	67.60
Total N (%)	1.99
P_2O_5 (%)	0.28
K_2O (%)	8.18
CaO (%)	1.63
MgO (%)	2.30
Na_2O (%)	0.23
Fe (ppm)	3,129.00
Mn (ppm)	134.00
Zn (ppm)	32.20
Cu (ppm)	19.10
Cd (ppm)	1.40
Cr (ppm)	17.50
Pb (ppm)	5.90

Sources : Proceedings XXII Congress - (ISSCT)

India is perhaps one of the few countries in the world to establish as many as 125 commercial digesters for the production of methane gas from the distillery spent wash. Each M^3 of spent wash generates 30-35 M^3 of bio-gas (60-65% methane) with a calorific value of 5000-5400 kcal/M^3.

It has been observed that after bio-methanation, BOD load of spent wash comes down to about 5000 mg/l which after secondary aerobic treatment reduces to about 1500 mg/l. Its disposal before bringing the BOD to accepted level of 100 mg/l needs substantial dilution.

Another method being used by some of the factories is the manufacture of bio-earth – a useful fertilizer. In this method there is no effluent discharge and press mud is mixed with

treated spent wash and aerated by the heep of aero-tillers. This bio-fertiliser contains up to 3.5% Nitrogen, 2.5% Phosphorus, as (P_2O_5) and 2.5% Potash (as K_2O) and is superior to farm-yard manure in its manurial value.

24.11 *Views of the Committee*

24.11.1 Bagasse, Molasses and Filter cake are the 3 important by-products of the sugar industry. In the interest of the sugar industry & the came growers, it is necessary that these are utilised in the most profitable manner.

Bagasse is an important raw material for the purpose of manufacture of paper and particle board. At the same time, bagasse can also be used for generation of additional electricity. While the use of bagasse prevents de-forestation by providing raw material to the paper industry, it use for co-generation helps to augment power generation at lower capital cost and in shorter time than conventional sources of power generation. It should therefore, be left to the individual sugar factories to decide on the basis of relative economics as whether to opt for co-generation or supply bagasse for manufacture of paper or particle board. The manufacture of paper and particle board is likely to be more profitable in cases where the maufacturing facilities are located near the sugar factory. The Govt. of India has reduced the import duty on bagasse pulp recently to 10%, but it has been reported that the paper manufacturers often tend to import wood pulp at the reduced rates of duty in the garb of bagasse pulp. The likely impact of these imports on the demand of bagasse by paper mills will also need to be taken into account.

24.11.2 The price of power paid by the Electricity Board to the sugar industry should be determined on a realistic basis. In case of annual supply to the grid, price of energy produced through co-generation should be based on average cost of generation of recently set up projects by the Electricity Board and purchase of power from other sources. Unless this is done, the sugar industry will never be encouraged to produce power for supply to the grid by burning of bagasse & other biomass.

24.11.3 It may in some cases be economical for sugar factories to arrange the supply of co-generated power to growers located in its reserve area for energising of tubewells. The cost of power could then be recovered from the cane growers from the payment of their cane price. The Electricity Board may however, charge wheeling charges from the sugar mills for distributing the power co-generated at the sugar mills to the growers. The Committee recommends that the SEBs may grant necessary permission when approached by a sugar factory on payment of reasonable wheeling charges. Similarly, the SEB's may grant necessary permission when approached by a sugar factory for supply of power generated by it to other consumers, and wheeling charges may be recovered by the SEB from the sugar factory.

24.11.4 According to policy guidelines of the Ministry of Non-Conventional Energy Sources (MNES), subsidy is admissible on the units installing 60 bar boilers. This has apparently been

done to encourage installation of these high pressure boilers as technology demonstrator. However, the number of sugar mills in the country which are likely to install such high pressure boilers is limited. For giving further impetus to co-generation, the MNES may be requested to allow suitable subsidy on installation of 45 bar boilers also provided the sugar mill concerned supplies power generated after installation of such boilers to the State Electricity Board.

24.11.5 The present rate of duty on imports of molasses is @ 10%. This is far below the excise duty levied on the molasses produced in the country. The Govt. of India should impose a countervailing duty on the import of molasses such that it atleast equals to the excise duty levied on molasses produced in the country.

Prior to June 1993, the State Government had been fixing the price of molasses from time to time and the State Governments in U.P., Bihar, Punjab and Haryana had been adopting the same price by issuing identical notifications under their representative State laws, namely, Madras Prohibition Act, 1937 read with Madras Prohibition Amendment Act 1958, Bihar Molasses Control Act 1947 as amended by the Act of 1958 and the Bihar Molasses Control Rules 1955. East Punjab Molasses (Control) Act 1948 and East Punjab Molasses (Control) Rules 1962 and Up Shira Niyantran Adhiniyam 1964. On 4th May 1993, the Minister of State in the Ministry of Chemicals and Fertilisers made a suo moto statement in Parliament announcing Government's decision to rescind the Molasses Control Order 1961 and the Ethyl Alcohol Price Control Order 1971 – as a consequence of a deliberate policy of literalisation, since it was felt by Government that excessive regulation of allocation and prices of molasses and ethyl alcohol 'were the main constraints impeding dynamic growth of this sector'. The two control orders were later rescinded by two separate notifications dated 10th June, 1993. By a circular letter No. 1502/24/91-Ch II dated 11th June, 1993 addressed to all State Governments, the Central Government (through the Secretary, Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilisers) forwarded to each State Government copies of two notifications each dated 10th June 1993, rescinding the Molasses Control Order 1961 and Ethyl Alcohol Price Control Order 1971. The first two paragraphs of the circular letter read as follows :-

i) As you would be aware, the Government have decided to rescind the Molasses Control Order 1961 and the Ethyl Alcohol Price Control Order 1971 so as to decontrol the movement and prices of molasses and alcohol. Copies of the notifications rescinding the two orders in question are enclosed.

ii) The question of decontrolling molasses and ethyl alcohol was under consideration for quite some time. The two orders in question have served an important purpose in the past. They have helped in the utilisation of molasses, which are waste products of the sugar industry for useful purposes, including production of industrial alcohol and the

downstream alcohol based chemical industry. However, now it is felt that these orders have outlived their utility and in fact the regime of control is inhibiting the free movement of molasses and alcohol and causing unnecessary delays which are having an adverse effect on the downstream industries. In line with the economic liberalisation programme of the Government, market forces need to be allowed to operate and controls minimised for allowing the realisation of full potential of growth of industries and proper utilisation of molasses. The price control on molasses has inhibited the creation of modern storage facilities for them. A similar situation is found to exist for ethyl alcohol. In fact, estimates indicate that the ethyl alcohol distilleries are utilising only 60% to 70% of their capacity. As against this, about six to seven lakh tonnes of molasses is allowed to rot for want of allocation. Molasses are being expand production. The withdrawal of the control orders is expected to provide a better opportunity for all the sectors dependent on molasses to function optimally in a free market economy.

The intension of the Central Government was, thus, clearly to deregulate the price and distribution of molasses throughout the country. However, as mentioned above, some of the State Governments have continued to impose restrictions on the movement of molasses within the State as well as outside the State. This is clearly against the intention of the Central Government and to a large extent defeats the purpose of its policy of decontrol over molasses. The regulation over distribution of molasses and restrictions on its movement outside the State result in unduly low price for molasses sold by the sugar factories and adversely affects the economy of the industry. The Committee, therefore, recommends that the intention of the Central Government should now be given statutory effect by invoking and exercising powers of the Central Government under Section 26 of the Industrial Development & Regulation Act, 1951 conferring powers on it to issue directions. The instructions contained in circular dated 11th June, 1993 referred to above should thus be given a statutory force to ensure implementation of the Government policy regarding decontrol of molasses by all State Governments. This will enable the sugar industry to obtain proper price for its molasses which will ultimately benefit the cane growers. There is no justification for any apprehension that removal of restriction on the movement of molasses outside the State will deprive the distilleries of that State their requirement of molasses as the distrilleries in the State will have an obvious freight advantage in obtaining the molasses from factories in the State at the market price. Similarly, there is no justification for the apprehension that removal of restriction on movement of alcohol, outside the State will deprive the alcohol based chemical industries in the State of their requirement.

24.11.6 Since there are no restrictions on the import of molasses, similarly, there should be no restrictions on the export of molasses to other countries. This will enable the sugar factories to obtain fair price from molasses not below the export parity price. In this case also there is no justification for any apprehension that this will deprive distillers in the

country of their requirement of molasses as they will always be able to get molasses at prices even somewhat below the export parity price because of the freight advantge enjoyed by them.

24.11.7 The excise duty on molasses at present at rate of Rs. 500/- tonne is excessive. Quite often the price of molasses goes below the rate of excise duty levied on it. There is a strong case for suitable reduction of excise duty on molasses. The criteria for levying duty on molasses would be the sugar content of molasses. At present the excise duty on free sale sugar is Rs. 340/- tonne; since the molassess contains less than 50% sugar, the excise duty on molasses should not exceed Rs. 170/- tonne. The additional excise duty of Rs. 37/- per tonne on free sale sugar is in lieu of sales tax which will continue to be levied on molasses.

24.11.8 Many chemicals which are produced in India from alcohol are produced from petroleum products in other countries. Since production from petroleum products is often cheaper. Chemical Industry in India is also likely to switch over to the petro-chemical route in future. There is, therefore, a need for identifying alternative usages of molasses and alcohol.

It has been found that the Ethyl Alcohol act as an oxidant when admixed with motor fuel. At present this is achieved by import and mixing of Methyl Tetra Butyl Ether (MTBE). This can be substituted with Ethyl Alcohol. Various tests have proved that the use of Alcohol at 6.5% in mixture with motor fuel does not create any problems in the working of automobile engines and helps in reduction of pollution. Therefore, the use of Alcohol as an admix with motor fuel should be encouraged. This will go a long way in proper utilisation of the available molasses on one hand and reduce the dependence on import of petroleum products and reduce pollution from vehicles on the other. The only stumbling block at present is the lack of agreement between distrilleries & oil companies in regard to the price of Alcohol to be paid by the oil companies. In case the Distilleries and the Oil Companies are not able to negotiate the price of Alcohol for the purpose of admixing it with motor fuel, the Government should intervene to amicably arrive at a mutually advantageous price through the use of good offices of the Department of Food and Consumer Affairs and the Department of Petroleum and Chemicals.

24.11.9 The use of bio-mass as an alternate source of energy should be encouraged. The sugarcane provides large amounts of trash which can be used as fuel in sugar factory boilers. However, the collection and transportation of trash from the fields to the factory is costly and therefore use of baling machines for baling of cane trash needs to be encouraged. A private Mill in Tamil Nadu and a few other mills in the Cooperative Sector are already attempting to collect and transport trach. It has been found that the collection, bailing and transportation of trash is economical through use of bailing machines. The

surplus trash after meeting the field requirements for trash blanketing may be baled for transportation and burning in sugar factory boilers, so that equivalent quantity of bagasse is released for other purposes. Since baling of trash is a new innovation, necessary loan assistance from SDF may be provided to sugar mills for purchase of baling machines.

24.11.10 Another important area which needs attention is the depithing of bagasse before transportation to paper mills. It is noted that the paper mills necessarily de-pitch bassage before pulping in order to achieve the required pulping quality. The pith should preferably be separated at the sugar mills site before transportation of bagasse to paper mills as the transportation of pith results in an unnecessary increase in the cost of transportation. The separated pith can be used for burning in the sugar factory boilers. Neccessary loan assistance should be provided from SDF for the purchase of de-pithing machines and for making various minor modifications in the sugar factory boilers for the purpose of using pith as fuel.

Chapter 25

Human Resource Development

25.1 Employees of an organization are its most valuable asset. The capabilities of the employees can be increased manifold by providing necessary training and environment for their growth. The productivity of any industry can be improved substantially through a properly motivated work force. Therefore, investment in Human Resource Development pays a much greater dividend than any other forms of investment. Incidentally, the focus on Human Resource Development in sugar industry in India is badly lacking. The scenario of technology is rapidly changing worldwide in all industries and there has been a marked improvement in the technical status of the sugar industry as well. However, the pace of training of the employees in the sugar industry particularly in India, it seem, has not been able to keep pace with the latest developments in technology.

25.2 There are at present 459 operating factories in the country as on 30.06.1997. A large number of these factories have been set up before 1950's. Therefore, a large number of employees are at the verge of retirement and may need replacement. The factories set up before the 1950's had a number of sections, where a large labour force was required. These sections primarily included cane handling, bagasse firing and handling, filter presses, juice settling tanks, centifugals and sugar bagging and handling sections. With the advent of modern technology steps have been taken to mechanise and automate a number of process steps. The improvements in technology in different sections of the sugar plant have also brought about a reduction in number of machines & equipment.

This is true, in particular with sections like conventional filter presses, settling and centrifugation. The conventional filter presses, settling tanks and low speed centrifugals have been replaced with technically superior vacuum filter, multi tray clarifier and high speed self discharging or continuous centrifugals. The number of workers which therefore used to be in the region of 1100 to 1200 in an old 800 to 1000 TCD plant set up prior to 1950's have since reduced drastically in a modern 2500 TCD plant. A typical workers strength prepared by National Federation of Cooperative Sugar Factories Ltd., a few year ago for a standard 2500 TCD modern sugar plant is as under:-

Table 25.1

S.No.	Name of Section	No. of Person
1.	Administration	9
2.	General Office	16
3.	Accounts Section	20

4.	Labour Welfare	2
5.	Cane Department	83
6.	Cane Development	–
7.	Time Office	10
8.	Sugar Godown	4
9.	Security	33
10.	Stores and Purchase	14
11.	Engineering	270
12.	Manufacturing	200
13.	Medical, Sanitation & Misc.	31
	Total	699

However, a number of new sugar factories particularly in the private sector have been able to substantially further reduce the number of workers in their plants, in many cases to less than 300. In view of high man power costs, various factories are making their best efforts to rationalise labour strength as far as possible.

25.3 The countrywise average labour strength/factory in case of some countries is generally as under:

Table 25.2

Country	Average labour strength/factory
India	1000
Australia	250
Taiwan	300
Cuba	140
Hawai	80

Source: Man power optimization a case study by Agiwal, Gujral & Srivastava – STAI proceeding, 1997

It may be noted that the sugar plants in overseas countries as above are much larger than the plants in India and therefore actual manpower TCD capacity is far less than in India. In Mauritius there are a total of 6000 mill workers in 16 mills of average 3000 TCD size. Presently there is an embargo on fresh employment by almost all existing sugar factories in India. In absence of any fresh recruitment, the existing strength is getting gradually reduced through retirement and natural wastage. The sugar factories are also resorting to mechanisation of its various operation including automation and computerisation with a view to minimize the number of workers as far as possible.

25.4 It is noted that the increase in capacity of the industry is taking place both through expansions of existing plants and setting up of new sugar mills. During modernisation & expansion of the existing plants, the existing workers rendered surplus due to modernisation are re-located on positions arising out of installation of new equipment if any, and therefore, there is no anticipated increase in the number of workers during expansion. However, new mills which are being set up will need additional un-skilled, semi-skilled, skilled and technically trained man power.

The number of new factories which have been set up since 1990 are under:-

1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
8	7	12	10	8	13	11

Therefore, in view of the past trend, it is estimated that the number of factories which are likely to be set up will not be more than @ 15 year. Accordingly, the maximum number of workers required to be employed in the new units will even @ 600 workers factory, not exceed 9000 employees per year. Considering the present employment trend it has been observed that the employers are more inclined to recruit trained/skilled personnels so that these personnels can perform multi farious functions in the sugar plant. It is felt that the future trend shall be more towards employing skilled personnels and therefore their number will not be less than about 60% of the total work force. In other words, out of a total requirement of 9000 workers, the requirement of skilled and trained workers drawn from ITI and other vocational colleges will be not less than 5400 workers annually. The break up of categorywise manpower for each new factory will be ready as per Table 25.3

In addition to above, each factory may have a Labour Welfare Officer, a Medical Officer & a few workers for the purpose of sanitation and as Drivers, Gardeners, Cooks etc. Normally about 3-4 Stenographers are also employed for day to day secretarial work. The trained manpower primarily required is in the category of Engineers, Technologist and Diploma and ITI Certificate holders in the technical side.

Table 25.3

Name of the Section	Category											
	Tech. Gradu.	Engg. Gradu.	CA's	Agri. Gradu.	Engg. Dipl. holder	Compu. Progr/ holder	ITI Certi.	Arts Sci. Comr. Gradu.	Pan boiling certi-ficate	SSLC	Unski-lled	Totals
Administration	3	3	2	1	–	–	–	–	–	–	–	9
General Office	–	–	–	–	–	4	–	–	–	–	4	15
Accounts Section	–	–	–	–	–	–	–	18	–	–	1	19
Labour Welfare	–	–	–	–	–	–	–	–	–	–	1	1
Cane Deptt.	–	–	–	1	–	–	4	35	–	–	42	82
Cane Dev. Deptt.	–	–	–	3	–	–	–	1	–	–	1	5
Time Office	–	–	–	–	–	–	–	6	–	–	4	10
Sugar Godown	–	–	–	–	–	–	–	3	–	–	1	4
Security Section	–	–	–	–	–	–	–	–	–	–	28	28
Store & Purchase	–	–	–	–	–	–	–	8	–	4	1	13
Engineering	–	6	–	–	10	–	195	5	–	–	54	270
Manufacturing	5	–	–	–	–	–	45	18	14	9	109	200
Total	8	9	2	5	10	4	240	101	14	13	246	656

25.5 At present in addition to number of Engineering Colleges, Polytechnics and ITIs, there are 2 premier sugar institutes in the country which train technical man power for the sugar industry. The two institutes are the following:

1. National Sugar Institute, Kanpur

2. Vasant Dada Sugar Institute, Pune

In addition to the above, Guru Nanak Dev University, Amritsar is also conducting a B.Tech. course in Sugar Technology. These institutes are together able to train the following number of Post Graduates in Sugar Technology and Sugar Engineering annually.

Sugar Technology — 150 nos.

Sugar Engineering — 50 nos.

Therefore, it is estimated that sufficient man power will be available in the skilled and technical categories. However, it has been reported that the level of skills and technical

competence of the existing man power and the man power which is to be employed in future needs to be substantially upgraded to meet the changing technology requirements. Therefore, courses for re-training of sugar industry personnels must be organised by various institutes at all levels. The criteria for selection and the course content of the existing sugar institutes also need a thorough review. It has also been found that training at Artisan levels is badly lacking and special courses for the sugar industry personnels should be undertaken in the various Polytechnics located in the regions where a large number of sugar factories exist.

25.6 *Views of the Committee*

25.6.1 The Committee observes that the existing institutes for training of technical personnel are adequate to cope with the annual requirement. However, special courses for sugar industry personnels at the artisans and the middle technical levels may be started in ITIs and Polytechnics in regions where large number of factories exist. The Deptt. of Sugar and Edible Oils may persuade the concerned State Governments to start these courses.

25.6.2 The Committee also feels that the level of skills and technical competence of the existing man power and the man power which is to be employed in future needs to be substantially upgraded to meet the changing technology requirements. Therefore, both the syllabus and the facilities for training need to be upgraded. For this purpose, the course content in NSI & VSI needs to be suitably revised to include subjects which are relevant to the present day requirements in the sugar industry.

25.6.3 The Committee had already recommended in Chapter-16 necessary measures for re-organising the NSI. Kanpur and strengthening the VSI, Pune to make them more efficient instruments for training & research.

25.6.4 Sugar industry is now adopting automation and instrumentation for process control very rapidly and there is, therefore, a need for conducting appropriate short courses for existing technical persons in process control, automation and management.

25.6.5 At present there is no institute which provides specialised training in management for sugar industry personnel. It will be desirable that specialised management programme for sugar industry are taken up in reputed management institutes like the IIMS, Indian Institute of Rural Management Anand etc. The Sugar Industry Management and Development Society, which has been recently registered should take necessary steps for organising these courses. It is understood that the Government has agreed to provide Rs. 50 lacs as seed money from SDF for setting up of the Society and ISMA has also agreed to provide its share of Rs. 25 lacs. The Committee recommends that NFCSF Ltd. should also convey its concurrence to provide its share of Rs. 25 lacs, so that the Society starts functioning without delay.

Chapter 26

Taxes

Central Excise duty

26.1.1 Sugar industry is at present subjected to taxation both by the Central and State Government. Excise duty is the main tax levied by the Central Government. Upto 28.2.1966, excise duty was being levied at a specific rate of Rs. 28.65 per quintal, consisting of basic duty of Rs. 22.15 per quintal and additional excise duty at Rs. 6.50 per quintal, in replacement of Sales tax on sugar which was abolished from 14.12.57. From 1.3.66, the same was revised to Rs. 37.00 consisting of basic duty of Rs. 30.50 and additional duty of Rs. 6.50 per quintal. From 1.10.67, the previous rate of Rs. 28.65 was restored, which continued upto 28.2.67.

26.1.2 From 1.3.68, the method of levying specific rate of duty was substituted by ad valorem rate of 23%, consisting of 19% basic and 4% additional duty. The rates have been revised thereafter from time to time as indicated in Annexure 26.1.

26.1.3 Excise duty on molasses has been converted from ad valorem to specific duty of Rs. 500/- per metric tonne. The duty is applicable to both sugar and khandsari molasses. In respect of khandsari molasses, excise duty will be payable only on such molasses which are used in the manufacture of alcohol. Khandsari molasses used in the manufacture of goods other than alcohol are fully exempted (Serial No. 1 of Notification No. 4/97-CE). The collection of duty will be at consumption point and not at manufacturing point. Industrial user procuring khandsari molasses is liable to discharge duty at Rs. 500/- per M.T. on the date of receipt of such molasses. There is no change with regard to liability of sugar factories towards excise duty on molasses produced by them.

Sugar cess

26.2 The Central Government started levying 'sugar cess' in pursuance of the Sugar Cess Act,. 1982 which was enacted to provide for the imposition of cess on sugar for the development of sugar industry and matters connected therewith. The sugar cess is levied by way of a duty of excise. An amount equivalent to the proceeds of the duty of excise collected, reduced by the cost of collection, is credited to the Sugar Development Fund. From 1st November 1982, the amount of cess payable by sugar factories is Rs. 14 per quintal of sugar.

Cane cess/ *Purchase tax*

26.3.1 Cane cess / Purchase tax is levied by the Governments of sugar producing States except Assam, Nagaland, West Bengal, Orissa, Rajasthan and Goa. The rates of cess / purchase tax are not uniform in all States and during all sugar seasons. A statement showing the Statewise cess / purchase tax in rupees per tonne of sugarcane is at Annexure 26.2. The purchase tax on cane is very high in States of Tamil Nadu, Andhra Pradesh and Karnataka as compared to Gujarat, Maharashtra and U.P. In Andhra Pradesh, the rise in tax from 1994-95 has been phenomenal. The factories have to pay these taxes while purchasing cane from the farmers.

26.3.2 Cost of sugarcane accounts for more than 60% of cost of production of sugar. Such a wide variation in tax has its impact on cost and wherever the incidence is comparatively substantial, it adds to the cost of production of sugar.

Views of the Commiee

26.4.1 Large surplus funds are at present available in the SDF, financed from the cess on sugar. However, since we are recommending assistance from the Fund for a number of additional purposes, it will not be desirable to make any change in the rate of cess at this stage. When the funds available from the cess get fully utilised, the question of increase in the rate of cess can be considered if there is additional requirement.

26.4.2 The rates of purchase tax on sugarcane in the major sugar producing States in the tropical zone have now become more or less uniform. However, in the sub-tropical area, there is still considerable variation. The industry in Bihar has particularly represented against significantly higher incidence of purchase tax and other fees and taxes on sugarcane levied in the State as compared to the neighbouring State of UP. Such variation in taxes between neighbouring States adversely affects the industry in the States where higher taxes are levied. Ministry of Food & Consumer Affairs, Deptt of Sugar & Edible Oil may try to persuade the State Governments in the sub-tropical areas either through direct discussion or through discussion in the Zonal Council to attempt uniformity in the rate of tax/cess on sugarcane. Since the yield of sugarcane in the sub-tropical area is lower and there is considerable scope for increase in yield in that area, the State Governments in sub-tropical areas may also be persuaded to convert purchase tax into cess so that the proceeds are utilised on development of sugarcane in the State.

26.4.3 In most of the major sugar producing States, the purchase tax on sugarcane is now levied on a specific rate. A few States, however, still continue to levy the tax on ad valorem basis. In such cases, it becomes difficult to reflect the incidence of the tax in the levy price of sugar. If the system of partial control continues, the State Governments in those States may also be requested to levy purchase tax on sugarcane on specific basis so that its incidence can be properly reflected in the price of levy sugar.

Chapter 27

Financing

27.1 Like any other industrial undertakings, sugar units require long term loan finances to set up new factories or carry out expansions in capacity. In addition, working capital loans are also availed of by them.

Long term loans

27.2 The principal providees of long term finance have been the financial institutions such as IFCI, ICICI, and IDBI. For new sugar factories, the loan assistance is generally to the extent of 60% of the project cost. Generally the institutions join together in the grant of loan with any one of the institutions as the leader. After assessing the viability of the project, the loans were being granted with the normative project costs as the ceiling.

New units (Private Sector)

Nowadays, the institutions have been allowed to charge interest from a band and the normative concept cost is also not being rigidly adhered to. Each application is treated on merits for grant of loan. Besides these institutions, nationalised banks have also emerged as loan providers for factories to be established in joint sector. Equity part of the project is to be arranged by the promotors themselves.

New units (Co-operative/ Govt. Sector

27.3 For co-operative sector, the procedure for loan sanction is more or less similar. The co-operative banks are also offering loan assistance. Equity part of the project is split into two parts. Co-operatives are the joint ventures of farmers in the area who are also its members. 10% out of 40% of equity is to be brought in as farmers' contribution. Thereafter, the State Government would contribute the balance 30% of equity. For this, they are eligible to get 15% and 19.5% as refinance from National Co-operative Development Corporation (NCDC), for units to be located in normal areas (districts) and notified industrially backward districts respectively, which would has to be eventually repaid to them. The State Governments are finding it difficult to contribute to the share capital. In Gujarat, all the factories are in co-operative fold. In Maharashtra, barring a few, all belong to co-operative sector. Many new licences in Maharashtra could not be commissioned in time for want of equity capital from State Government. NCDC has limited budget of its own for meeting part of State Government obligation and cannot cater to the requirements of all the requests from State Government. At present, new sugar factories are not eligible for loan assistance from Sugar Development Fund. Since inception upto 31.3.97, NCDC had contributed to share capital for 181 units to the extent of Rs. 366.34 crores out of Rs. 383.17 crores

sanctioned. Statewise details are given in Annexure 27.1. During the 9th Five Year Plan period, they propose to participate in equity capital of twenty new mills in co-operative sector. During 1997-98, an amount of Rs. 5.1 crores is being provided.

Expansion projects

27.4.1 For these projects, loan assistance is available to the extent of 50% of the project cost from the financial institutions / banks as also NCDC. From the Sugar Development Fund set up by Government, loan assistance on soft terms is available towards meeting the equity portion of the project cost to the maximum extent of 40% under the scheme of modernisation cum expansion, now reduced to 37.5%. For obtaining loan from SDF, the projects must be vetted and cleared by financial institutions / NCDC. There is a moratorium of 8 years before repayment of loan and interest to SDF commences and it is repayable in 5 annual instalments. Earlier, the loan facility was restricted to expansions only upto 2500 TCD. It has now been relaxed to cover cases upto 5000 TCD. NCDC has sanctioned Rs. 350.35 crores for 46 units under modernisation / expansion and disbursed Rs. 288.63 crores upto 31.3.97. Statewise breakup is shown in Annexure 27.1.

27.4.2 Besides above, NCDC finances projects for by-product units (molasses based and power cogeneration plant) and meets the expenditure for hiring advisors under T & P Cell Scheme. Summary of assistance provided under various schemes is given in Table 27.1

Table 27.1 – Summary of assistance rendered by NCDC upto 31.3.97

Scheme	No. of units	Amount	
		Sanctioned (Rs. / crores)	Released
1. Share capital for new mill	181	383.17	366.34
2. Modernisation/Expansion	46	350.35	288.63
3. Sugar by-product units	33	105.86	91.18
4. Rehabilitation	17	13.15	13.15
5. T & P Cell	–	0.67	0.67

(Source : NCDC)

Need and adequacy

Working capital loans / cash credit arrangement

Role of RBI

27.5.1 As a seasonal industry, sugar factories produce sugar in four to five months and stock it for a year (sometimes even for a longer period when there is excess production) as monthly sugar release is regulated by Government to ensure supply of sugar throughout the year with minimum fluctuations in prices. Levy sugar monthly quota is more or less constant as it is based on uniform availability per capita for covering population as per the last census. Cane price payments account for sizeable outgoings and is tagged with the loans sanctioned. The loans are sanctioned based on peak stock holdings with a ceiling. Levy stocks are valued at levy price and free sale at prevailing market rates or average of prices during last three months, whichever is lower. Unless factories get adequate credit, cane arrears mount when as in 1995-96 production was an all-time high and many factories could not get loan on entire stock produced. Sugar factories are required to provide 20% margin on the stock value and balance is given by banks. From 22nd October 1977, as per Reserve Bank of India directions, margin on levy and free sale sugar has been reduced to 10 and 15 per cent respectively, affording some measure of relief to the sugar units.

27.5.2 Nationalised banks and other private sector banks are controlled by Reserve Bank of India. There is a Standing Committee on Coordination of Institutional Finance for Sugar Industry, constituted in January 1983 and headed by Deputy Governor of RBI, in which representatives from industry, bank, financial institutions and government are included. The Committee considers the problem of industry - financial and otherwise. The Committee met last (seventeenth) on 25th June, 1993 in Mumbai. Thereafter, with no pressing problem, the issues as and when raised are tackled by RBI through direct interaction with industry. RBI has ushered in deregulation. 'Maximum permissible bank finance for cash credit / working capital' prevalent till March 1997, has been withdrawn from April 1997 and banks have been given liberty to settle cash credit arrangements with sugar industry on their own. Realising the importance of the industry for getting need based credit, RBI vide its letter dated 14th August 1997, had urged the banks to 'ensure timely sanction of need based credit limits for borrowers in the sugar industry.' Due to delay in receiving levy price differentials from Government, banks were advised to increase credit limits on levy sugar sold at provisional price to the extent of difference between final and provisional prices with the stipulation for adjustment when the difference is reimbursed by Government.

Role of NABARD

27.5.3 Financial requirements of co-operative sugar factories for working capital are generally met by district co-operative banks. The co-operative banks are controlled by the apex body in the State and overall regulation of their functioning exercised by National Bank for Agriculture and Rural Development (NABARD). Unlike RBI, the co-operative banks are closely monitored by NABARD. Guidelines are issued annually by NABARD on cash credit policy to be followed by the co-operative banks. For the current sugar season 1997-98, credit policy has been announced by NABARD on 18th August 1997 under the heading 'Credit Authorisation Scheme.' The salient features are as follows :-

1. State / Central co-operative banks may sanction / renew cash credit (pledge) limits to co-operative / government owned sugar mills against stocks of sugar upto 120% of maximum amount utilised by them in 1996-97 season.

2. The above is allowable only to mills whose accounts are regular in 1996-97 and net worth is positive.

3. For mills with irregular accounts, banks have no discretionary power to allow cash credit. Prior authorisation from NABARD along with plan of action to set right irregularities in account and tagging for cane payment are necessary. Banks should not allow any irregularities in 1997-98 season.

4. Mills having negative net worth would get credit only after bank is given 'unconditional and irrevocable Default Guarantee from concerned State Government as to repayment of principal and interest' on cash credit drawn for 1997-98 season by them.

5. Extension of cash credit to new factories for the first time would need prior authorisation from NABARD.

6. Need based finance must be given to units qualifying for it based on peak requirements in 1997-98 season and ensuring maintenance of prescribed margin by mills at all times.

7. All requests for grant of additional cash credit would have to be submitted to NABARD for prior authorisation.

8. Banks must monitor the operation of the mill and ensure proper end use of credit, particularly with regard to cane dues of farmers.

9. Wherever mills are availing of incentive benefits as new / expansion, banks must ensure separate deposit of incentive amount and its utilisation for repayment of instalments of term loan and interest due to concerned financial institutions as IFCI, IDBI / commercial banks.

27.5.4 It is also seen that NABARD have issued elaborate guidelines for financing downstream units of the sugar mills as also for giving clean loans for off-season repair and also for purchase of stores and spares. RBI had earlier imposed a ceiling limit of Rs. 25 lakhs for clean loan to meet off-season repairs. It has now been removed and left to the banks for decision.

27.5.5 It appears that Ministry of Food & Consumer Affairs who have a major role to play in the maintenance of health of the sugar industry are not at all involved in such a vital area of operation. RBI and NABARD have not kept the Ministry informed of all the day-to-day developments and copies of communications issued by them are not being endorsed to Ministry of Food & Consumer Affairs.

27.6 It has sometimes been argued that share capital contribution by the State Governments without receiving any dividend constitutes a capital subsidy to the cooperatives sugar mills. Its incidence has been assessed at 16% of the investment cost by the World Bank in its draft report of April 1997 on India's sugar industry. It has been stated that this distorts investment decisions and has also led to mills being established in areas with little prospects of economically sustainable cane production. While there may be some weight in this argument, in the present circumstances in the country, the participation of State Governments in the share capital of the cooperative sugar mills is inescapable. The cost of a 2500 TCD mill at present is over rupees fifty crores. Its equity portion at 40% would be around rupees twenty crores. Since the cooperative sugar mills can raise their share capital only from the farmers within the area of the factory, unlike entrepreneurs in the private sector who can raise capital in the share market, it would be impossible for the promoters to raise this amount of capital on their own from the farmers. The share capital contribution by the State Government with assistance from NCDC is, therefore, essential if sugar factories of economic size are to be set up in cooperative sector. However, in order to minimise the risk of distortion and unfair advantage to cooperative mills vis-a-vis the private mills, the State Government should insist on payment of dividend by the cooperative mills at the

rate at which interest is paid by them on non-refundable deposits, or on term loan from financial institutions in case of mills which do not have any non-refundable deposits. It has been reported that sometimes the State Governments do not accept the offer of the mills to redeem the share capital contributed by the State Government in order to maintain their control over them. This is not justified and the State Governments should, in fact, encourage the cooperatives to redeem their share capital so that they can work on truly cooperative lines free from Governmental control.

27.7 It has been represented by National Federation of Cooperative Sugar Factories that financial institutions are not sanctioning term loans to cooperative sugar factories in the States where other factories set up in the past have defaulted and the State Government is not honouring its guarantee. The plea of the financial institutions is that the same principle is applied by them in case of private sector and loans are not sanctioned to units belonging to a group if some other units of the group are in default. In case of cooperative sugar mills, State Government is a co-promoter. However, this makes it difficult for promoters of new cooperative factories to raise financial assistance and the consequent delay in sanctioning the loans after the matter is sorted out between the financial institutions and the State Government, leads to escalation in costs. The State Governments should, therefore, ensure as joint promoters that the cooperative factories are run on sound financial basis and do not commit default in repayment of loans to financial institutions, and in the event of such default to honour their guarantee.

Chapter 28

Cooperative Sugar Mills

28.1 *Introduction:*

The cooperative sector of the sugar industry made real beginning after attainment of political independence in 1947. Prior to this, there were three cooperative sugar factories established in Andhra Pradesh and one in Uttar Pradesh. In the then State of Bombay, the progressive sugarcane farmers belonging to Mali community established a sugar factory at Malinagar, Tq. Malshiras, Distt. Sholapur, Maharashtra. All the members of this factory were very progressive sugarcane farmers themselves. They wanted to establish cooperative sugar factory but there was no Cooperative Act for registration and functioning of a cooperative sugar factory: so they established a joint stock company in the name of The Saswad Mali Sugar Factory Ltd. in 1932. The shares were all given to the farmers only. During the period of British rule, the rural leaders were busy in fighting for political independence. After attainment of political independence, the leaders diverted their attention to economic problems and they realised that political independence alone will have no meaning unless there is economic independence of the rural population particularly the farming community. The acceptance of democratic system at political level enabled the rural leaders to occupy position of power at various levels such as Gram Panchayat, Zila Parishad, State Assembly and Parliament.

28.2 *Pravara Experiment:*

Around this time, farmers in Shrirampur Tq. in Ahmednagar Distt. of Maharashtra led by Dr. Padmashree Vikhe Patil were holding a series of meetings for establishment of their own cooperative sugar factory. Padmshree Dr. Vikhe Patil organised such farmers and he was ably guided by Dr. D.R. Gadgil, the then Director of Gokhle Institute of Economics and Politics, Pune. The series of meetings culminated in the establishment of Pravaranagar cooperative sugar factory at Loni, Tal. Shrirampur, Distt. Ahmednagar, Maharashtra. Dr. D.R. Gadgil wanted State-partnership in cooperatives and he was strongly supported by Dr. Vaikunthbhai Mehta, doyen among cooperators and also the then Finance Minister of the Bombay State. Dr. Vaikunthbhai Mehta was pursuaded by Dr. Vikhe Patil to help the cooperative venture at Pravaranagar by contributing share capital from State Government of Bombay. This satisfied the requirement of equity portion of the project cost and the balance amount was given by Industrial Finance Corporation of India as term loan against the State Government guarantee for repayment of principal amount and payment of interest. The Pravara experiment proved highly successful and more and more factories came to be set up in the then Bombay State.

28.3 *Land Reform Policy:*

Another crucial development was the adoption of land reforms policy by the Government of independent India. Ceiling was imposed on land holding both irrigated and dry

lands. This made private sugar factories with captive large sugarcane plantations unworkable. Even the sugarcane estates developed by private sugar factories in Maharashtra State were taken over by the State Government and brought under the control and management of State Farming Corporation, a State Government undertaking. The cane supply from these fields to private factories was stopped. As a result, the private factories gradually closed down.

28.4 *Support Under Industrial Policy Resolution 1956:*

The Government of India announced in 1956 Industrial Policy Resolution which included policy for encouragement to processing of agricultural commodities in the cooperative sector on priority basis. In conformity with this policy, preference has been provided for cooperative sector in the Licencing Policy of the Government. As a result the new factories were established largely in the cooperative sector. As on 30-06-97, 254 out of 459 installed factories were in Cooperative Sector and these accounted for installed capacity of 77.54 lakh tonnes out of total installed capacity of 134.33 lakh tonnes.

28.5 *Pravara Pattern of Functioning of a Coop. Sugar Factory:*

The bye-laws of Pravaranagar cooperative sugar factory, its system of functioning, and its working of sugarcane price were thoughtfully planned by Dr. D.R. Gadgil and even today, the Pravaranagar model has by and large been repeated all over the country. Therefore, it is necessary to see the essential feature of the working of cooperative sugar factories as depicted in the Pravaranagar model.

28.5.1 *Linkage of share with cane acerage:*

The share capital is allotted among the sugarcane growers (existing as well as potential) on the basis of one share of Rs. 1,000/- corresponding to one acre of sugarcane cultivation. The normal financing pattern requires that 40% of the total project cost should be collected in the form of share capital. 40% share capital of the project cost is not possible to be collected in the initial period from the farmers when the farmers are having very low income level and investible surplus funds are not available. So the State Government with the assistance of Central Government through NCDC contributes a major quantum of about 3 times the farmers' share in the initial period. There was built in provision for return of the term loan of financial institutions and thereafter of State Government's share capital. The cooperative system made it obligatory to give each farmer member one vote irrespective of number of shares held by him. Even on share holding by any single member, ceiling was put under the Cooperative Society Act and Rules. The share could be purchased only by sugarcane cultivators in the specified area of operation of the sugar factory.

28.5.2 *Democratic Board-Professional Managers:*

The member share holders elected sub-zonewise their representative Directors on the Board of management at regular intervals. The Directors elected Chairman and Vice-Chairman

from among themselves. The management was in the hands of farmers' representatives and policy decisions were executed by professional managers firstly from outside and later from among the local educated youth who were trained and developed.

28.5.3 *Harvesting & Transport of cane not left to Members:*

Right from the beginning, the sugar factory undertook on behalf of its members, harvesting and transport of sugarcane from field to factory, through labour groups, contracted on behalf of farmer members. The maturity of cane was scientifically assessed before the start of the crushing season and sugarcane cutting orders were given by the factory's agricultural department on the basis of maturity. The factory also arranged the transport of sugarcane from field to factory. This system served large number of objectives. Principal advantages are as follows : (1) the factory got fully matured cane, (2) this was transported in shortest possible time and (3) supply was scheduled according to the crushing requirement of the sugar factory, with neither excess cane nor short supply (known as No Cane).

28.5.4 *Payment of uniform ex-field cane return:*

Being a cooperative society, the payment of uniform exfield price to each and every supplier was made. Harvesting and transport charges were pooled together and borne by all members. This satisfied the members because of equal treatment. This also solved a practical problem of locating a new cooperative sugar factory at economically central place and solved political disputes of asking for location of sugar factory in their respective village by sugarcane farmer members.

28.5.5 *Cane payment based on working results of sugar factory:*

System of sugarcane payment: The payment system was based on operational results. The basic concept was that sugar factory was an extension of farmers' agricultural activity of sugarcane cultivation. So instead of selling sugarcane, the farmers together processed the cane into sugar and sold the sugar and its co-products. Hence, total receipts from sale of sugar and co-products less the processing charges such as salaries and wages of factory workers, power, fuel, chemicals as well as harvesting and transport charges were available for distribution among the sugarcane suppliers pro-rata to individual supply. This payment was made in two or three instalments. No difference was made between small farmers and big farmers in any respect. The State Government retained power to fix cane price (correct word 'Cane Returns') as long as its share capital was not fully refunded and the Government guarantees to term lending institutions and others were outstanding.

28.5.6 *Deductions from cane price for various purposes:*

The fixation of cane price by passage of time evolved into a regular system and

while passing the residual amount to growers, the deduction were made towards repayment of loan of financial institutions and share capital of State Governments, non-refundable and refundable deposits, area development fund, hutments for poor, small savings scheme, contributions for Vasantdada Sugar Institute, contribution for National and State Relief Funds for natural calamities so on and so forth.

28.5.7 *Socio-economic Development through factory:*

Lastly, the sugarcane farmers have never looked upon sugar factory as only processing unit for sugarcane but through the medium of the factory, it has endeavoured socio-economic, educational and cultural development of the entire area surrounding the sugar factory.

28.6 *Cooperative & Private Sugar Factories Compared:*

The comparison between a cooperative sugar factory and a private sugar factory will make the position of cooperative sugar factory more clear. Broadly, the comparision is as follows:-

	Private	*Cooperative*
28.6.1	*Share:*	
(a)	A share represents right to dividend when company is a going concern.	A share represents right to processing of cane produced by the share holders and right to receive maximum possible cane price.
(b)	Shares can be purchased by anybody with investible funds in India & abroad.	Shares can be purchased by sugarcane farmers within the area of operation of the concerned cooperative sugar factory.
(c)	Shares are quoted on stock exchange.	Shares are not quoted on stock exchange.
(d)	Any number of shares can be held by an individual.	Limited number of shares allowed to be held by an individual.
(e)	Objective is to get more dividend. Hence shares of sugar company giving unsatisfactory dividend are sold by the holders.	Objective is timely processing of cane, and expect maximum possible price for sugarcane.

28.6.2 *Management:*

Management in the hands of owner - business house.	Democratic management through elected directors.

28.6.3 *State Partnership:*

Private	*Cooperative*
It is not there.	It is provided in initial period.

28.7 *Regional Variation from Pravara Pattern:*

28.7.1 The Pravara pattern was followed in the State of Gujarat, Maharashtra and North Karnataka, because these areas formed part of a common Bombay State. Hence, the bye-laws and functioning, harvesting and transport system as well as cane payment is similar in these areas. Due to encouragement of the Government of India and the message spread by Pravara experiment, (which was seen by the farmers' leaders in various parts of the country) the cooperative system of sugar factory spread all over India. The Pravara pattern has largely continued even at present in the states of Gujarat, Maharashtra and North Karnataka. However, variations have been made in other States.

28.7.2 *Reasons for variation:*

The main reason of changes from Pravara pattern has been caused by change in the State Government policy. For example, in the State of Tamil Nadu, newly elected Government removed elected Board of Directors in the cooperative sugar factories and initially, the party workers were nominated to the non-official posts. However, subsequently even these were withdrawn and the factory functioning came to be fully controlled by the Government appointed Managing Directors/Special Officers/General Managers in the sugar factory. The entire working of the sugar factory is centrally controlled by the State Government dealing with cooperative sugar factories (generally Industries Deptt.). The powers of the State Government are executed through Directors/Commissioners of Sugar. In the State Federations, elected Directors are no more there and these are General Managers/Special Officers of individual cooperative sugar factories. The entire operations of the cooperative sugar factory are controlled by the State Government. The sugarcane price is paid as per the State Government's advice and not on the basis of working results of the individual sugar factories, though some variation is made on account of the sugar recovery of the individual sugar mill. The system of State Government control also came to exist in the State of U.P., Punjab, Haryana, Rajasthan, Orissa, Assam, Kerala, etc. In all the States, where the Pravara pattern is not exactly followed, there has been some variation to the extent of control by the State Government. For example, now U.P. has got elected Directors in all the cooperative sugar factories but the elected Directors can elect only the Vice-Chairman of the sugar factory. The chairman continues to be the District Magistrate

of the District in which the factory is located. These elected Vice-Chairman are members of the State Federation of U.P. However, the elected Vice-Chairmen elect among themselves only the Vice-Chairman of the Federation and the Chairman of U.P. Federation continues to be the Secretary (Sugar) of U.P. Government. The Federation continues to be managed by IAS officers. The factories' General Manager are also mostly State Government officers. The State Federation controls service conditions of all the officers of the member cooperative sugar factories. The officers are transferable from one factory to another factory as well as from one factory back to the State Government service and vice-versa. All the economic decision for any sugar factory are taken by the State Federation only. A broad effect of this has been observed to be as follows:-

(a) The farmer members suppliers do not feel the same level of affinity to their cooperative unit as the farmers under Pravara pattern feels with their cooperative sugar factory.

(b) The members of a cooperative sugar factory do not get full advantage/disadvantage of the operational results of their sugar factory because uniform cane price is paid in the State. Hence a farmer supplying cane to a private sugar factory and to a cooperative sugar factory get uniform cane price.

Broardly the same pattern is followed in Punjab and Haryana. In these States also while elected Board of Directors exists the Chairman and MD and other Managers of the Coop. Mills are appointed by the State Government and are transferable from one Mill to another and as well as from a Coop Factory to State Government and vice versa. Chairman and MD of State Federations are also appointed by the State Governents from amongst its IAS officers. There is no noticeable change in the State Government policy in these States towards democratisation of the management and control of the sugar factories by entrusting more and more control in the hands of the sugarcane growers themselves. There is no noticeable increase in the collection of share capital from members and withdrawal of Government's share capital from the cooperative unit.

28.8 Broad comparision of working of cooperatives in Gujarat/Maharashtra/North Karnataka vis-a-vis cooperatives in other States is given below:-

		Cooperatives in Gujarat/ Maharashtra/North Karnataka	*Coops. In Other States*
1.	Ownership of units	Largely with cane growers.	Largley with State Government.
2.	Control	Exercised by democratically elected representatives of growers.	Exercised by States Government through Director/Commissioner of sugar.

3.	Management	Board decisions executed by professional Managing Directors appointed by Board.	Society chaired by District Magistrate managed by G.M./ M.D. appointed by Govt.
4.	Cane Price	Based on working results.	Based on Government advised uniform price for all factories.
5.	Managers' Tenure	Permanent at one place.	Transferable from one factory to another factory, from factory to Govt. & to factory.

Views of the Committee

28.9 The cooperative sugar factories in most States other than Gujarat, Maharashtra and North Karnataka are at present not functioning as truely cooperative organisations but are working more or less as a Department of the State Government. They are, therefore, unable to reap the advantages of cooperative form of organisation enjoyed by their counterparts in Gujarat, Maharashtra and North Karnataka. The control by State Government may be unavoidable so long as bulk of the share capital is contributed by the State Government and State Government is guarantor of the term loans. In order to function as truely cooperatives, the cooperative sugar factories in these States should, therefore, try to return the share capital of the State Government at the earliest possible and, thereafter, function free of Government interference in the management. It has been stated by some of the cooperative sugar mills before the Committee that in some States the State Governments do not permit the cooperative factories to return the Government share capital. This is not justified and the State Government should instead encourage the cooperative factories to return its share capital and become self-reliant, as already recommended in para 27.6.

28.10 So long as the State Government exercises control over the management of a cooperative sugar factory because of its share capital contribution, it should appoint professional managers, who are able to identify themselves with the factory and are accountable for the results and are not transferrable from one factory to other or from a factory to State Government and vice-versa. This is essential for improvement in managerial efficiency of these factories, which would be in the interest of both the cane growers and the State Government.

Chapter 29

Sick Mills

29.1 NABARD collects details from cooperative banks in the State about the financial position of cooperative units. The data on the financial status of cooperative sugar mills as supplied by NABARD as on 31.3.97 is shown in Table 29.1

Table 29.1 – Data on financial status of cooperative sugar mills in major States as on 31.3.97

Name of the sugar producing State	Number of CSMs	Number of CSMs in losses	Number of CSMs with negative networth	Number of CSMs with negative inadequate NDR
Karnataka	17	14	5	8
Uttar Pradesh	31	30	21	21
Tamil Nadu	15	13	7	4
Gujarat	18	11	5	7
Haryana	10	6	4	4
Andhra Pradesh	18	13	4	6
Punjab	15	10	8	8
Maharashtra	113	60	20	23
Total	237	157	74	81

Note : CSM - Cooperative Sugar Mills

NDR - Net Disposable Resources

29.2 Similar information in respect of private mills has not been available. However, according to the information supplied by the Industrial Finance Corporation of India on 6th March 1998, out of 157 sugar factories assisted by them, 61 were chronic defaulters, out of which 39 were considered by them to be sick, that is, their accumulated loss has exceeded the net worth. Nine of these companies are of BIFR and 30 non-BIFR.

29.3 The limited information available above shows that the financial position of the industry is not sound both in private and cooperative sectors. In Government sector, UP Sugar Corporation

Ltd. and Bihar State Sugar Corporation Ltd. are two major Government companies running several sugar mills. Most of the sugar mills under both the corporations have large accumulated losses.

Views of the Committee

29.4 Although no comprehensive study about the causes of sickness in the industry appears to have been recently carried out, the following appear to be main reasons for this sickness :-

(i) The price for sugarcane is, in most States, fixed by State Governments while the prices for levy sugar, which accounts for 40% of production, are calculated on SMP, which is much lower than the State Advised Prices, and prices of free sale sugar are also regulated by Central Government through regulation of monthly releases. Many of the State Governments, particularly in recent years, have fixed the cane prices at high level in the interest of the cane growers without regard to the price of sugar and the Central Government have been keeping the free sale prices at lower level in the interest of consumers. The free sale prices have thus not been allowed to rise adequately to offset the losses incurred by the mills on supply of levy sugar.

(ii) Till recently, Government have exercised control on price and distribution of molasses. The controlled price had been kept low in the interest of the distilleries and the alcohol based industries. Even after the price control has been rescinded by the Central Government, many of the State Governments have continued to exercise control on their distribution which leads to low realisation to the mills from the sale of their molasses.

(iii) As discussed in detail in Chapter 20, sugar industry in India has been experiencing wide fluctuations in output during the sugar cycle. Most of the sugar factories run into losses when there is over-production leading to fall in free sale sugar prices. If such a situation lasts for a few years, losses mount and net worth gets eroded. During the phase of lower production, efforts are made by Government of India in the interest of consumers to hold back the rise in free sale sugar prices by liberal free sale releases with the help of imports. Many factories are thus unable to recoup the losses incurred in the earlier phase of over-production.

(iv) Sometimes the units have been set up in anticipation of adequate cane becoming available but the same did not materialise either because of initial over-estimation, whether through mistake or deliberately to secure the licence, or anticipated irrigation projects on which the estimate of cane availability was based, did not get completed in time or sometime even got abandoned.

(v) Low availability of cane due to setting up of a number of units in close proximity, or due to reduced availability of irrigation, for example, due to fall in water table in Maharashtra.

(vi) Delay in development of adequate cane supplies for meeting the requirement of 2500 TCD capacity mills, which had been set up due to the insistence in the licensing policy on not licensing a mill below this capacity.

(vii) Uneconomic size of factories set up in the past and their outdated machinery, which have failed to expand and modernise due to financial difficulties or non-availability of adequate cane, despite the assistance provided from the Sugar Development Fund.

(viii) In some cases, the units may have gone sick due to mismanagement and misappropriation of funds.

29.5 In order to improve the financial health of the industry and prevent growth of sickness, it is necessary that proper policies are followed which promote efficiency and financial viability. Necessary recommendations in regard to such policies have been made in the relevant chapters in the report. However, it is necessary that some remedial measures are taken to rehabilitate the mills which have already gone sick. It is sometimes argued that rehabilitation of sick units involves subsidisation of the sick units by the healthy ones. It also puts premium on inefficiency and mismanagement and prevents their takeover by healthier units which would provide economies of scale. While there is some merit in this view, and it may not be desirable to waste funds on trying to rehabilitate potentially unviable units or to help units which have grown sick due to inefficiency or mismanagement, it is necessary to take effective measures for rehabilitation of sick units which are potentially viable to protect the interest of large number of farmers supplying cane to such factories and the workers employed in them. The capital investment involved for rehabilitation of a potentially viable sick unit would also be much less than that required for setting up of a new unit of equivalent capacity. In the case of private and Government factories, there is already a provision in the Sick Industrial Companies (Special Provision) Act 1985 for examination of their case for possible rehabilitation by BIFR. Sugar factories in the cooperative sector, like all other units in the cooperative sector, are not covered by this legislation and no legislation has been enacted so far to take care of sick industries in the cooperative sector, including sugar. Government may consider the desirability of either enacting a separate legislation for the industrial units in the cooperative sector or bringing them within the scope of the Sick Industrial Companies Act. Such a legislation will, however, have to apply to all industrial cooperative societies and a decision in this regard would have to be taken by Government on grounds of general policy. Till such a legislation is enacted, it is suggested that for sugar mills in the cooperative sector, a Committee under Secretary, Sugar and Edible Oils, with representatives from Department of Revenue, NCDC, NABARD, IFCI, Director (STM) and NFCSF may be set up. The representative of the concerned State Government may be co-opted as its member when the case of a cooperative sugar mill from that State is considered. NCDC may act as convenor and nodal agency of the Committee. This Committee may consider the reasons for the sickness of the unit and

make necessary recommendations in case of those which are potentially viable. In case of non-viable units, their merger with the adjoining mills, which will also provide economies of scale, may be encouraged.

29.6 So far as sick mills in the Government sector in Uttar Pradesh and Bihar are concerned, these are being kept alive by pumping in of large public funds towards payment of cane price and wages of workers which could be more profitably utilised for development of the State. In case of mills which are potentially viable, State Government should, therefore, take urgent steps to modernise them and expand them to economic capacity or to privatise them. In case of those mills which are not potentially viable because of inadequate availability of cane, steps may be taken to close them and transfer the cane area to the adjoining mills, provided those mills have the capacity to crush additional cane in the normal season.

Chapter 30

Sugar Trade

Introduction

30.1 Distribution of sugar had been subject to control since early forties. Control on price and distribution was enforced for the first time in April 1942 under Defence of India Rules. It was entitled Sugar Control Order, amended subsequently as Sugar & Sugar Products Control Order. It lasted till 7.12.47, till control was lifted. Thereafter, periods of control and decontrol followed. Details are given in paras 13.2 to 13.8 of Chapter 13. Upto 1967-68, control was on the entire production and sale. Now and then, some quantity as per formula laid down was allowed to be sold in the free market. With the introduction of partial control from 1967-68 season, part of sugar was allowed to be sold as free sale and these were regulated by Sugar (Control) Order, issued from time to time. At present the distribution and sale of sugar through wholesalers is regulated by the Sugar (Control) Order, 1966. Vide clause 4 of the said order, sugar producers can not sell sugar held by them without a direction issued in this regard by Central Government. At present, Central Government is issuing monthly free sale orders under which each factory is allowed to sell free sale sugar as per quota indicated in the Order.

Sugar through PDS

30.2.1 At present, 40% of sugar is acquired from all sugar factories except new sugar factories covered under 1993 / 1997 incentive scheme and expansion units to the extent of actual production in excess of base production as defined in the Scheme, at pre-determined zonal ex-factory prices for issue at uniform price throughout the country through Public Distribution System. Levy sugar distribution is governed by the provisions of Levy Sugar Supply (Control) Order 1972 and 1979.

30.2.2 Levy sugar distribution is done by State agencies or Food Corporation of India. Monthly levy release orders are issued to the direct allottee States and FCI who are to lift the quota from the factories. Dealers in sugar do not play any part in levy sugar distribution through PDS, and the provision of Sugar (Control) Order are not applicable to levy sugar.

Sugar wholesale dealers

30.3.1 Sugar factories are required to sell free sale sugar to recognised/licensed wholesale dealer. Central Government have delegated the power to license wholesale dealer in sugar to State Governments.

This has been done with a view to ensure that the movement of sugar from factory to market can be regulated and ceilings on the number of licences have also been imposed. In September 1990, Government of India directed State Governments to issue additional wholesale dealer licence in sugar to the extent of 50% of the numbers operating as on 1st August 1990. On 27th October 1997, this has been further raised to 60% of wholesale dealer licence issued as on 1st August 1990. The relaxation has been done to ensure adequate and smooth availability of sugar in the market in view of rising consumption and higher monthly free sale quota nowadays as compared to 1990.

30.3.2 Initially, the dealers were allowed to keep the sugar stock for only 10 days which was reduced to 7 days from 1991 to 1994. The same has been extended to 30 days as on date. Stock limits have been pegged at 500 quintals in cities and towns with a population of one lakh or more and 250 quintals for towns with less than one lakh population.

View of the Committee

30.4.1. The system of licensing of wholesale dealers and restrictions on their stock holdings and period of turnover of stocks were introduced during war time to prevent any excessive rise in prices through hoarding by the trade as it was not possible to augment supplies speedily in areas of shortage. In normal peace time, they serve no purpose. The number of wholesale dealers, particularly if licensing requirements are done away with, would be so large that any concerted action on their part to push up prices by hoarding of stocks would be impractical. With the free movement of stocks from one part of the country to the other, it is also not possible for the local dealers in a particular area to push up prices through hoarding. An apprehension is expressed in some quarters that in the event of removal of controls, the traders may withhold supplies if they anticipate rise in price in the near future. This, however, would only help to reduce the fluctuation in prices as the supplies during the period when shortages were expected would get augmented and the price at that time would not rise to the same extent. Free movement of goods and unrestricted trade would, in fact, help achieve the objective of Government policy of reducing the fluctuations in sugar prices during the course of the year. Restriction on the number of licences, in fact, often creates difficulties in the smooth availability of sugar in the market. That is why Government have been frequently obliged to increase the number of licences but since there is always a time lag between the need for larger number of dealers and the

Government decision to allow increase in licences, in the interim period, the availability of sugar to the consumers in areas where their number is inadequate suffers. Industry has also reported that in areas where the number of licensed wholesalers is small, they sometime take undue advantage of the compulsion on the mills to sell their free sale quota within a prescribed time limit and join hands to force the mills to sell it at less than market rate. The system of licensing thus helps to create a monopoly of the dealers which provides them opportunity to exploit the situation. The system also leads to unnecessary harassment and corruption. In none of the major sugar producing countries studied by the Committee, such a control on trade in sugar exists.

30.4.2 The Committee, therefore, is of the view that the present system of licensing of wholesale dealers serves no useful purpose and is counter-productive. The same may therefore be abolished. The existing restrictions on the holding of stock and period of turnover may also simultaneously be abolished.

Chapter 31

Pollution Control

31.1 Sugar Industry is an agrobased industry and the factories are located in rural areas. A large number of sugar factories have thus become synonymous with overall rural prosperity and play a vital role in the economy of the country but at the same time it is also a potent source of environmental pollution.

Rapid industrialisation is the need of the day. It is necessary to meet the daily growing requirements of the country. It is noted that any developmental activity often may affect the environment of the region in which the activity is taking place. However, in an anxiety to accelerate the pace of development, proper attention is invariably not paid to preserve the environment and ecological balance. Industrialisation also leads to consumption of substantial quantities of natural resources including water creating its scarcity.

The growing evidence of environmental pollution compelled the Government of India to enact appropriate legislation regarding Environmental Protection. The most important legislations for the control of water and air pollution are Water (prevention and control of pollution) Act, 1984 and Air (prevention and control of Pollution) Act 1981, under the provision of which State Pollution Control Boards were constituted. Some of the important legistlations in this regard are as under :

i) Water (Prevention & Control of Pollution) Act (1974)

ii) Water (Prevention & Control of Pollution) Act (1975)

iii) Water Cess Act (1977)

iv) Water Cess Rules (1978)

v) Air (Prevention & Control of Pollution) Act (1981)

vi) Air (Prevention & Control of Pollution) rules (1982)

vii) Environment Protection Act (1986) by Ministry of Environment & Forests. Government of India

viii) Hazardous Wastes (Handling & Management) Act (1993)

ix) Hazardous Wastes (Handling & Management) Rules (1994)

Under the provisions of these legislations, State Pollution Control Boards have been given vast powers to form standards for waste water disposal and gaseous emissions and to get

them implemented by the industry. Recently Supreme Court has also taken a note of some public interest petitions concerning environment protection.

Sugar factory waste mainly consists of liquid containing both organic and inorganic impurities which are as such not harmful or toxic to human body, plant and animal life. but after degradation are capable of fouling the environment if not treated and disposed off properly. Mill, clarification and boiling house washings, floor washings and leakage of juice from the pipes & pumps and entrainment of juice in condensers etc. are the main sources of water pollution from sugar mills.

Mill house waste is generated by continuous flow of water used for cooling the mill bearings which also pick-up oil and grease and occasionally juice from the spill over and leakages.

The waste from the clarification-house is not large in volume as compared to waste from other units but possesses high polluting matter.

Boiling and centrifugal floor washings, leakage of syrup, juice, massecuite and molasses etc. from pipes, glands of pumps or due to overflow of tanks also generates polluting waste.

The spray pond overflow also forms a serious source of pollution from the sugar factory. The condition becomes serious if there is a heavy entrainment of sugar materials taking place at the condenser.

The final mixed wastes from all sections of the sugar factory show a wide variation in their chemicals characteristics and the content of organic polluting substances – principally sugar and other carbohydrates. The polluting load of the mixed final waste varies from factory to factory and the BOD (Biological Oxygen Demand) values range between 800 mg/l to 1660 mg/l.

It is pertinent to mention that good house keeping has a very important role in improving the quality and quantity of the effluents and could well be considered an integral part of the waste water management system. Prevention and treatment of wastes should begin within the factory itselt. Trapping of cane juice splashing in the mill house, eliminating entrainment of sugar into effluents, proper handling of sugar house products like juice, syrup, massecuite and molasses, dry cleaning of floors etc. are the steps to be taken to achieve good house keeping. The factory should devote sufficient attention on this aspect and lay down procedures to achieve good house keeping practices such that the pollution load in the effluents is reduced to a minimum. Good house keeping not only reduces the waste disposal but also results in higher recovery of sugar and profits to the industry.

The effluent from a sugar mill as it leaves the factory premises, may not appear to be physically harmful due to its relatively clear appearance. However, after stagnation, it turns black due to the formation of hydrogen sulphide and starts emitting foul smell as a result of

fermentation of carbohydrates and nitrogenous matter. When released into streams, it depletes the dissolved oxygen of the receiving water and may cause killing of fish and mortality of other useful aquatic life. Oil and grease in the effluent hastens such mortalities since these hinder the dissolution of atmospheric oxygen into the receiving waters and take long time to decompose. When discharged on land indiscriminately, soil sickness may result because of the clogging of soil pores with decaying solids and oil and grease.

Sugar mill effluents are rich in carbohydrates and are readily biodegradable, both by anaerobic and aerobic processes. As the climatic conditions, viz. duration and intensity of sunlight and temperature conditions are favourable in our country, the biological treatment is the most efficient, simple, and economical.

Since all the sugar factories in India are located in rural areas and therefore, there is a wide scope for utilising these effluents on land for irrigation after suitable treatment.

31.2.1 A typical 2500 TCD factory (following double sulphitation process) generates about 1000 KLD of effluent, which may have the following constituents :

*	Oil and Grease	:	35 to 60 mg/l
*	Total suspended solids	:	250 to 1000 mg/l
*	Total dissolved solids	:	1500 to 2000 mg/l
*	BOD	:	1000 to 1500 mg/l
*	COD	:	1825 to 3000 mg/l

The BOD load in the final effluent may vary form 800 mg/l to 1600 mg/l. Also the effluent water does not contain toxic and hazardous substances. Hence it is possible to bring the BOD load in the final effluent water to as low as 500 mg/l by observing good house keeping practices. The oil and grease are trapped and separated leaving only carbo-hydrates which are readily bio-degradable and could be used safety for ferti irrigation. Considering the nature of the effluent water and the level of BOD, sugar industry is one of the low polluting industries. However, keeping in view its association with the distillery industry, the Government has classified sugar as one of the hazardous and high polluting industries.

The Ministry of Environment and Forests notified the Environment Protection Rules 1986, where under laid down standards for disposal of water water from sugar industries. As per the standards, the trade effluent should have BOD not exceeding 30 mg/l for disposal into river 'nala' etc. and not exceeding 100 mg/l for disposal on land. The discharge of effluent water for irrigation was in vogue earlier also and there were no prescribed standards for disposal of effluent in such manner.

Separate standards were prescribed for ferti-irrigation by an amendment order issued vide notification GSR 422(E) dated 19th May 1993 the Ministry of Environment and Forests notified that in the case of effluent containing bio-degradable organic matter without toxic chemicals and pathogens namely fermentation industry, sugar units, dairy plants and food and food processing industry units. The BOD level of 500 mg/l was permitted to be discharged on land for ferti irrigation. This provision was however withdrawn again based on the studies conducted by ICAR in regard to the indiscriminately disposal of waste water by distillery units, which it was feared might cause degration of soil as also contamination of underground water. This is again a contentious issue as the sugar factory effluent water does not contain may toxic ferti-irrigating. This has been followed not only in India but also in other countries such as Brazil, South Africa etc.

The standards prescribed by the Central and State Pollution Control Board for disposal of effluents are given in Table 31.1 and 31.2.

While total effluent discharged by the sugar factory varies from unit to unit depending up on the house keeping practices, the Ministry of Environment and Forest, as per the Notification No. GSR 422(E) dated 19th May 1993 has prescribed a norm for waste water generated by sugar factory at 0.4 m^3/t of cane crushed.

Table 31.1 – Standards Prescribed by Central and State Pollution Control Boards for Disposal of Trade Effluents

	Central/State Pollution Control Board	BOD 5 days limit mg/l 20°C	
		For Disposal into River stream	For disposal on land as irrigation water
1.	Bureau of India Standards (IS : 2490 Part I)	30	100 (500 for distillery spent wash for disposal as irrigation water for secondary treatment)
2.	Central Pollution Control Board	30	100 (500 for disposal as irrigation water after primary treatment
3.	Assan	Same as BIS and Central Pollution Control Boards Standards	
4.	Bihar	30	100
5.	Haryana	30	100
6.	Karnataka	—	100

7.	Madhya Pradesh (IS : 2490 Part I	Same as B.I.S. Standards	
8.	Maharashtra	50	—
9.	Tamil Nadu	30	—
10.	Uttar Pradesh	30 (50 for straw Board Industries and 100 for existing distilleries)	200 (500 for existing distilleries setup upto 1984 only)

Table 31.2 – Standards Prescribed by Bihar State Pollution Control Board for Disposal of Elluents of Different Industries

	Industry	BOD 5 days limit mg/l 20°C	
		For Disposal into River stream, etc.	For disposal on land as irrigation water
1.	Domestic effluent	20	—
2.	Oil Refinery	15	—
3.	Distilleries, Malteries Breweries	30	500 (For land disposal as secondary treatment for further removal of BOD)
4.	Integrated Iron and Steel	30	—
5.	Man made fibre (synthetic)	30	—
6.	Small pulp and paper	30	100
7.	Sugar 30	100	
8.	Leather Tanneries	30	100 (350 for disposal into public sewers)
9.	Natural Rubber	50	100
10.	Synthetic Rubber	50	—
11.	Composite Wooden (Mill)	100	—
12.	Cotton Textile (composite & Processing)	150	—
13.	General Standards	30	100 (350 for disposal into public sewers)

31.3 *Effluent Treatment Technologies Adopted by Sugar Industry*

A large number of sugar factories have installed different designs of ETP's for effluent treatment.

The effluent treatment system in a sugar factory may consist of any single or combination of one or more of the following system(s):

* Anaerobic Lagoons
* Anaerobic and Facultative system
* Water Hyacinth Cultivation
* Composting with Pressmud
* Bulk Volume Fermentation
* Anaerobic Contact Filter followed by Chemical Treatment
* Anaerobic Contact Filter followed by Aerated Lagoons
* Aerated Lagoons
* Anaerobic Lagoons + Oxidation Ditch
* Anaerobic Lagoons + Oxidation Ponds
* Anaerobic Lagoons + Algal Ponds
* Anaerobic Digestion + Aerated Lagoons
* Anaerobic Lagoons and surface Aerators
* Compressed Air Treatment in Aeration Tanks
* Arfil Towers
* Extended Aeration System
* Activated Sludge System
* Surface Aerators and Clarifier
* Activated Sludge and Bio-filter System
* Miscellaneous System.

Broadly the above treatment methods may be grouped into three main categories as under :

i) Anaerobic System

ii) Anaerobic System followed by aerobic system

iii) Totally aerobic system

31.3.1 *Anaerobic System*

Totally Anarobic

This method of treating effluents uses lagoons, contact filters, composting, bulk volume fermentation method, anaerobic digestion, anfil tower etc.

Semi-Aerobic Systems

This system employs Water Hyacinth ponds, algal ponds, oxidation ditch, oxidation ponds, bio-filter and natural oxidation process

31.3.2 *Anaerobic system followed by aerobic system*

This type of treatment uses Anerobic systems followed by semi-aerobic or totally aerobic systems like aerated lagoons, surface aerators etc.

31.3.3 *Totally Aerobic Treatment Systems*

In this type of treatment, combination of systems/methods such as extended aeration/ activated sludge cum bio-filter method, surface aerators, compressed air treatment in aeration tanks etc. are in use.

In general, treatment efficiency of anaerobic systems is more for high pollution load effluents like those of distillery, pulp and paper factory, tanneries etc. For low pollution load effluents, like those of sugar factories, totally aerobic systems are much more efficient. Anaerobic systems in such cases can help to reduce the cost of aerobic treatment. Semi aerobic systems preceded by anaerobic or aerobic systems serve as an efficient and economical way to get a lower BOD in case of high influent BOD of about 1000 mg/l or so.

31.4 Salient features of different treatment system are as under :

31.4.1 *Anaerobic Lagoons*

Generally anaerobic lagoons are 'kaccha' and lead to foul smell. Sometimes, pollution load may increase due to decay of vegetation during stagnation. The system requires much

longer retention periods and hence need very large areas of land for ETP. The cost of land, effluent seepage to under ground water, air pollution by foul smell are main factors making this system inefficient, but operation costs are negligible. Treated effluent of this system is not likely to meet the standards.

31.4.2 *Water Hyacinth Ponds*

This system needs more land, generally 'kaccha'. It is supposed to be more efficient than anaerobic lagoons, but disposal of large bio-mass is the main problem. At times, treated effluent may have higher pollution load due to decay of dead vegetation. It is helpful for the removal of some toxic metals from trade effluents (not present in sugar industry wastes).

31.4.3 *Bulk Volume Fermentation*

This process is suitable to treat distillery effluent for bio-gas generation. Sugar factory effluents with lower pollution load can be used alongwith distillery waste. It is not possible to reduce BOD to less than 5000 mg/l by this process in case of distillery waste, hence secondary aerobic treatment is necessary.

31.4.4 *Anaerobic Contact Filters*

This method of treatment requires less land, comparatively efficient for low pollution load effluents and works with low operation cost, but it is difficult to achieve prescribed norms in case of high BOD effluents and therefore, a secondary aerobic treatment is required with the above. It gets clogged in course of time and needs cleaning after a fixed interval of time. Anaerobic contact filter followed by aerated lagoons is a better alternative to using chemicals. In later case, recurring costs are higher and sludge disposal is another problem.

31.4.5 *Aerated lagoons with Surface Aerators/Extended Aeration with compressed Air Treatment*

These aerobic systems are more efficient and are capable of treating effluents of moderate BOD load of say 400 to 800 mg/l to a final BOD of 30 mg/l or less, provided bacterial culture is properly maintained at MLSS 3000-4000 mg/l and continuous aeration is done. The land requirement is less, treatment efficiency is high and running costs are more due to higher power requirement.

31.4.6 *Anaerobic lagoons followed by oxidation ditch/oxidation pond/algal pond*

This method of treatment requires more land, less operational cost and low power requirement, but requires comparatively long detention period. This method is less efficient than totally aerobic system. It is difficult to achieve prescribed standards for the final treated effluent if initial pollution loads are high.

31.4.5 *Anaerobic lagoons followed by Surface Aerators/Aerated lagoons*

This method of treating the effluents, require lesser land when compared to the above process and also needs less detention period in second stage treatment. By this treatment the treated effluents likely to achieve prescribed standards, if bacterial culture is maintained properly at MLSS 300-4000 mg/l and continuous aeration is practised. In general, this system needs more land and ETP cost is expected to be high due to construction of 'pucca' tanks of larger detention period, foul smell is formed during anaerobic stage.

31.4.8 *Arfil towers will PVC Pal Rings*

It is a system of PVC Pal rings filled anaerobic reactor designed for bio-methanation. it is being used in one factory of Gujarat, more details are not available about cost and efficiency.

31.4.9 *Activated Sludge/Extended Aeration/Surface Aerator followed by Clarifier*

This system needs less land no foul smell, less detention period (2-3 days in case of extented aeration and about one day in case of activated sludge) capable of treating effluents of around 400-800 mg/l BOD to less than 30 mg/l, if bacterial culture is properly mainained and continuous aeration is practised.

Due to high power requirement, the operational costs are high. In case of high pollution loads say 1000-2000 mg/l BOD, it is difficult to achieve prescribed norm of 30 mg/l BOD. Necessary to maintain low pollution loads by good house keeping practices to keep low pollution load in final effluents. An optimum system adopted by a large number of factories.

31.4.10 *Activated Sludge and Bio-filter System*

Capital cost involved in this system is high, but running cost is almost same as activated sludge process. The detention period is also less (one to two days). This system is more efficient for even high pollution load fluctuations. If proper culture is maintained and aeration is done continuously, foul smell can be eliminated completely and it can meet the prescribed standards of at high initial BOD loads of around 1500 mg/l.

31.5 Based on the above the following two systems are considered to be capable of treating sugar factory effluents efficiently :

i) *Activated Sludge and Bio-filter System*

This system comprises of :

— This filtering unit consisting of Coarse and Fine Screens to remove bagasse, cush-cush, grit, sediment etc.

— An oil and Grease Separator to remove oil and grease from effluent

— An equalisation-cum-pre-aeration tank to equalise fluctuations in volumes and loads and to freshen the effluent. About 5 to 10% BOD is also reduced in this unit. The pH neutralisation is also done here.

— An activated sludge tank to treat the effluent by either compressd air or by use of fixed surface aertors, with a detention period of about 24 hours. In some cases extended aeration is used with a detention period of 2 to 3 days. It gives about 90 to 95% reduction in BOD.

— A Bio-filter to further treat the effluent by natural oxidation using micro-roganisms fixed on solid supports such as brick pieces, stones, wood, plastic media etc. The effluent is sprayed over solid media and recycled to get maximum reduction of BOD. It gives about 80 to 90% reduction in BOD depending on extent of recycling of effluents. A single or a number of bio-filters in series or in parallel may be used depending on pollution load or volume of the effluent to be treated.

— A Clarifier or Settling Tank to remove secondary sludge formed in activated sludge aeration tank and bio-filter. part of the settled sludge is re-cycled back to activated sludge tank to maintain high culture density (MLSS).

— Some times primary clarifier is also used before pre-aeration-cum-equalisation tank in order to remove suspended matter. If sludge is more, two secondary settling tanks, one after activated sludge tank and other after bio-filter-may be used.

— Sludge drying beds to dry settled sludge in a period of 10 to 15 days, so that it may be disposed off as manure to the fields.

ii) *Extended Aeration/Activated Sludge process and Clarifier*

Generally, the system is economical and efficient and has been adopted by a large number of sugar factories of India. The system comprises of :

* A system of coarse and fine screens

* An oil and grease separator

* An equalisation-com-neutralisation tank

* An aeration tank to provide 2 to 3 days retention time

* A Clarifier to provide sludge settling facility and recyclining of sludge to aeration tank

* Sludge drying beds.

The brief details of three typical ETP]s basied on extended aeration, activated sludge and Bio-filter-cum-activated sludge process used by sugar factories are given Table -31.4. The specifications of plant and equipment may vary from one plant supplier to another. The land requirement for a 1250 TCD factory treating 500 KLD of effluent by activated sludge process is likely to be 800 to 1200 sq. meters.

Table 31.4 – Brief Details of Typical Effluent Treatment plants based on different Treatment Systems Used by Sugar Factories

S.No.	Description	Treatment Sustem Details		
		Extended Aeration (560 KLD)	Activated Sludge (500 KLD)	Bio-filter and Activated Sludge (720 KLD)
1		2	3	4
1.	Screen Chamber (RCC)	1 (No.) (2x1.65 m)	(1 No.) (1.5x1x1m)	(1 No. 40 min dern.) (4x2x2.4 m)
2.	Grit Chamber (RCC - 1:2:4)	(1 no.) (2x1.2x2.6 m)	—	—
3.	Oil & Grease Trap (RCC)	(2 Nos.) 12.8x1.2x2.6 m)	(2 Nos.) (5x1.5x1.5 m)	(1 No.) 1.68x1.2x1.3m Depth
	Detention Time	40 min	30 min	15 min
4.	Aeration Tank (RCC)	(2 Nos.) (14.8x13.86x3 m)	(1 No.) (10.5x10.5x4.5 m) SWD	(1 No.) 11.57x11.57x 4.05 m)
	Detention Time	3 days	24 hours	18 hours
5.	Surface Aerators (fixed) (1450 RPM)	10HP x 4 Nos. 15HP x 2 Nos. Total = 70 HP	2 Nos. Compressors. 12.5 HP each & No. Aeration grid or 2 Nos. 20 HP fixed aerators	1 No. 25 HP Aerator in Aeration Tank & 1 No. 10 HP in Equalisation Tank

1		2	3	4
6.	Clarifier (RCC)	(1 No.) 5.3 m dia x 2.65 m depth	(1 No.) 6 m dia x 2.3 m depth	(1 No.) 6 m dia x 2.5 m depth
	Detention Time	4 hours	3 hours	2 hours
7.	Sludge Drying Beds (Bricks, masonry work)	10 x 10 x 1 m divided into 6 sections	5 x 5 x 1.2 m divided into 4 sections	3 x 4 x 1.5 m divided into 3 sections
8.	Sludge Recycle Pump	(2 Nos.) 5 HP each	(2 Nos.) 5 KL/hr, 4 m head	(2 Nos.) 3 HP, 18 KL/hr
9.	Clarifier Peripheral/central) Drive)	(1 No.) 3 HP	(1 No.) 3 HP	(1 No.) 3 HP
10.	Effluent Pumps	—	(2 Nos. 25 KL/hr. 3 m head	(2 Nos.) 30 KL/hr. 5 HP. 4 m Head
11.	Equilisation Tank	—	(1 No.) (3.17 x 1.7 x 2 m)	(1 No.) (6 x 5 x 3 m)
	Detention Time	—	30 min.	3 hours
12.	Bio filter	—	—	(1 No.) (7.63 m dia x 5.95 m height) Plastic media used
13.	Bio-filter Recycle Sump.	—	—	(1 No.) (3 x 1.5 x 1.9 m)
14.	Bio-filter Feed Pump	—	—	(2 Nos.) 7.5 HP. 145 KL hr. 7 m head
15.	Installation Cost* (Rs. lacs)	8.75	16.00	18.00
16.	Operational Cost* (Rs. lac/month)	0.17	0.80	0.80

* Based on 1992 data given by factories to NSI

31.6 The important factors identified in a successful effluent treatment system by activated single/extended aeration/bio-filer processes, in general are :

* Good house keeping
* primary treatment
* Water and waste water management by recycling of unpolluted/other wastes
* Sufficient number of aerators of required power and proper design
* Regular and efficient aeration causing a good turbulence in the aeration tank
* Addition of required dose of lime, urea, DAP and effluent during culture development.
* A proper bacterial culture with a MLSS content of 3000 to 400 mg/l
* A proper supply of nutrition to micro-roganisms in the ratio of 0.1 to 0.2.
* A well designed clarifier with a re-tention time to 4 to 6 hours with proper mechanical arrangement for sludge removal and recycling back into aeration tank.

The efficiency of any system depends mor on the operational aspects than on design only.

31.7 *Air Pollution and Its Control in Sugar Industry*

The Environmental Protection Act 1986 laid down standards for stack gas emissions from boilers given in Table 31.5. As would be seen that the stack gas emissions prescribed were mainly related to coal consumption per day. On representations made by the sugar industry for separate norms for bagasse fired boilers, a Core Group was constituted in the Central Pollution Control Board, which after consultations with experts in the industry and eminent technical experts prescribed emission standards which are given in Table 31.8.

The State Government prior to the notification of emission standards for bagasse fired boilers fixed different norms for particulate matter the main pollutant in stack gas emission in sugar factory boilers. Even after the Central Government suggested norms based on technical expertise the State Governments fixed different norms for air emission by sugar industry which are very rigid compared with the norm suggested by the Central Government as would be evident from the Table 31.7. For stack height the same norms which are applicable to coal fired boilers are applied to sugar industry and these are given in Table 31.6.

Table 31.5 – Air Pollution Control Standards Evolved by Central Pollution Control Board for Small Bodies

(Emission Regulations Part IV : COINDS/26/1986-87)

Capacity of Boiler	Control Device	Coal Consumption (MT/day)	Required suspended particulate Matter (SPM) (Emission* (mg/N cubic meter)
Less than 2 tonnes/hr	Cyclones	8.5	1600
2 to 15 tonnes/hr	Multi-clones	8.5-64	1200
More than 15 tonne/hr	Bag filters	More than 64	150

* All emission normalised to 12% carbondioxide

Table 31.6 – Stack Height standards evolved by Ministry of Environment and forests Notification No. GSR 422(E), dated 19th May 1993 (Part D, II Equipment based Standards)

S.No.	Parameter	Standard	
1.	Sulphur Dioxide		Stack-height limit in meters
	i) Power generation capacity		
	— 500 MW and more		275
	— 200/210 MW and above to less than 500 MW		220
	— Less than 200/210		$H=14\ (Q)^{0.3}$
	ii) Stream generation capacity	Coal consumption per day	
	— Less than 2 T/hr	Less than 8.5 MT	9
	— 2 to 5 T/hr	8.5 to 21 MT	12
	— 5 to 10 T/hr	21 to 42 MT	15
	— 10 to 15 T/hr	42 to 64 MT	18
	— 15 to 20 T/hr	64 to 104 MT	21
	— 20 to 25 T/hr	104 to 105 MT	24
	— 25 to 30 T/hr	105 to 126 MT	27
	— More than 30 T/hr	More than 126 MT	30
			or using the formula $H=14\ (Q)^{0.3}$

Note : H – Physical height of the stack is metres
Q – Emission rate of SO_2 in kg/hr,
MT – Metric Tonnes

Table 31.7 – Standards for Stack Emission Prescribed by Tamil Nadu State Pollution Control Board

S.No.	Paramter	Unit	Tolerance		
			Residential Rural Area	Sensitive Area	Industrial mixed use
1.	SO_2	microgram/cu.metre	80	30	120
2.	CO	micrograms/cu.metre	2000	1000	5000
3.	NO_8	micrograms/cu.metre	80	30	120
4.	SPM	micrograms/cu.metre	500	100	500

It suggests a tolerance limit of 30 to 120 microgram per cubic meter for SO_2, 1000 to 5000 microgram per cubic meter for carbon monoxide, 30 to 120 microgram per cubic meter for nitrogen oxide and 100 to 500 microgram per cubic meter for SPM depending on the area in which the boiler is under operation.

Fortunately, sugar factory flue gases do not contain any toxic emissions except SO_2, CO and the SPM in the form of fly-ash particles. The flue gases of a sugar factory contain SPM of around 1500 mg/N cubic meter.

Table 31.8 – Air Pollution Control Standards (SPM) for Bagasse fired Boilers

(Vide Ministry of Environment and Forests, Government of India Gazette Notification No. GSR 422 (E) dated 19th May 1993)

S.No.	Description	Parameter	Concentration (mg/NM^3)
59.	Bagasse-Fired Boilers Emissions		
	a) Horse Shoe/Pulsating grate	Particulate matter	500 (12% CO_2)
	b) Spreader Stroker	Particulate matter	800 (12% CO_2)

Note : In the case of horse shoe and spreader stroker boilers, if more than one boiler is attached to a single stack, the standard shall be fixed based on added capacity of all the boilers connected with the stack.

To reduce the same to the prescribed standards, various types of control devices are used by sugar factories, such as :

— Air duct with cyclone catcher

— Cyclone Arrester

— Dust Collecting System

— Fly ash arresters

— Monoclone type mechanical dust collector

— Norrick multiclone type dust collector

— Soot trap and dampers

— Vertical cone type flyash arrester

— Wet scrubber type flyash arrester

The standard specifications for sugar plants provide for multi clone type dust collectors, which is cost effective and consumes less power for treatment of air pollution in sugar industry. under normal operating conditions it has an efficiency of about 60 to 80 percent and capable to bring down the emission level to 500 mg/NM^3 for horse shoe/pulsating type boiler and 800 mg/NM^3 for spreader stoker boiler depending upon the initial SPM load in flue gases and type of boiler used (table 31.9). The typical analysis of stack gases coming out of different type of mechanical dust collection devices is given in table 31.10.

31.8 Comprative efficiency of different types of air pollution control devices used in sugar factories is indicated below :

Table 31.9 – Comparative efficiency of different air pollution control devices

S.No.	Equipment	Efficiency
1.	Settling Chambers	Arrests upto 20 micron size particles
2.	Cone type/inertial type.	50%
3.	Single cyclone	50%
4.	Multiclone	60 to 80%
5.	Bag Filters	95 to 99.5%
6.	Electostatic Precipitators	95 to 99.9%
7.	Wet Scrubbers	95 to 98%

Table 31.10 – Comparative performance of different types of flyash collectors used in sugar factories

S.No.	Boiler	(SPM) Suspended Particulate matter) (mg/N cu.metre)		
		Multiclones	Inverted cone	Scooping+ multiclones
1.	**Stepgrate with ID FAn**			
	Before Collector	400	400	400
	After Collector	120	239	80
2,	**Horse Shoe Balanced**			
	Before Collector	1500	1500	1500
	After Collector	450	900	300
3.	**Spreader Stroker**			
	Before Collector	2500	2500	2500
	After Collector	750	900	500

31.8.1 *Fly-ash Arresters/Dust Collectors/Cyclones*

These type of equipments are more suited for coal fired boilers of small capacity. The Fly-ash particles in stack gases of bagasse fired boilers are likely to escape out unless these devices are carefully operated. The use of multi-clones as an operational item for air pollution control has been suggested in the standards specifications for a 2500 TCD sugar mill. It is felt that with this arrangement. SPM content may be brought down to about 800 mg/N cubic meter or even lower.

Requirement of careful and controlled operation of these devices and high power consumption are the limiting factors. A large number of factories have installed Fly-ash arresters.

31.8.2 *Wet scrubber type fly-ash arrester*

These are likely to be more efficient for bagasse fired boilers provided water scrubbing nozzles are properly placed in the device and proper scrubbing of stack emission is ensured. The treated effluent from ETP or unpolluted less polluted effluents may be used for scrubbing instead of flesh water, which may be settled in a tank before recycling back to ETP for further treatment. It is likely to increase the volume of effluent to be treated in ETP. Many factories in Punjab are stated to have successfully installed these devices.

31.8.3 *Bag Filters*

bag filters may be suited to bagasse fired boilers provided they are made to withstand high temperatures of stack gases, or the gas temperature may be suitably brought down to prevent the chances of ignition. There is a need to study their working as in case of wet scrubber type fly-

ash arresters. These are likely to incur high installation and recurring costs than fly-ash arresters and are not favoured.

Considering the above, its observed thatthe multiclones, wet scrubbers are the air pollution control equipments suitable for Sugar Industry bagasse fired boilers. Escape of small quantity of SO_2 from sulphur burners and joice sulphiters can be easily controlled by proper equipment design and process control. The following inferences have been drawn in this respect.

* Bag filter technically do not suit well for bagasse flyash, separation.

* Although the ESP's are very efficient, these are economically not feasible.

* Single cyclones are less efficient and do not meet the emission standard level.

* Additional power consumption in wet scrubber is about 350 HP for a 2500 TCD plant. The efficiency of this system is very high. However, in some factories, due to existing power limitation the use of wet scrubber may be difficult to adopt, but generally this system can be considered as appropriate for Sugar Industry boilers.

A practical solution could also be the installation of multiclones of the compounding of settling chambers, inertial separator and multiclones. By adopting this, the emission level of about 250 mg/N cubic meter of SPM may be obtained. Whereas, in case of wet scrubbers, a still lower level of SPM than the above than be achieved.

31.9 *Noise Pollution*

Noise is a disturbing factor and lowers efficiency in work. It disturbs sleep and leads to nervous irritability. In sugar factories, machines cause noise while in operation. Power treansmission through mechanical parts, leakages of steam, moving of conveyers and blowing of hooters etc., are sources of noise pollution. The replacement of chain type conveyors with belt conveyors wherever possible, gear transmission, with hydraulic power transmission use of good quality material to stop steam leakages, balancing of rotating parts etc., reduce noise. Since noise is energy, more the noise in a factor, more will be the power losses.

There are no standard prescribed on noise pollution for sugar industry, but according to the available literature, 150 db (decible) noise level can cause immediate hearing damage. Acceptable noise level in rural, sub-urban, city and industrial areas vary from 25 to 60 db. Table 31.11 lists the American National Standard Specifications for sound level in the industry. Reduction in, the noise level in sugar factories will save energy and improve working efficiency of the personnel.

31.10 *Present Status of Water and Air Pollution in Sugar Industry*

31.10.1 *Water Pollution*

As far as water pollution control in sugar industry is concerned, most of the factories have installed ETP's based on anaerobic-cum-aerobic treatment methods, either alone or in combination

or are using some kind of treatment method. Most of the factories are using the treated effluents for ferti-irrigation since the BOD values of treated effluent are unable to meet the perscribed norms of 30mg/1 for disposal into river stream.

It has been observed that sugar factory effluents are rich in nitrogen, phosporuous and other fertilising nutrients for soil and can save valuable resources of the country in the form of fertilisers and irrigation water. This practice has been in vogue in several countries including Cuba, Brizil, Mexico and Australia. Even in our country, ferti-irrigation has been adopted in the long past without any adverse effects save in some exceptional cases where untreated effluents ofsugar factory and distillery are dispossed anaerobic decomposition of the wastes.

The sugar factory effluents do not contain toxic and hazardous substances as such and can be safely used after proper treatment for ferti-irrigation. A lot of work on these lines has been done by Tamil Nadu Agricultural University. VAM Organics Ltd., Gajraula, GB Pant University of Agriculture and Technolocy, Pantnagar and Haryana Agriculture University, Hissar and beneficial effects have been reported in higher yields of sugarcane and other crops. The distillery effluents have high pollution loads and have high potash content in addition to nitrogen and phosphate.

It is therefore, important that the sugar factory effluents should be delinked from the distillery effluents and effluents from other industries attached to sugar mills and take out from the list of hazardous industries.

31.10.2 It may appropriate to decide the BOD levels of treated effluents of the factory on case to case basis instead of insisting on final BOD of 30 mg/1 in all cases. Wherever feasible, emphasis should be laid on minimisation of wastes and their recycling to achieve zero pollution or to reduce the cost of treatment. After examining all aspects, ferti-irrigation may be allowed, rather encouraged, on case of case basis in order to conserve our national resources like water, power and fertilizers. Only in such cases where treated effluents are directly allowed to be drained into rivers, a final BOD of 30mg/1 or more may be insisted. An incentive to the sugar industry for reduction in pollution loads expressed in terms of tonnes of Chemical Oxygen. Demand may also help greatly in pollution control.

31.10.3 *Air Pollution*

To control air pollution, quite a large number of factories have installed some type of fly-ash arrester, but their number is low as compared to ETP's installed to control water pollution. Another aspect is the high power consumption is operation of these fly-ash arresters and hence only some of the stacks are connected to the fly-ash arresters. allowing the rest of flue gases to go into the atmosphere as such. The proper control and operation of these devices is a major factor to affect their efficiency, hence there is a need to design better types of multi-clones with low power consumption.

Some factories in Punjab are stated to have achieved zero pollution with the help of water scrubbers, which need to be verified for demonstration to other factories. Water scrubbers are

more efficient devices than multi-clones, but their properdesign and operation is an important consideration. Their high water consumption and therefore. Generation of additional effluents require further treatment, i.e. the air pollution gets converted into water pollution. For the purpose of economising the performance of wet scrubbers, it is suggested to use of less polluted effluents of sugar factory for water scrubbers and recycle these to save water consumption. The polluted effluents generated may either be passed through a clarifier or a settling tank to remove the settled solids. These solids may be used as manure alongwith press mud or may be briquetted into fuel. The effluents may then be sent to ETP for treatment.

31.10.4 *Noise Pollution*

Although there are standards for control of noise pollution. in general, but no spefific standards has been laid down for the sugar industry. At present no specific efforts appear to have been made by sugar industry to reduce noise levels in sugar factories. Even though PCB's are not insisting on this aspect, it is obligatory for the industry to take necessary steps to reduce the noise in the sugar factories by proper repair and maintenance of equipments, pumps, mill bearings, gears etc. and replacement of more noise creating devices with better ones. It will improve the efficiency of the workers and will indirectly add to the productivity of the industry. Since, noise is energy, reduction in noise levels will also reduce power and steam consumption in the factories.

To summarise, the sugar industry has started taking necessary steps to control water and air pollution. Financial constraints have affected proper functioning of ETP's. It is felt that it some value added products are obtained during anaerobic and aerobic treatment of effluents, like bio-gas, cattle feed, proteins, enzymes, vitamins etc. present in the bacterial bio-mas formed, then the cost of treatment may be compensated to a great extent. It may also help the industry to diversify suitably, Development of appropriate and cost effective technology in this regard may be an answer to the problem.

31.11 *International Scenario*

At the international level also different countries have formed their standards in regard to protection of environment and have enacted necessary legislations. WHO has formed International Standards (1971) for drinking water and ISI (now renamed as BIS) has also formed nearly similar standards (Table 31.14).

A survey data from 11 sugar producing countries including India. Indicates that pollution control legislation have been instituted mainly between 1970-80 (5 countries). prior to 1970(2), from 1980-90(3) and after 1990(1). Most countries have reviewed their legisltion andtightened the requirements in the past ten years.

In eight of the countries there is at least an annual visit to sugar factories by enforcement authorities. Some respondents indicated that there were regular monthly visits.

In four of the countries surveyed, contaminated runoff from cane yards is regarded as factory effluent and must be treated accordingly, A sump-and-weir system is needed to capture the first running for treatment, but to divert subsequent heavy flow to a natural watercourse.

Some of the standards applicable in different countries are summarized in Table 31.11

In addition to the standards shown in Table 31.11, there are others that must be met but these are usually not a problem with sugar factory effluents. (The island of Reunion has 46 standards). Some countries have a different set of standards for water that is to be used for irrigation while others have no legal standards for such water.

Table 33.11 – Standards required by different countries for effluent that is to be discharged to public water

Country	Parameter and Standard (mg/1)								
	COD	BOD	pH	°C	Na	P	Pb	Oil	SS
Australia		20	6.5-8.0	1+	?	?	?	?	30
Colombia		%	6.0-9.0	40		.03	%		
India	250	30	6.5-8.0	30	60	5	.1	10	100
Indonesia	200	30	6.5-8.5			2	10	1	175
Jamaica	100	50	6.0-9.0	45		5	.1	10	50
Mauritius	30	20	5.0-9.0	40	230	.7	.05	.2	30
Philippines	100	50	6.5-9.0	3+			5	70	
Reunion Island	125	30	5.5-8.5	30		10	.5	10	35
South Africa	75		5.5-9.5	35	90^				
	1	.1	5	25					
Thailand		60	5.0-9.0	40			.2	5	30
USA*	15	*	*						

Source : ISSCT proceeding; XXII Congress-1996

\+ = Max. Temp. rise at "sink"

% = 80% reduction required

^ = Max. rise above intake concn.

* = See text for some louisiana standards.

? = being decided

SS = suspended solids

The 1983 US Federal Water Quality Standards for Louisiana factories allow discharge (30 day avg.) of BOD and suspended solids equivalent to 0.0045% and 0.0071% respectively of the cane processed. Louisiana standards are specific for the five different waterways involved, each requiring at least 5 mg/1 of dissolved oxygen in the discharged effluent. Dissolved solids standards range from 200-2000 mg/1: focal coliforms, from 200-10,000/100 ml.

Effluent Quantities

The volume of effluent ranges from almost zero to 1100% on cane, depending of whether cooling water and/or cane washing water is passed on the effluent system. The survey results show that factories without cane washing plants generally produce 0.2-0.3 m^3 of of effluent/t of cane crushed. This excludes "once-through" cooling water which can be discharged without treatment. much higher quantities are reported from countries where it has not yet become necessary to treat the effluent fully before discharge (e.g. Reunion and mauritius).

Concentrations

Factories producing 0.2-0.3 m3 of effluent/t of cane generally report COD concentrations in the range of 1500-2500 mg/l. The concentrations rise considerably during factory washing and can be influenced by management in the factory.

Aerobic Treatment

Anaerobic Treatment alone seldom reduces the COD to the required level so it needs to be followed by aerobic treatment. Table 31.12 summarises survey results of the No. and types of aerobic facilities in use. It is evident that many cane sugar factories have aeration ponds, mostly simple shallow ponds but sometimes with mechanical aerators. An increasing number of more sophisticated aeration systems are being installed in cases where space is limited or where greater control is required.

Table 31.12 – The No. and types of aerobic facilities in use

Country	Activated sludge	Biological filter	Aeration ponds
Australia	4	0	Yes
Colombia	0	0	Yes
India	±250	±25	±140
Indonesia	0	0	Yes
Jamaica	0	0	Yes
Mauritius	0	0	Yes
Philippines	0	0	Yes
Reunion Island	0	0	Yes
South Africa	8	2	Yes
Thaland	0	0	Yes
USA (Louisiana)	0	0	Yes

Source : ISSCT Proceeding : XXII Congress -1996

World over, the average emission standards for SPM is 350 ppm. In South Africa wet scrubbers are in use for control of emissions.

Some countries have set their noise pollution levels. American National Standard Specifications for sound level in the Industry is given in Table 31.13.

Table 31.13 – American National Standard Specification for sound Level in the Industry

Duration per day (hours)	Sound Level [db (A)]
16	80
8	85
2	95
1/4	110
1/8	115

Source : ISSCT Proceeding; XXII Congress - 1996

db = desibels, noise level unit

The exposure to noise if composed to two or more periods in one day, then the combined effect is considered.

maximum penalties for, non-conformity with requirements are generally, severe, involving substantial fines and/or jail. South African legislation has recently been changed so that maximum fines are not fixed but are determined according to the savings that are being made by not treating effluent properly. seven countries indicated that their legislation made provision for closure of offending factories.

Minimum training requirement for effluent plant operators are specified in the legislation of five countries. In India and South Africa and plant manager generally requires a BSc. or equivalent.

31.12 *Views of the Committee*

Pollution abatement and control is an important area and the sugar industry must take utmost care to ensure that minimum environmental pollution is caused due to it. The Committee notes that in case of sugar industry, the main source of pollution to the environment are through water and air.

31.12.1 The Central Pollution Control Board (CPCB) had laid down the standards in 1993 for suspended particulate matter in emissions from bagasse fired boilers. The standard fixed by

CPCB is 500 mg/NM^3 for horse shoe type boilers and 800mg/NM^3 for spreader stoker type boilers. Various State Pollution Control Boards have fixed more sringent standards which are actually applicable to coal fired boilers. Thus while the CPCB has formulated specific standards for bagasse fired boilers, the State Pollution Centrol Boards have failed to fix any standards for the bagasse fired boilers and continue to apply standards for coal fired boilers to bagasse fired boilers which are unnecessarily more stringent. It is therefore, recommended that the State PCB's may revise and fix standards suitably for bagasse fired boilers such that these are in conformity with the standards fixed by the Central Pollution Control Board. Higher standards may be fixed for sugar factory boilers only under special circumstances eg. in the case of boilers located near inhabited areas or places of tourist interest etc.

31.12.2 Initially the Central Pollution Control Board was allowing water effluents discharged with a BOD load of upto 500 PPM for ferti irrigation provided certain conditions were fulfilled. This relaxation was withdrawn in April. 1996 on the ground that the conditions prescribed were not practical and therefore, earlier standard of 100 PPM were restored. For the purpose of ferti irrigation, a sugar plant of 2500 TCD would require about 150 acres of land, which is normally available near the sugar mill. It is therefore, recommended that the Central Pollution Control Board may restore the relaxation which had earlier been allowed for BOD load of upto 500 PPM. The CPCB may also commission a study to assess the limit of BOD to be allowed to ferti irrigation which may be entrusted to National Environment and Engineering Research Institute (NEERI) or some other competent institute.

31.12.3 The Committee notes that the CPCB and hence various PCB's are treating sugar industry as hazardous industry, but the basis of regarding it as hazardous industry is not known. One of the reasons of treating it as a hazardous industry could be that often distilleries are attached to the sugar mills. It is felt that this is not an appropriate reason for including sugar industry itself amongst the hazardous industries as a large no. of factories function without an attached distillery. The sugar factory effluents contain bio-degradable organic matter without toxic chemicals and it is, therefore, recommended that the industry should be taken out from the list of hazardous industries.

31.12.4 pollution control measures are often costly and also require considerable expenditure on their operation and maintenance while they do no lead to any increase in productivity. These are, however, essential for protection of environment. Necessary loan assistance should therefore be made available from SDF for installation of such measures as already recommended in Chapter 21.

31.12.5 The existing technology for pollution control is very expensive. The Committee technology for pollution control in the sugar industry. Necessary funds should be made available from SDF for the purpose on priority basis.

Chapter 32

Concluding Observations

32.1 Sugar Industry in India has expanded both in terms of installed capacity and production during the last four decades to meet the increase in demand for internal consumption arising from growth in population and per capita income. The country is now the largest producer of sugar in the world. There have, however, been wide cyclical fluctuations in production, much wider than in the rest of the world, with their adverse effects on cane growers, sugar mills, consumers and the industries utilising by-products. The financial health of the industry is generally not sound. The Industry has so far grown in a protected environment as prior to 1994 sugar imports were not permitted on private account. With the opening of the country to imports under OGL, the industry has to be prepared now to face competition from foreign producers. Necessary policy measures are, therefore, required to improve the financial health and competitiveness of the industry. We have recommended necessary changes in the policy framework to ensure that the competitiveness and financial health of the industry improves to enable it to meet the emerging challenges and the magnitude of cyclical fluctuations in production are minimised.

32.2 R&D in sugarcane and cane processing and modernisation of the industry have to play an important role in long term improvement in the efficiency of both the cane cultivation and its processing. We have made a number of recommendations to strengthen the R&D effort and improve its interaction with growers and the mills to make the research more responsive to the needs of the industry.

32.3 Given proper policies the sugar industry in the country should be able to meet the competition from foreign imports. No protection for the industry has, therefore, been suggested. It is, however, necessary to ensure a level playing field for domestic industry vis-a-vis foreign exporters. Necessary recommendation for the same and measures for promotion of exports on a regular basis have been recommended.

32.4 Khandsari and gur are important component of the sweetener industry which utilise the same raw material , viz., sugarcane. Their technical efficiency is, however, lower so that considerable loss of sugar is involved in manufacture of Gur and Khandsari. We have accordingly recommended a policy framework so that this loss is minimised while the modernisation and development of these sectors of the industry is also encouraged.

32.5 Cooperatives constitute a dominant sector of the sugar industry accounting for 57% of the installed capacity and annual sugar production as on 31.3.1997. We have, therefore made a special study of the cooperative mills and have made certain recommendations for improvement in their working particularly in States other than Maharashtra and Gujarat.

32.6 Sugar Industry has been subjected to a wide variety of controls right from the stage of setting up of a mill to purchase of its raw materials and sale of output. We have recommended abolition of those controls which had become outdated or had become impediment to efficiency. We have, however, not followed a doctrinaire approach in this regard. Where we found that controls are necessary for efficient functioning of the industry, for example, in the case of licensing and cane area reservation, we have recommended their continuance with suitable modifications to improve their effectiveness and minimise any adverse effects. We have, in fact, followed pragmatic approach on all issues.

32.7 Proper mechanism for fixing price of sugarcane is of critical importance for the efficient functioning of the industry as well as welfare of the growers. We have suggested a mechanism which we believe would be fair to both the farmers and the mills and make for harmonious relations between these two important segments of the industry.

32.8 In the long run, the interests of the cane growers and the sugar mills are congruent. They both stand to gain if the industry develops on healthy lines and is able to face the competition in the world market. The consumers also ultimately would get sugar at reasonable price only if the industry is developed on healthy lines so that the cost of production is minimised. In the short run, there may sometimes be conflict of interest between the growers, factories and the consumers. We have tried to make recommendations in such matters which are fair to all the concerned interests.

32.9 We trust Government will now take urgent steps for consideration and implementation of the recommendations contained in the report. We would urge that even in anticipation of the consideration of the entire report, urgent action may be taken to implement (a) the recommendations contained in Chapter 19 for levy of countervailing duties on imports to prevent excessive imports which may harm the interest of both the industry and the growers, and (b) for issue of a notification suspending incentive schemes for LOIs to be issued in future pending review of the scheme so that the liability for compensation for loss of incentive does not go on increasing.

32.10 The Committee was set up vide notification dated 14th March, 1997 and was required to submit its report within six months. The names of representatives of the Confederation of Indian Industry, CACP and Ministry of Agriculture were, however, conveyed by erstwhile Department of Food on 22.4.97. This report is being submitted within one year of the actual constitution of the Committee. We regret that it has not been possible to submit the report within the stipulated period of six months from the date of notification. Considering the comprehensive nature of the terms of reference of the Committee and the indepth study required to be made for making meaningful recommendation through issue of questionnaires, field visits to major sugar producing States, discussions with State Governments, representatives of the Sugar Industry, cane growers and other concerned Department and institutions, it was not

possible to submit the report in a shorter period. It may be mentioned that the Bhargava Commission which earlier undertook similar study of various aspects of the Sugar Industry, took 3 years and 5 months (from September 1970 to February, 1974) to submit its report, despite much larger component of its staff.

32.11 Shri J.A. Chowdhury, Secretary, Deptt. of Sugar & Edible Oils, his predecessor, Shri Arun Sinha and all the officers and staff of the Department have extended full cooperation to the Committee in the performance of its task. Special mention may be made of Shri Surendra Kumar, Joint Secretary (Sugar), his predecessor Shri Navin Kumar, Smt. Sushama Nath, Joint Secretary (EO) and Shri Deepak Khandekar, Deputy Secretary (Sugar), who gave their unstinted help to the Committee at all stages. Stenographic assistance sanctioned for the Committee comprising a stenographer and a typist proved inadequate. Shri S. Balasubramaniam, P.S. and S/ Shri Harish Pokhriyal, Dibakar Misra and Vijay Singh Rohilla, PAs, in the Department took considerable load of stenography in addition to their normal duties.

32.11.1 State Governments of the States of U.P., Punjab, Haryana, Bihar, Maharashtra, Gujarat, Karnataka, Tamil Nadu and Andhra Pradesh made very efficient arrangements for visit of the teams of the Committee to their State and organised discussions with the concerned officers of the State Government and representatives of cane growers and sugar mills. The Embassy/High Commission and their commercial staff in Thailand, Australia, South Africa and Mauritius also made excellent arrangements for visit of the team of the Committee to those countries and arranged for discussions with concerned Government officers scientists in research institutes and representatives of cane growers and sugar mills.

32.11.2 Shri S.L. Jain, Director General, ISMA and Shri M.S. Marathe, Managing Director, National Federation of Cooperative Sugar Factories have assisted the Committee throughout its deliberations and made necessary information available to the Committee. M/s. Shakti Sugars Limited made available an unpublished study (Outline of a Competitive Study on "India's Sugar Industry by LMC International U.K.) and the Department of Sugar and Edible Oils , the unpublished draft report of the World Bank on "India's Sugar Industry": Priorities for Reforms," April'97 for use of the Committee.

32.11.3 Shri J.J. Bhagat, Member-Secretary of the Committee had to perform his duties in the Committee in addition to his normal work as Mission Director, Sugar Technology Mission. He gave generously of his time and the Committee benefitted immensely from his expert advice on technical matters relating to the Industry.

32.11.4 The Committee had a small staff of five Consultants, a Stenographer, a Typist, a Clerk and two Peons. All the five Consultants - S/Shri S.K. Khosla, D.P. Rangan, R.P. Sinha, P.S. Ganesan and T.M.S. Krishnan - worked hard and helped the Committee by collection and analysis of data, drafting of Chapters and arrangements for meetings and travels.

32.11.5 The Committee wishes to place on record its deep gratitude to all the above mentioned persons and organisations for the help rendered by them to the Committee. The Committee is also thankful to the various individuals and organisations who responded to the questionnaire issued by the Committee and all officers of the State Governments, various Departments of the Central Government and Research Institutes and representatives of the cane growers, sugar mills and other concerned organisations who met the Committee and gave it the benefit of their views.

Chapter 33

Summary of Conclusions and Recommendations

A. Conclusions

Development of Sugar Industry

1. (i) The first sugar mill was set up in United Provinces in 1903 with a modest cane crushing capacity. Protection was accorded to the industry in 1932. By 1936-37, 140 factories were in operation. The number of factories remained static upto 1950-51. Thereafter there was steady acceleration in installed capacity and as on 28.2.98, there were 460 sugar factories with an installed capacity of 137.75 lakh tonnes.

(ii) In 1950-51, 107 factories were located in sub tropical belt and 32 in the tropical belt. By 1996-97, tropical belt had 258 units and balance 202 were in sub-tropical belt.

(para 2.4)

(iii) There were two co-operative sugar factories in 1950-51 out of a total of 139. By 1997-98, their number rose to 254 out of a total of 460 installed.

(para 2.5)

(iv) The average installed capacity in the country has increased over the years. However, as on 28.2.98, 241 units had still installed capacity below 2500 TCD.

(para 2.22)

(v) Sugar industry is the second largest agro-based industry in the country next to cotton textiles. It is the largest agro-based industry located in rural areas. The growth of the industry has generally kept pace with the rising consumption demand over the years. The production increased from 11 lakh tonnes in 1930-31 to 164 lakh tonnes in 1995-96 although it declined to 135 lakh tonnes during 1996-97. There have, however, been wide cyclic fluctuations in production.

Growth of Sugarcane Cultivation

2. (i) The area under sugarcane has increased at a compound annual rate of 1.83 % during 1949-50 to 1995-96.

(para 3.1)

(ii) Sugarcane is generally more profitable relative to other crops in the areas where it is planted.

(para 3.3)

(iii) Sugarcane is mainly planted on irrigated land in India.

(para 3.3.1)

(iv) For the entire period 1949-50 to 1995-96 the yield per hectare has increased at a compound annual growth rate of 1.21%.

(para 3.4.1)

(v) The yield per hectare is much higher in tropical than in sub-tropical areas. However, the yield in sub-tropical areas has been rising while that in tropical areas has been stagnant.

(para 3.4.2)

(vi) The highest yield is reported in Tamil Nadu followed by Karnataka and Maharashtra during the 5 years period 1992-93 to 1996-97. Yield per hectare in case of Adsali Crop is more than that of non-Adsali crop.

(para 3.4.4.)

(vii) While ratooning of crop is a common practice in all the major sugar producng States, it is more prevalent in U.P. Ratooning is necessary to bring down the cost of production and being early maturing, it is this crop which is available to feed the factories earlier than the plant crop. The yield of ratoon crop has been much lower than the plant crop in several States.

(para 3.4.5.)

(viii) A part of the increase in All India average yield during the last 30 years has been achieved because of the increase in the proportion of area under sugarcane in Maharashtra, Tamil Nadu and Karnataka, where the yields are higher than U.P. and other States.

(para 3.4.8)

(ix) The average yield in India compares reasonably well with the average yield in other major cane producing countries. However, a higher proportion of cane crop in India is irrigated. In the irrigated regions in many countries yields are higher than in India.

(para 3.4.9)

(x) Sucrose yield in India is lower than that in Australia, Mexico and U.S.A. The lower sucrose yield per hectare in India may apart from climatic factors be also due to system of payment for sugarcane on tonnage basis without link to sucrose content, and the inability of the

research institutions to evolve suitable high sucrose varieties of cane for different agro-climatic conditions.

(para 3.4.11)

(xi) The production of sugarcane has increased at a compound annual growth rate of 2.67% over the period 1949-50 to 1995-96.

(para 3.5.1)

(xii) The actual All India recovery of sugar per cent of cane has been varying between the lowest of 9.33% and the highest of 10.31 per cent during the past 4 ½ decades. Comparing the 5 years 'weighted average recovery percentage (All India) the recovery has remained at about 10% throughout this period and has not shown any improvement despite increase in percentage of cane production in Maharashtra and Karnataka, where the average recovery is much higher than All India average and increase in percentage of new/modernised factories. This shows that there has been no increase in sucrose content of cane during the last more than four decades.

(para 3.6.1)

Present Technical Status of Sugar Industry in India

3. (i) There is a trend towards higher plant sizes but the rate of increase in plant capacities has been very gradual so far due to inadequate measures taken for cane development and paucity of funds. On 28.2.98, as many as 241 out of 460 factories were still below the stipulated minimum economic size of 2500 TCD. The lower average size of mills in India tends to increase the cost of production of sugar in the country.

(para 4.3.1 to para 4.3.3)

(ii) The technology adopted in many sugar factories is outdated because these factories were set up long back. About half of the sugar factories are more than 25 five years old. Physical condition of many of these factories is poor resulting in downtime and loss of capacity. However, a number of sugar factories have during recent years installed the latest equipments and are serving as models for modernisation and rehabilitation of other old existing factories.

(para 4.3.4 - para 4.4.1)

(iii) The largest percentage of old units are in States of Andhra Pradesh, Bihar, Madhya Pradesh, Rajasthan and West Bengal whereas the States of Gujarat and Maharashtra have the largest percentage of near modern industry. In case of UP, bulk of modern industry is located

in west and central UP and majority of old plants are located in east UP. Efforts are required to bring about a qualitative change in the status of the industry in the States which have mostly old factories.

(para 4.4.2)

(iv) Sugar industry in India has considerably lagged behind in the process instrumentation and automation.

(para 4.6)

(v) Sugar industry in India is bound under the Government notification to produce certain limited grades and quality of sugar, whereas a large number of sugar producing countries in the world produce a variety of sugars. There is considerable scope for improvement in sugar quality, particularly for those sections of the industry which by virtue of the location are well placed to export to the world market. A booming food processing sector may also create substantial domestic demand for high quality sugar.

(para 4.8)

(vi) Through various energy conservation measures, it has been possible for sugar industry in the country to reduce the energy requirements from 250 kWh per tonne of sugar to 120 kWh per tonne. Similarly, the process requirement has been reduced from 600 kgs per tonne of cane in the early 1960s to 480 - 500 kgs per tonne of cane now. A number of sugar mills have taken up production of additional power through back pressure or the condensing route.

(para 4.9)

(vii) India's performance in milling efficiency is much lower than in Australia, Brazil, Cuba, South Africa, Thailand and USA. The country's average performance is, however, dragged down by poor performance by mills in UP. Sucrose losses to bagasse of about 7% are high.

(para 4.10.1 and Table 4.7)

(viii) There is need for more effective systems of computing mill house and boiling house efficiency by installing facilities for direct estimation of sucrose content in sugarcane.

(para 4.10.2)

(ix) Indian sugar industry does not stand out among the group of industries with highest over all average recovery. However, Maharashtra's

performance does rank among the higher performers.

(para 4.10.3)

(x) Sugar output per hectare per year in India is lower than in countries like Australia, Mexico and USA.

(para 4.10.4)

Status of Khandsari and Gur Sector

Khandsari

4.1 (i) The units are mainly concentrated in U.P. Almost all the units have installed horizontal crushers which are more efficient in cutting down losses in juice extraction.

(para 6.1.3)

(ii) About 40% of the units operate with cane crushing capacity between 50-100 TCD and rest with 50 TCD and less.

(para 6.1.4)

(iii) About 37% of the units have 3-roller sets which extract 50% to 69% of juice., 44 % operate 6-roller sets which can extract 70% of juice, 17% operate with 9-roller sets which can extract 75% of juice and 12% operate with 12-roller sets which can extract 80% juice.

(para 6.1.3)

(iv) In the States of Andhra Pradesh and Karnataka all the units are located at a distance of more than 20 kms from the sugar factory, while in U.P. nearly 40% of the units are functioning within 15 kms. and about 65% within 20 kms. of the sugar mills.

(para 6.1.5)

(v) The units crushed about 14% of cane in U.P. which accounts for about 6% of India's total cane production.

(para 6.1.7)

(vi) The recovery of sugar was about 7% (para 6.1.14)

(vii) About 60% of the units in U.P. make payment for cane supply almost immediately after receipt of cane, further 32-34% of units offer payment within a week. None of the units hold dues beyond a month in U.P.

(para 6.1.15)

(viii) The units are under no obligation to pay SMP to growers and except in period of cane scarcity, the price paid by them is generally lower than that paid by sugar mills.

(para 6.1.15)

(ix) Return on total input cost was only 11% in U.P. and 13% in Andhra Pradesh . That may be the reason for steep fall in the number of units in both the States.

(para 6.1.10)

Gur Sector

4.2 (i) This activity is primarily confined to unorganised cottage industry sector.

(para 6.2.1)

(ii) 97% of units manufacture Gur only and about 3% of units manufacture khandsari and gur. U.P. accounts for the largest number of units.

(para 6.2.1)

(iii) Nearly 50% of the units are located within 20 kms radius of the nearest sugar mill in U.P. and Haryana. In Tamil Nadu and Karnataka as many as 44% and 60% of the units respectively are in operation within 15 kms. of the nearest sugar factory. However, in Andhra Pradesh more than 70% of the units are located beyond 20 kms. from the sugar factory.

(para 6.4.1)

(iv) Recovery rate was about 11%. The units in A.P. had the highest recovery of over 13%.

(para 6.2.10)

(v) The return in U.P. was only 8% which would not have covered even the conversion cost fully. Only the units in Karnataka and Tamil Nadu gain in real terms from this activity.

(para 6.2.11)

(vi) Bulk of the gur is marketed through Mandis and local traders. About 36% was sold to traders outside the States.

(para 6.2.12)

Both Sector

4.3 (i) The sugarcane used for production of khandsari and gur has come down to about 34% in 1994-95 from 55% in 1980-81. During the years of fall in cane production, the percentage of sugarcane used for

khandsari and gur increases while in years of increas in cane production, its percentage decreases.

(para 6.2.13)

(ii) Information regarding sugarcane used for production of khandsari and gur is however not independently collected but is derived by deducting the sugarcane used for production of sugar and estimates of its use for seed and chewing from estimated total cane production.

(para6.2.13)

Consumption Trends

5. (i) Consumption has increased by 64.78% during the period from 1984-85 to1995-96, i.e., at 4.31% per annum. compounded during the 11 year period.

(para 7.2)

(ii) The per capita consumption of sweetners in India is higher than the world average. However, the consumption of sugar alone is lower. The consumption of gur and khandsari is on the decline, while the consumption of mill sugar is on the increase.

(para 7.8)

(iii) The per capita consumption of sugar is higher in the higher income groups than in the lower income groups and in urban areas as compared to rural areas.

(para 7.8)

(iv) With the growth in income and greater urbanisation, the consumption of mill sugar is likely to continue to increase while the consumption of gur and khandsari is likely to come down further.

(Para 7.8)

Price of Sugar, Gur & Khandsari

6. (i) Over the 15 years period 1981-82 to 1995-96, increase in the wholesale price of sugar has been substantially lower at 125% than that of 'Agricultural Commodities (230%), Food Articles '(236%) and for 'All Commodities' (196%). Increase in Gur price (169%) has been somewhat higher that of sugar, while khandsari prices have increased by almost the same extent(123%).

(para 8.1.3)

(ii) The average retail price of sugar has increased by 186% during the period from 1982 to June 1997 as against 252% rise in the general Consumer Price Index during the said period.

(para 8.2.3.)

Development of Sugar Industry in other cane sugar producing countries

7. (i) Presently there are over 100 countries producing sugar. The desire to achieve self-sufficiency has led to an upsurge in the production of both sugarcane and cane sugar. As a result the production of sugar increased from a level of 51.22 million tonnes during 1962 to 124.19 million tonnes during 1996. India has attained the status of largest sugar producing country, contributing 19.47% of world's cane sugar production during 1996. At the same time, yields have improved in all the countries, but these have been achieved, in part, through changes in the distribution of the cane area.

(para 9.1)

(ii) World sugar production follows a cyclic pattern. The causes for each peak can be traced to conditions inherent in the preceeding period of low price which induces contraction in output and creates shortage in the market. These in turn put pressure on prices which induces expansion and new investment leading to over production and another period of low prices and process of contraction. Apart from the effect of changes in prices, the cyclic pattern of world cane sugar production is largely influenced by the production of cane sugar in India. The variations in output in both ways has been much steeper in India vis-a-vis rest of the world excluding India. The observed variations in the output of India's cane sugar appears to have significant influence on the variations of total world output.

(para 9.4 & 9.6)

(iii) Compared with the extreme volatilety experienced in the 1970s, world sugar prices have maintained a relative stability over the last 15 years since 1982. Greater market participation of developing countries which demonstrate a greater price elasticity of demand, introduction of market economy in States of erstwhile Soviet Union which has made consumption demand more price sensitive than under a centrally planned system and improved information flows are some of the factors which have helped to reduce price instability.

(para 9.10)

(iv) Average size of Indian sugar unit is way below the capacity in various other sugar producing countries. In most countries, the small sized units were amalgamated into a larger unit with reduction in the number of sugar units. Contrary to this in India, greater emphasis has been laid on horizontal growth of the sugar mills.

(para 9.24.2)

(v) All India average sucrose yield are lower than those in Australia and to a marginal extent as compared to European Union, Mexico and U.S.A. This may be partly due to system of payment of sugarcane on basis of weight rather than sucrose content as in most other countries.

(para 9.28.3)

Laws and Practices Relating to Sugar Industry in other cane sugar producing countries

8. (i) Out of twelve countries studied in this chapter, there is system of cane zoning in Australia, Indonesia, Mauritius and Taiwan while there is no system of cane zoning in European Union, Mexico, Philippines, South Africa, Thailand and USA. In certain countries like Brazil, there is a binding contract between millers and growers. In Sri Lanka, allottee farmers are obliged to supply cane to the respective mills, but private growers can supply their cane to a mill of their choice. In countries where there is no reservation of cane area for different mills and where there is no other form of binding contract between millers and growers, intense competition for cane can develop.

(para 10.16.1)

(ii) For setting up of a sugar factory among the countries studied above, no licensing is required in Australia, Brazil, European Union, South Africa and USA, whereas it is needed in other countries.

(para 10.16.2)

(iii) No incentive / concession for setting up of new sugar factories or expansion of existing factories is allowed in any country.

(para 10.16.3)

(iv) The research and development activities are financed through cess in Sri Lanka and Taiwan and finance is partly contributed by Government in USA. Philippines maintains a fund for research and development. In Indonesia, a small financial contribution is made by Government as 80% of mills are owned by Government. In other countries, it is financed by the industry or by industry and growers together.

(para 10.16.4)

(v) In so far as pricing of sugarcane is concerned, it is based on revenue sharing in Australia, Indonesia, Mauritius, Philippines, Taiwan, Thailand, Mexico, South Africa and USA. In Brazil, it is at present determined by Government, but from May 1998, it will be determined

by an agreement between growers and mills. In Sri Lanka, it is determined by sugar companies.

(para 10.16.7)

(vi) There is no restriction in any country on the agency through which factories have to obtain cane from the growers.

(para 10.16.9)

(vii) There is no control on stock limit of traders in any of these countries.

(para 10.16.11)

(viii) There is no legal restriction in any country on the kind of material in which sugar can be packed.

(para 10.16.12)

(ix) Import of sugar is regulated in Indonesia, Mexico, Mauritius and Philippines. The ban on import of sugar has been removed in Thailand, but these are subject to high rate of tariff protection (104%) which will gradually fall to 94% by 2004-05. In Australia, import tariffs were removed from 1.7.97. In South Africa and Sri Lanka, there is no quantitative restriction, but import duties are levied. Brazil does not import sugar but has import tariff of 16%. The rates of import duty levied by different countries at present are indicated in Annexure 10.1.

(para 10.16.13)

(x) The export of sugar in Brazil is liberalised and is made either by individuals or traders, but is subject to export licenses (quotas). Sugar which is exported without licence has to bear export tax at 40%. In Mauritius, all exports are made through MSS and in South Africa through SA Sugar Association. In Thailand, 50% long term exports (quota B) are marketed by TCSC, the remaining 50% of 'B' quota and entire remaining exports (C quota) are exported by millers through licenced exports houses. In Taiwan, the entire foreign trade is regulated. In European Union, exports are subsidised by levy on domestic sale. Anyone who holds a licence can export. Licences are granted to companies which bid for the lowest subsidy rate.

(para 10.16.14)

(xi) In Brazil, four to five ratoons are generally taken. In Indonesia, two to three ratoons are taken but in traditional cane areas,

more than five ratoons are taken. In Philippines, about three ratoons and in Mauritius, about eight to ten ratoons are taken.

(para 10.16.15)

(xii) In Indonesia, there is ceiling on land holding but land can be rented and sugarcane be grown by the private enterprise or co-operatives. Sugar mills can rent about fifty hectares of land (against a ceiling of five hectares) for raising cane nurseries and for field trials. In Philippines, sugar mills are not exempt from land ceilings, but for R & D purpose by sugar mills, there is no ceiling. In Sri Lanka, mills are allowed to have upto 250 hectares of land for the purpose of R & D, while the ceiling is one hectare for irrigated and 1.75 hectares for rain-fed land. In Taiwan, there is ceiling on land holding but there is no restriction on the size of farms owned by sugar mills for obtaining cane for milling or by Taiwan Sugar Research Institute for R & D. There is no ceiling on land holdings in Brazil, European Union and South Africa.

(para 10.16.16)

B. Recommendations

Cane Area Reservation

1. Committee recommend continuation of existing cane area reservation policy with the following modifications.

(para 12.23)

(i) Reservation of area should be on a permanent basis.

(para 12.24)

(ii) Cane area required for a factory to meet its requirement for expansion of capacity which is under implementation should also be taken into account while determing its reserved area.

(para 12.25)

(iii) Whenever part of area from an existing factory is to be shifted to another factory, such transfer may be made only if cane availability is surplus to requirements of factory for normal season working for its existing capacity including expansion under implementation. If the per hectare yield of cane in a reserved area is lower than the average in other similar areas due to insufficient cane development work by the factory concerned, the availability of cane in the reserved area may be based on the yield average of similar areas.

(para 12.26)

(iv) In all cases excess area may be transferred from the factory only after giving an opportunity to the factory to show cause against such an action. Sugarcane (Control) Order may be suitably amended to incorporate this.

(para 12.26)

(v) A provision may be made in the Sugarcane (Control) Order for appeal to a Quasi-judicial authority to be set up by Government of India against an Order of transfer of cane area from the reserved area of a factory.

(para 12.2)

(vi) In States where systematic demarcation of cane area has not been done, a fresh exercise may be made to redraw the cane area for factories in such a manner that each unit gets a compact area with adequate cane to cover a normal season working at optimum capacity. Factories affected by such redemarcation may be given opportunity for hearing. Once this has been completed, the reserved area may be maintained on a permanent basis.

(para 12.28)

(vii) Whenever sugar cooperatives are to be registered as multi State cooperative society enabling them to obtain cane across a State boundary, provision regarding prior consultation by Central Registrar with the State Registrar of cooperative societies before granting registration must be strictly followed and the State Registrar should in turn consult the factories likely to be affected by transfer of area before giving his consent.

(para 12.29)

(viii) Whenever a factory does not register any farmer's cane on grounds of inadequate crushing capacity or having already registered adequate cane to cover its normal season's working and within 15 days after end of the normal season, he may be permitted to supply it to any other factory outside the reserved area.

(para 12.30)

(ix) Cane should not be transferred from the reserved area of a Mill to another Mill area for ironing out differences in the availability of cane during year of cane shortage.

(para 12.30)

(x) In the case of co-operative mills also, the growers, whether members or non-members, should not be permitted to supply cane to a mill outside the reserved area except in the circumstances mentioned at (viii) above. However, non-members shall also be treated equally with the members in regard to cane pricing and scheduling.

(para 12.31)

2. Penalty for poaching of cane from reserved area of factory by another should be suitably enhanced by all States to make it an effective deterrent.

(para 12.32)

Licensing policy

The Committee recommends continuance of licensing policy with the following modifications.

(para 12.36)

(i) Licences should be granted after verifying the ability of promoters to contribute to the equity part of project cost. For cooperatives, the promoter should show proof of having collected at least 2.5% of capital cost before grant of licence.

[para 12.36 (i)]

(ii) Insistence on minimum economic capacity of 2500 TCD for new unit should be given up. The size of the unit to be set up should be left to the entrepreneurs and financial institutions.

[para 12.36 (ii)]

(iii) There should be no need for a licence for expansion in capacity and expansions may only be registered with Government of India and concerned State Government. Application for allocation of additional cane area for expansion where required shall, however, have to be made to the State Government before expansion is undertaken.

[para 12.36 (iii)]

(iv) Validity of letter of intent should be raised from one year to three years in case of cooperative units.

[para 12.36(iv)]

(v) The radial distance from an existing mill for locating a new mill may be kept at 25 kms.

[para 12.36(v)]

3. The Committee recommends complete decontrol of sugar. Decontrol may, however, be phased over a period of two years. From the beginning of the Sugar Season following the date of announcement of the policy, the percentage of levy sugar may be reduced to 20% which may be continued at the same rate during the next Sugar Season and from the beginning of the subsequent Sugar Season the levy may be completely abolished.

(para 13.28)

4. Control on releases should continue even after complete decontrol of prices.

(para 13.29)

5. Supply of sugar through PDS may be discontinued when complete decontrol becomes effective. The subsidy at present allowed in supply of sugar through PDS can be distributed among the beneficiaries by adding to the subsidy at present allowed on foodgrains.

(para 13.30)

6. If Government wishes to continue sugar under PDS, the required quantity may be purchased from industry/trade by tendering or at fixed prices from the Mills. Additional subsidy outgo would be offset by higher excise collection on levy quota converted as free sale. If shortfalls still continue, the balance may be met by increasing excise duty to the required level.

(para 13.30)

7. During the continuance of the System of partial control, following modifications may be made in the existing policies:-

(i) After cane prices are determined by the Statutory Sugarcane Pricing Board, as recommended in Chapter 14, levy sugar prices should be based on actual cane price paid by the factories in the zone based on price determination by the Board. Element of subsidy will increase on account of likely higher levy prices, which can be met by increasing excise duty to the required level.

(para 13.31)

(ii) Levy sugar prices should be announced at the start of the crushing season. Delay in announcement affects the cash flow of factories. For unavoidable delay in announcement, interest on difference between provisional and final price may be paid to the Mills.

(para 13.35)

(iii) Interest may be paid to the Mills on delayed lifting of levy sugar beyond initial time limit, when the delay is not due to any fault of the factory.

(para 13.36)

(iv) Monthly releases both under partial and total decontrol situation, should be determined by a Committee comprising a senior officer of Department of Sugar & Edible Oils, one representative each from NFCSFL and ISMA. Efforts should be made to maintain the free-sale prices at about the levels assumed by the proposed Sugarcane Pricing Board, by adjustment of free-sale releases, operation of buffer stock and control on export beyond the minimum quantity recommended in Chapter 19.

(para 13.29)

(v) There should be total transparency in the system of releases. The allocation for various factories should normally be in proportion to their stocks. Where stocks of previous year still remain to be released, these should be released first unless it becomes necessary for fresh stocks to be released in any area for meeting regional requirements. Basis of allocation should be made known to the apex bodies of the industry so that they can convey the same to factories and any aggrieved factory may be able to make a representation.

(para 13.32)

(vi) The present restriction on sale of at least 47.5% of monthly free-sale during each fortnight may be removed and factories may be allowed to sell upto 10% of quota in the succeeding month.

(para 13.33)

(vii) The penal provision including converting unsold monthly freesale quantity as levy, should be acted upon only in times of rising prices when intention to hoard can be inferred. If lapses occur due to force majeure conditions, the penal provisions should not be enforced.

(para 13.34)

(viii) Interest charges incurred on stocks held beyond the requirement of 2.5 months' 'opening stock' for next season not released in the sugar year and not covered by buffer stock should be paid to the factories.

(para 13.37)

(ix) FCI should settle claims of State Governments, whenever documents are complete, expeditiously and in case of delay beyond 90 days should pay interest to the concerned State Governments.

(para 13.38)

Pricing of Sugarcane

8. (i) Announcement of SMP will need to be continued even under system of complete decontrol of sugar prices as a guarantee of a minimum price to the growers.

(para 14.10.1)

(ii) Decision of Government to announce SMP before the start of sowing season should be rigidly followed.

(para 14.10.1)

9. Sub-Clauses (c), (d) and (e) of Clause 3 of the Sugarcane (Control) Order, 1966, may be deleted so that SMP is not related to the price of sugar paid by consumers.

(para 14.10.2)

10. So long as the principle of uniform support price throughout the country is followed for other agricultural commodities, the same principle may continue to be followed in the case of sugarcane also.

(para 14.10.3)

11 Instead of linking SMP to recovery percentage, SMP may in future be fixed on average sucrose content of cane supplied to the mill. A premium may be allowed on recommendations of the CACP. on the varieties which have higher sucrose content.

(para 14.10.4)

12. Khandsari units may be required to pay the same SMP, as applicable for sugar units, and Sugarcane (Control) Order may be amended accordingly. SMP should however be enforced on khandsari units only during normal crushing season.

(para 14.10.5)

13. A firm convention may be set up to follow the recommendations of CACP in regard to SMP unless after submission of Report of the CACP, there has been significant change in the prices of inputs or the support prices for competing crops have been fixed at a level beyond CACP's recommendations.

(para 14.10.6)

14. A system similar to that obtaining in most of the major sugar producing countries for pricing of sugarcane based on the price of sugar received by the mills may be adopted in this country, which will provide for determination of cane price on relevant economic consideration and not on any extraneous political or beaurocratic considerations.

(para 14.11.4)

15. Share of growers may be fixed on the basis of percentage of average cost of purchase of sugarcane to total sales realisation, (excluding excise duty and cess and incidence of purchase and other taxes levied on sugarcane by State Government) during the last ten years. BICP may be requested to determine this percentage on the basis of information to be supplied by the factories. It would be desirable to take the ten years' average preceeding the year in which the decision to adopt this system is taken, so that the audited figures of expenditure on purchase of sugarcane as well as sales realisation becomes available.

(para 14.11.5)

16. Cane price may be fixed separately for different zones but within a zone all mills should be required to pay the same cane price.

(para 14.11.6)

17. Cane price in each zone may be determined by the following formula:-

$$\text{Cane price per tonne} = \text{Average price of sugar per quintal in the zone during the year} \times \text{Growers' percentage share} \times \frac{\text{Average recovery in the zone during the year}}{\text{All India average recovery during the year}}$$

(para 14.11.8)

18. (i) Sugarcane Pricing Board comprising an economist of repute as Chairman to be appointed by the Government of India, and officers not below the rank of Joint Secretary from Department of Sugar, Civil Supplies and Ministry of Agriculture, Economic Adviser in the Ministry

of Finance, one representative each of NFCSF and ISMA and two representatives of cane growers - one from tropical and another from sub-tropical region to be nominated by Government of India as members, may be set up. The Board will determine in September each year advance price for ensuing crushing season for different price zones in accordance with the above formula. The advance price will in no case be lower than the SMP nor higher than the cane price based on the likely import parity price. Final price for each zone will be determined by the Board before end of November next based on the actual ex-factory sale prices in the zone, excluding excise duty and cess, incidence of purchase tax/ cess on sugarcane and actual zone and All India recovery. Board may be given a statutory status by making necessary provisions in the Sugarcane (Control) Order.

(para 14.11.9)

(ii) The Board will also determine a premium for specified higher sucrose varieties and early maturing varieties in differnt price zones by multiplying the premium recommended by CACP for such varieties for SMP with the proportion which the cane price determined by the Board for the zone bears to the SMP.

(para 14.11.10)

(iii) The Board may adopt the existing levy sugar zones with such modifications as may be necessary to ensure homogenous zones on the basis of price of sugar and recovery percentage.

(para 14.11.11)

19. The mills should be statutorily required to pay minimum of 80% of the advance price determined by the Board or SMP, whichever is higher, within 15 days of supply of cane by the growers. The remaining amount out of the advance price shall be paid by the mills before the end of the sugar season. The difference between advance price and final price shall be paid by the mills within 15 days of the announcement of the final prices. A provision may be made in the Sugarcane (Control) Order of all the States, where this provision does not exist at present, for recovery of arrears of sugarcane prices remaining unpaid till the end of sugar season as arrears of land revenue, besides payment of interest at the rate of 15% on any delay in payment of cane price beyond the above period.

(para 14.11.13)

20. Clause 5-A of Sugarcane (Control) Order, 1966 may be deleted.

(para 14.11.14)

21. The co-operative sugar mills in Maharashtra, Gujarat and North-Karnataka may continue the present practice of distributing the sale proceeds amongst the member growers, if they so desire as growers are effectively the owners of these mills. The co-operative mills in other States in which growers have majority of share capital may also be free to adopt that system at their option. The Board should, however, determine cane price in accordance with the above formula for Maharashtra and Gujarat also so that co-operative factories in those States which wish to adopt this system may be able to do so and the same can also be taken into account for determining the levy prices for the mills in these States.

(para 14.11.15)

22. The need for changeover to the system of cane prices based on test of sucrose content of cane at the time of supply is unexceptionable, but there are serious practical difficulties in introducing this system in the country. The STM is at present experimenting with quicker and simpler methods of estimation of sucrose content of cane. These efforts need to be expedited. It would be necessary before starting the system of payment based on sucrose content, to provide for conduct of the test or at least its supervision by an agency of the State Government or an independent agency set up by it in which the growers may have confidence.

(para 14.12)

23. Proviso (i) (b) to Clause 3A of Sugarcane (Control) Order, 1966 may be amended to allow the cost of transportation as may be fixed by the State Government having regard to the actual cost of transportation in the area.

(para 14.13.1)

24. The maximum weight of the binding material under Proviso (iii) to Clause 3A of Sugarcane (Control) Order, 1966, may be increased to 3 kgms per quintal of sugarcane.

Cane Supply arrangements

25. In Proviso (iv) to the Clause 3A above, the words **'harvesting and transportation'** should be substituted for **'harvesting'.**

26. Mills in U.P. should be free to have direct links with farmers as regards cane supply , payment of cane price and cane development. There is also need to have an organisation to represent the interests of growers. All cane suppliers to the mills may be required to be member of such associations and election of their office bearers should be held under supervision of Cane Department or other such Department as the State Governsment may direct. No Government officer should be on board of these associations so that these act genuinely as associations of cane growers. In order that the growers should look upon these associations as their own organisations and the latter feel themselves accountable to the growers, the activities of these associations should be funded by deduction from the price of cane delivered by the growers at the rate to be determined by the association. However, in order to help the association to collect the dues which may otherwise be difficult because of large number of members involved, the mills may deduct the subscription from the cane price and transmit it to the association. It may not be necessary to have these associations in the area of cooperative sugar mills as the mills are owned by the growers themselves. However, if in the case of any cooperative mill, there is a substantial percentage of non-members supplying cane to the mill, say 50% or more of the total growers, the association of cane growers may be formed in the area of that coopertive mill also.

(para 15.11.5)

27. Registration for cane may be permitted separately for early, mid and late varieties, so that balanced quantities of sugarcane of differnt maturities becomes available for crushing during different parts of the season.

(para 15.12)

28. Penalty for non-supply of bonded quantities may be enhanced to about 5% of cane price, which should be enforced strictly. The amount of penalty, however, should not be credited to the funds of the mill, but to a welfare fund to be utilised by a Committee comprising the representatives of the farmers, on the welfare of the cane growers.

(para 15.13)

29. It may be left to each factory to determine whether or not to undertake harvesting and transportation of cane. Where a factory, other than cooperative factory, decides to take up harvesting and

transportation of cane, the farmers should be free to harvest and transport the cane themselves if they so choose, unless there is an agreement between the mill and the growers' associations for entrusting the work to the factory. It should be not open to the factory to coerce the farmers to have the harvesing and transportation done by the factory by refusing to accept the cane harvested and transported by the grower himself or delaying the issue of parchies to such farmers.

(para 15.14)

30. There should be no legal compulsion to set up purchase centres and the desirability or otherwise of setting up of purchase centres and their number and location should be left in the Northern States also, to the factories. However, in case cane is required to be supplied either at the gate or at centres located beyond 10 kms, the grower should be reimbursed the additional cost of transportation beyond 10 kms. so that growers living at a distance from the mills are not required to bear additional cost.

(para 15.15)

R&D and Modernisation in Sugar Industry

31. State Governments may be empowered to issue directions to mills for payment of cane price by crossed cheques.

(para 15.16)

32. NSI, Kanpur should be converted into an autonomous organisation as a Registered Society. The society should have a Governing Body with an eminent person as its Chairman and a scientist to be nominated by CSIR, an eminent Sugar Technologist, a Research Scientist to be nominated by ICAR, a scientist from TIFAC, a representative each from the two Apex organisations of the Industry and a nominee of the Ministry of Food and Consumer Affairs as its members. The requisite funds for the functioning of the institute may be provided upto the extent of 75% from SDF and the remaining 25% may be met by the institute from consultancy, contract research and other sources. The focus of activities of the Institute should be on teaching and fundamental research in the various areas of Sugar Technology and Sugar Engineering. The course content for various technical courses should also be revised to keep pace with the changes in the technology trends in the industry e.g. the coverage in the area of process instrumentation and automation should be suitably enhanced.

(para 16.10.1)

33. The expenditure of VSI, Pune be met to the extent of 50% by grant from SDF and balance through contribution from the sugarcane growers and from other sources. At the same time, adequate representation may be provided to Deptt. of Sugar & Edible Oils, Ministry of Food & Consumer Affairs, NFCSF and ISMA on the Board of the institute, to make it more accountable and sensitive to the needs of the entire industry.

(para 16.10.2)

34. The proposed National Institute of Sugarcane and Sugar Technology may concentrate mainly on research in cane processing. Its management structure and funding may also be broadly on the same pattern as suggested for National Sugar Institute, Kanpur.

(para 16.10.3)

35. STM should be made a regular organisation and should expand its activities and have in-house facilities for pilot scale trials for the purpose of process modification in the sugar plants.

(para 16.10.4)

36. The requisite funds for the functioning of STM may be provided through SDF to the extent of 50% and the balance 50% may be contributed suitably by the Deptt. of Science & Technology and through consultancy, contract research, fees and other sources.

(para 16.10.5)

37. The STM should be asked to create testing facilities exclusively for sugar industry. These testing facilities can be provided by the STM at New Delhi. Such facilities may also be provided in a few regional testing laboratories to be selected by Government in consultation with NFCSF Ltd. & ISMA for the convenience of sugar mills located near to them. STM may provide necessary guidelines and supervisory control over these testing laboratories.

(para 16.10.7)

38. In order to encourage research for the benefit of the sugar industry, chairs for research in the research institutes including universities and IITs may be set up by the sugar industry. Matching contributions to the extent of 50% may be provided from SDF as grant to encourage the industry to set up the chairs.

(para 16.10.8)

39. The Government should permit manufacture of different qualities of sugar including brown sugar and jaggery to meet consumer demand. The Government may however, charge excise duty at similar rates for different sugar qualities including jaggery that may be produced by the sugar mills.

(para 16.10.9)

40. The entrepreneurs and managers are aware of the advantages to operate at optimum efficiency levels and therefore, there is no need for the Government to monitor the performance in this regard, which only leads to harassment and corruption. The Governemnt therefore, may withdraw its letter dated 31st May, 1988 stipulating the various efficiency norms.

(para 16.10.10)

R&D in Sugarcane

41. The development of varieties combining a number of desirable characteristics such as early maturity, high yield, high sucrose content, resistance/tolerance to disease, water logging, soil salinity, drought etc. needs to be accorded high priority. Adequate support for setting up of facilities for use of biotechnology methods needs to be provided on priority basis and funds may be provided for the purpose from SDF liberally to the extent required.

(para 17.5.1)

42. The facilities for induction of flowering and seed setting are available only at Sugarcane Breeding Institute, Coimbatore. It is necessary to develop facilities for induction of flowering and seed setting in sugarcane in sub-tropical areas also. Support for setting up of necessary facilities for the purpose may be provided from the SDF to the extent necessary.

(para 17.5.2)

43. The cost of production of sugarcane plants through tissue culture is of high order and it does not, at present, seem to be economical to use this process for the purpose of production of seed for plantation by the cane growers. Tissue culture may, therefore, be utilised mainly for production of foundation seed from the breeder seed, apart from its use in research. For the purpose, laboratories for tissue culture may be set up jointly by a number of sugar mills instead of one in each mill. Loan assistance from the SDF may be made available for

the setting up of such joint laboratories. Arrangements may also be made by such mills with the concerned Agricultural Universities or research stations for providing expert advise on any problem.

(para 17.5.3)

44. The varieties recommended by the All India Coordinated Research Project should invariably be approved by the State Varietal Release Committee, unless there are any peculiar circumstances in an area on account of which, for reasons to be recorded, it is not considered desirable to approve a particular variety. All varieties should be evaluated irrespective of the location of the institute which sponsored it.

(para 17.5.4)

45. To expedite the spread of improved varieties in the field, varieties recommended for release by the All India Co-ordinated Research Project may also be made available to mills for multiplication pending their approval by the Central/State Varietal Release Committee.

(para 17.5.5)

46. It may be desirable to concentrate for the present on the use of heat treatment plant by the farmers who are entrusted with seed multiplication by the mill. Heat treatment plant may be made available by the mill, while its operation may be handled by seed growers and its expenses included in the premium which is allowed by the mill to the seed growers.

(para 17.5.6)

47. The research in sugarcane needs to be encouraged in the agricultural universities. Grants for the purpose may be given from SDF through ICAR against specific projects to be submitted by the concerned university.

(para 17.5.7)

48. The research in sugarcane takes much longer time than in other crops as the crop takes nearly a year for maturing and the effect on ratoons has also to be studied. There is consequently less interest amongst researchers in undertaking research in sugarcane. A scheme for grant of stipend for Ph.D/post Doctoral research in sugarcane may, therefore, be prepared by ICAR and funded out of SDF.

(para 17.5.8)

49. Due to budgetary constraints, the allocations for research have

not been adequate. The extent of support out of SDF also has not been adequate. The allocation of funds for research needs to be substantially stepped up.

(para 17.5.9)

50. In most other major sugar producing countries, the research in sugarcane is funded by growers or jointly by growers and the industry. Growers and industry also control the management committees of such institutes. This ensures proper interaction between the research efforts and the needs of the growers and the industry. It is recommended that one representative each of the National Federation of Cooperative Sugar Factories Ltd. and Indian Sugar Mills Association may also be appointed on the Cane Research Advisory Committees of various sugarcane research institutes to ensure better interface between the research institute and the industry.

(para 17.5.10)

51. Sugar mills may be allowed exemption from land ceiling for acquisition of land, either by purchase or lease, to the extent required for research and development on sugarcane, including trial demonstration and seed multiplication. 40 hectares of irrigated land would be adequate for this purpose for factories with 2500 TCD capacity, with suitably larger area for mills with bigger capacity.

(para 17.5.11)

52. To induce the mills to take up the cane development work in their area, the cane area for the mills need to be reserved on a long term basis and no part of this area should be transferred to another mill, unless the cane is surplus to the requirement of the mill.

(para 17.5.12)

53. The States, particularly in sub tropics, may utilise the proceeds of cess on cane for cane development work by setting up of Sugar Development Fund at State level.

(para 17.5.13)

54. The responsibility for cane development in the reserved area of the mills should be mainly of the mills as they have direct interest in such development. The State Governments cane staff should concentrate on other areas and on use of mass media, for example, TV, Radio and newspapers for extension work and on schemes which require

to be implemented at the State or regional level.

(para 17.5.14)

55. The State Department dealing with sugarcane may work out the economics of adoption of new varieties or cultural practices vis-a-vis the existing varieties/cultural practices before recommending the same to the farmers through their extension agencies. The profitability of sugarcane will change with the change in relative prices of inputs and outputs. The State Department dealing with sugarcane may review the profitability of various cultural practices on a regular interval on the basis of prevailing market prices and inform farmers about any change in the practices, such as optimum quantity of fertilisers to be used, which may be required as a result of change in relative prices.

(para 17.5.15)

56. Optimum crushing season for each State, or each region in case of larger States, may be determined by a Committee comprising representatives of the Cane Department of the State Govt., sugar factories and the farmers and efforts should be made to ensure crushing of sugarcane within this period, which would be in the interest of both the growers and the mills.

(para 17.5.16)

57. A minimum of 11.5 percent sucrose on maturity, with corresponding 8.5 percent of sugar recovery in the mills may be kept as the lower bench mark for release of new varieties.

(para 17.5.17)

58. The sugarcane research institute may carry out the study of economics of number of ratoons in different areas and on the basis of their findings educate the farmers through the state extension agencies and the mills about number of ratoons which would be most economical for the farmers in different agro climatic areas.

(para 17.5.18)

59. The drip irrigation may for the present be encouraged mainly in areas where water availability is low. Meanwhile research may be intensified to reduce the cost of drip irrigation and solve the problems faced by the farmers in its use.

(para 17.5.19)

60. The research institutes may carry out the requisite cost benefit analysis of the recommended practices vis-a-vis the existing practices followed by the farmers in regard to ratoon crop and state extension agencies and the mills should bring their findings to the notice of the farmers to motivate them to take proper care of the ratoon crop.

(para 17.5.20)

61. Since soil testing is useful for sugarcane as well as other crops, the State Governments may augment these facilities and ensure their full utilisation so that the deficiency of nutrients in the soil is made up in time.

(para 17.5.21)

62. It is necessary to have a coordinated programme for development of cane harvester to prevent duplication of efforts and to accelerate progress.

(para 17.5.22)

63. To improve the interaction between the State extension agencies, the mills and the growers, the system of annual review of working of the extension agencies involved in sugarcane extension by representative of the extension Department, mills and the growers at the district and State level may be introduced.

(para 17.5.23)

Measures for cost reduction

64. In India emphasis had been laid in the past on horizontal growth of sugar mills to encourage development of rural areas around the mills. While this policy has contributed to the dispersed growth of the Industry and provided employment to rural population over large areas, it is now necessary to review this policy in the interest of strengthening the competitive position of the sugar industry in the country to enable it to face the competition from the Industry in other countries.

(para 18.10.1)

65. In many countries there is a trend towards merger of the existing units for deriving the economies of scale. To facilitate such mergers for increasing size of the Mills to economic level, the sugarcane area of the merging unit may be permitted to be transferred to the unit with which it is merging. In order to protect the interest of the growers this should be permitted only where the new mill to be formed after the merger has the capacity to crush the cane within the normal season and

the farmers are either allowed to supply cane at the existing points of supply or they are compensated for additional cost involved in supplying cane to the new mills.

(para 18.10.1)

66. Some of the mills, particularly the older ones, have large surplus labour leading to high labour cost. In a competitive environment such mills may not he able to survive, thereby jeopardising the interests of both the growers and the workers. To facilitate voluntary retirement of surplus labour for making these units viable, loans may be granted from SDF to such units for financing voluntary retirement scheme.

(para 18.10.2)

67. The sugar industry should be allowed freedom to use any material for packaging. There also need be no restrictions on packaging below 50 kg or heavier packaging where mechanical handling is involved. So long as partial control continues, Government may, however, require levy sugar to be supplied in bags of prescribed weight viz 100 kg or 50 kg as the case may be. Development of I.S.I. specifications for cheaper bags with inferior specifications for 50 kg. packaging may be expedited.

(para 18.10.4)

68. Considerable economies in handling and storage cost can be achieved by bulk storage of sugar. This may however, not be practical so long as partial control continues. If and when Government implements complete decontrol, there would obviously be no restrictions on the type of storage to be used.

(para 18.10.5)

Imports

69. Imports may continue to be on OGL but the import duty may be levied at 40% of average difference between ex-factory price of free sale and levy sugar during of the past five years. The incidence would be around Rs. 130/- per quintal based on the average difference for the period from 1991-92 to 1996-97 years and is well below 150% allowed under WTO. Countervailing duty of Rs. 85/- per quintal to cover excise duty and cess on sugar levied by Governemnt of India and Rs.50/- per quintal to cover incidence of tax and cess on sugarcane levied by coastal states of Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu may also be levied.

(para 19.11.4)

70. Government may make efforts during next round of negotiations for reduction of binding rate of import duty on sugar from 150 to 25% and also press the developed countries to reduce the level of subsidisation of sugar industry.

(para 19.12)

71. Even during period of partial control on sugar prices, it is not necessary to import sugar on Government account merely due to shortage in levy, if there are adequate opening stock and production to meet consumption and closing stock requirements. If there is shortage on levy account only, it can be met by loan from free-sale or by purchase from industry by global tender so that purchase is made from mills in India so long as the purchase price is less than the landed cost of import and its cost of delivery at consumption point. Alternatively, the purchases can be made on the basis of the procedure followed by banks for valuation of sugar stocks for the purpose of working capital loans.

(para 19.13)

72. So long as restrictions on wholesale dealers remain, importers should be allowed to keep their stock in warehouses at ports only beyond prescribed limits and wholesalers dealing in imported sugar should also be made to follow regulations with regard to stock holding limit and turnover period as applicable for domestic sugar.

(para 19.13)

Exports

73. The Committee recommend a regular annual export quota of one million tonnes of sugar so that the Industry can plan properly by way of setting up extra capacity, and building markets among neighbouring countries which are major importers. With steady increase in installed capacity and production, this order of export would not affect domestic price. Exports at this level should be sustained even in the years of shortage as imports on OGL would flow in when domestic prices spurt and bring these under control. After April, when production estimates are firmed up, additional export quota may be released in instalments not exceeding one million tonnes at a time if there is surplus after providing for consumption and 2.5 months closing stock. Exports and Imports can take place simultaneously.

(para 19.14.1)

74. Mills exporting sugar may be exempted from levy on actual production in excess of normative production assessed on their capacity and normal duration of the region, so long as partial control on prices continues. In the event of complete decontrol normal releases may be allowed over and above the quantity exported by a Mill.

(para 19.14.2)

75. Under conditions of partial control, exports will continue to be at a disadvantage as the price of free-sale sugar from which exports are to be made would be higher as the mills have to compensate their loss in supply of sugar under levy below cost. There may be situations during this period when for maintaining stability of sugar prices in the over all interest of the industry and the cane growers, exports may be required to be made but individual mill may not be able to undertake those because it may involve loss. Even during this period, the individual millers, traders and export houses may be allowed to export sugar on their own. However, if the sugar exported by them is not adequate and additional sugar exports are considered by the Governement to be necessary in the interest of industry as a whole, it should be possible for exports to be made compulsorily for all mills through ISGIEIC, as was permissible under the Sugar Export Promotion Act, 1958. In case the Act still survives, it may be allowed to continue till the sugar prices are completely decontrolled. In case the Act stands repealed, a fresh law on the lines of the original Act may be enacted for the temporary period till complete decontrol of sugar prices.

(para 19.14.4)

Sugar Cycle

76. The origin of the sugar cycle is from the year of excessive cane production relative to the cane crushing capacity and the likely consumption demand. In order to reduce the extent of fluctuations in sugar production, which would be in the interest of the growers as well as the industry, sugarcane growers may be required to get the area intended to be planted with cane registered with the factory prior to plantation. Preference may be given to growers who had supplied cane in the past. Where likely production from the area sought to be planted is more than what can be crushed by the mill within the normal season, cane produced in unregistered area and unbonded cane may be crushed by the factories after milling all the bonded cane delivered at the factory. If as a result, the crushing season extends beyond 30th April, the price for the unbonded cane crushed during that period may only be SMP and not the cane price determined by the Cane Pricing Board. In States

like Tamil Nadu and Karnataka, where the normal crushing season goes beyond 30th April, this would apply only to the unbonded cane crushed beyond the normal date of close of the crushing season in those States. This will to a considerable extent discourage excessive planting of cane during such periods. It may be clarified that this applies only to the unbonded cane. So far as bonded cane is concerned, its price will have to be paid as determined by the Sugarcane Pricing Board even if it is crushed beyond the normal crushing season. Suitable amendment may be made in Sugarcane (Control) Order.

(para 20.16)

77. In order to encourage industrial cooperatives to maintain price equalisation fund for raw material prices to be paid to their members, they may be allowed to deduct the amount to be transferred to the fund from the income for the year for the purpose of Income Tax Act. Till such amendment in law is made, cooperative sugar factories may deduct a suitable amount from the cane price in years of higher price for crediting to Price Equalisation Fund, out of which some amount may be paid to the growers in years of low cane price. This will help in reducing the fluctuation in the cane price received by the growers.

(para 20.17)

Buffer Stock

78. Maintenance of buffer stock on regular basis is necessary to minimise sugar price fluctuations. Buffer stock should, however, be built out of surplus domestic production in good years and not out of import. The quantity to be taken to buffer stock may be surplus of production during the year plus opening stock over estimated consumption for the year and closing stock needed (equal to 2.5 months' consumption) for the ensuing season.

(para 20.25)

79. Creation of buffer stock involves payment of subsidy to mills for meeting stock holding charges and a maximum limit of buffer stock is, therefore, necessary. This upper limit may be the difference between minimum production in any year during the last five years plus opening stock of the season as compared to the estimated consumption of the season plus closing stock needed for the ensuing season. This would meet the shortfall for one year. If shortages persist for two consecutive seasons, which is unlikely to occur often, it would be more economic to import sugar.

(para 20.26)

Sugar Development Fund

80. Buffer stock may be offloaded in the market when free sale prices rise at a rate substantially higher than the rate of increase in general wholesale price index or it exceeds the import parity price (i.e., landed cost of imports + import duty + handling charges at the ports). Buffer stock is meant to tide over period of shortage and there need, therefore, be no minimum quantum of buffer stock.

(para 20.27)

81. Research Institutes are at present handicapped due to paucity of funds. Liberal grants may, therefore, be allowed for projects for R&D of cane and sugar industry. Growers, mills and the State Governments, individually or jointly, should be encouraged to set up research institutions by making matching contribution to the extent of 50% of expenditure. This may even apply to Vasant Dada Sugar Institute, Pune, as recommended in Chapter 16. Rules/Instructions may be modified to allow grants to institutes at regional/State level also.

(para 21.21)

82. While enhancing the availability of funds for research, a mechanism should be evolved for monitoring the progress of research projects financed from the Fund. Progress may be monitored against the milestones to be achieved on yearly or half-yearly basis, so that a mid-term correction may be made in the scope and direction of the policy where necessary. Where matching grants have been given from fund, adequate representation of the Central Government and the Industry (both ISMA & NSCSF) should be ensured in their management bodies to ensure proper utilisation of funds. The periodic monitoring may be entrusted to the Committees set up by the Government, vide its letter dated 29.10.1997.

(para 21.22)

83. Proposals for grants for research may, in future, be referred to two Apex organisation of Industry namely, NFCSF and ISMA for their comments in a time bound period, say, within a month before these are considered by the Standing Committee. Such proposals, which have not been sponsored by ICAR, may be referred to ICAR also for its comments in a time bound period.

(para 21.24)

84. After necessary mechanism to deal with schemes in Co-operative Mills as recommended in Chapter -29 has been set up, assistance from SDF may also be provided to potentially viable sick

cooperative sugar mills as a part of rehabilitation package, provided sickness has not been due to deliberate negligence/mismanagement, disposal of assets etc.

(para 21.24)

85. Loans for pollution control measure to the extent of 75% of the estimated cost may be advanced, even if these are not part of comprehensive modernisation scheme. These loans should carry interest at a concessional rate of 6% per annum as applicable to projects sponsored by TIFAC.

(para 21.25)

86. The earlier provision for considering a unit for loan for modernisation after minimum of seven years of its installation appears to be more reasonable and needs to be followed. Loans from SDF for modernisation after expiry of three years may be allowed, only in exceptional cases i.e. for adoption of technology which was not available when the plant was set up or for introducing new innovations like schemes sponsored by STM.

(para 21.26)

87. Cane Development Loans may also be sanctioned for factories under construction. These loans may, however, be advanced only when the machinery has been ordered and the civil works have been started.

(para 21.27)

88. Cane Development Loans may be granted on the security of second charge on the assets, provided the value of the assets is more than the amount of loan due under the first charge and sufficient balance is available to provide security for SDF loan.

(para 21.28)

89. Mills are at present allowed moratorium for re-payment of cane development loans. It should be provided in the conditions for grant of this loan that the amount of principal and interest received from the growers during the moratorium period will be utilised only for purpose of cane development by the mills.

(para 21.29)

90. Loans may be sanctioned on priority basis for infrastructure development schemes, wherever these are needed.

(para 21.30)

91. Loan assistance may be provided for trying out innovations which may be helpful to the entire industry. For instance, loan assistance may be provided for setting up of laboratory for cane testing by the mills which may be willing to introduce the system of payment of cane price on sucrose content basis.

(para 21.31)

92. A Committee comprising representatives of the growers, mill and State Government may be set up at the factory level to ensure that the funds advanced from SDF for cane development are utilised only for this purpose.

(para 21.32)

93. Even when distilleries, paper mills etc. are set up by sugar mills by using their own by-products, there should not be any concessional assistance from SDF.

(para 21.33)

94. Interest on the balances lying unutilised in the SDF, at the rate paid by Government of India on its borrowings, may be credited to the Fund.

(para 21.34)

95. The incentive scheme should be abolished in case of letters of intent / licence to be issued from a future date. Proper policies may be initiated to improve the health of the industry, as suggested at different places in the report.

(para 22.18)

96. Incentives, even after abolition of the scheme from a future date, should be allowed to units covered under current schemes in vogue for the balance period of entitlement. New LOIs / licences issued till the date of announcement of withdrawal of the scheme, may be granted benefit of incentives, provided they are implemented within the period stipulated in the incentive scheme.

(para 22.19)

97. If the policy of decontrol as recommended in Chapter 13 is implemented, incentive scheme in its present form ceases to be operative. After the decontrol, these units may be compensated for the loss of the incentive by grant from the SDF at the rate of difference between the ex-factory price of free sale and levy sugar, on eligible quantum of

production for the period provided in the present scheme in case of new units and expansion projects, or for the balance period under the relevant scheme in case of units which have already availed of incentives for some time. The necessary amendment in the SDF Rules may be made to provide for such grant. If there is any difficulty in compensating this loss from the SDF, either because of inadequacy of funds available in the SDF or any legal complication, the expenditure on this compensation may be met by levy of a specific cess for the purpose for a limited period during which the grant would be payable. This cess money should remain under direct control of Department of Sugar & Edible Oils, Ministry of Food & Consumer Affairs to ensure expeditious disbursement of compensation to such units.

(para 22.19)

Policy towards Khandsari & Gur

98. Direct estimate of cane crushed by khandasari units may be made once in five years to obtain more realistic figures.

(para 23.2)

99. No new licence for khandsari units should be allowed within the reserved area of a sugar mill and within 25 kms. from the site of a sugar mill, so that sugarcane produced within the reserved area of the mill is available to the mill for crushing and loss in sugar production involved on account of its crushing by khandsari units is avoided.

(para 23.4)

100. Khandsari units located outside the reserved area of the sugar mill may be allowed to instal vaccum pans and boilers and modernise and expand without any restrictions. The units which instal vaccum pans will be covered by the definition of sugar mill and therefore, need a licence as required for setting up of a new sugar mill. No levy may be imposed on these units up to 500 TCD capacity. Ceiling of 60,000 tonnes of cane crushing in a season may also be imposed. Units with crushing capacity in excess of 500 TCD may be required to supply sugar under levy subject to incentives available to new units. They may also be required to pay excise duty at 50% of that imposed on sugar. The sugar produced by such units will be exempted from payment of sales tax.

(para 23.5)

101. Khandsari development fund should be set up at State level out of cane cess paid by khandsari units. Purchase tax on cane levied

by State Governments, which has been recommended to be converted into cess, can be utilised for advancing soft loans to khandsari units for meeting part of the equity requirements for obtaining term loans for modernisation and expansion of these units. This assistance may be provided only to units located outside the mill's reserved area.

(para 23.6)

102. Sugar Technology Mission should help khandsari units also in adoption of improved technology. It should, for this purpose, interact with IIT, Kanpur and JNU, Delhi to use the technology developed by them for the benefit of khandsari units.

(para 23.6)

103. SMP should apply also to sugarcane purchased by khandsari units, but the same should be enforced only during normal crushing season.

(para 23.7)

104. Units which use more than one vertical crusher in a premise or close proximity, should be treated as commercial, and be liable to pay sales tax on khandsari.

(para 23.8)

105. Gur units using only one vertical crusher with upto 5HP connection may be delicensed.

(para 23.9)

106. Extension work for educating farmers about improved methods of gur production and storage and facilities available from KVIC should be undertaken by Block Development and Panchayat Officers of the State Government and the village level workers under them.

(para 23.10)

107. Research efforts undertaken for improvement in methods of gur production and storage by the Indian Sugarcane Research Institute, Lucknow need to be intensified, and this should cover the improved extraction of juice, increasing its self life and improvement in quality of gur on priority basis.

(para 23.10)

108. In order to avoid loss of sugar during juice extraction in the process of gur manufacture sugar factories may be permitted to manufacture gur or sell juice to gur producers. They may, however, be

required to pay excise duty on this gur or juice at the same rate as levied on sugar, in order to prevent evasion of excise duty and provide requisite protection to gur manufacturers.

(para 23.11)

109. In order to avoid hardship to gur manufacturers, who are generally farmers themselves, no limits on the stocks of gur to be held by dealers or period of its turnover may be imposed in future.

(para 23.12)

110. Information base for the gur industry at present is weak. The study carried out by NCAER during 1994-95 was organised when the gur units run by the farmers for making gur out of their own sugarcane had generally stopped functioning. Therefore, another study on the gur industry may be got conducted now, which will be more dependable for the position of the industry as a whole. The study should be conducted during the course of the season.

(para 23.13)

Utilisation of By products

111. While the use of bagasse prevents de-forestation to some extent by providing raw material to the paper industry, its use for co-generation helps to augment power generation at lower capital cost and in shorter time than conventional sources of power generation. It should be left to the individual sugar factories to decide on the basis of relative economics as to whether to opt for cogeneration or supply bagasse for manufacture of paper or particle board. The Govt. of India has reduced the import duty on bagasse pulp recently to 10%, but it has been reported that the paper manufacturers often tend to import wood pulp at the reduced rates of duty in the garb of bagasse pulp. The likely impact of these imports on the demand of bagasse by paper mills will also need to be taken into account.

(para 24.11.1)

112. The price of power paid by the Electricity Board to the sugar industry should be determined on a realistic basis. In case of annual supply to the grid, price of energy produced through co-generation should be based on average cost of generation of recently set up projects by the Electricity Board and purchase of power from other sources.

(para 24.11.2)

113. SEBs may grant necessary permission for distributing the power co-generated at the sugar mills to the growers and other consumers when approached by a sugar factory on payment of reasonable wheeling charges.

(para 24.11.3)

114. MNES may be requested to allow suitable subsidy on installation of 45 bar boilers also provided the sugar mills concerned supplies power to the SEB after installation of such boilers.

(para 24.11.4)

115. The present rate of duty on imports of molasses is 10%. This is far below the excise duty levied on the molasses produced in the country. The Govt. of India should impose a countervailing duty on the import of molasses such that it at least equals the excise duty levied on molasses produced in the country.

(para 24.11.5)

116. The instructions issued by the Central Government on 11-06-93 regarding decontrol of molasses should be given a statutory force by issue of directions under section 26 of ID&R Act to ensure implementation of the policy by all the State Governments and removal of all restrictions on movement of molasses within each State and outside the States.

(para 24.11.5)

117. As there are no restrictions on the import of molasses, there should also be no restrictions on the export of molasses to other countries.

(para 24.11.6)

118. The criteria for levying duty on molasses should be the sugar content of molasses. At present the basic excise duty on free sale sugar is Rs. 340/- per tonne; since the molassess contains less than 50% sugar, the excise duty on molasses should not exceed Rs. 170/- per tonne.

(para 24.11.7)

119. The use of alcohol for mixing with petrol upto 6.5% needs to be promoted. In case the Distilleries and the Oil Companies are not able to negotiate the price of alcohol for the purpose of admixing it with motor fuel, the Government should intervene to amicably arrive at

a mutually advantageous price through the use of good offices of the Departments of Sugar and Edible Oils, Petroleum and Chemicals.

(para 24.11.8)

120. It has been found that the collection, baling and transportation of trash is economical through use of baling machines. The surplus trash after meeting the field requirements for trash blanketing may be baled for transportation and burning in sugar factory boilers, so that equivalent quantity of bagasse is released for other purposes. Since baling of trash is a new innovation, necessary loan assistance from SDF may be provided to sugar mills for purchase of baling machines.

(para 24.11.9)

121. The paper mills necessarily de-pith bagasse before pulping in order to achieve the required pulping quality. The separated pith can be used for burning in the sugar factory boilers. Necessary loan assistance should be provided from SDF for the purchase of de-pithing machines and for making various minor modifications in the sugar factory boilers for the purpose of using pith as fuel.

(para 24.11.10)

HRD

122. The Deptt. of Sugar and Edible Oils may persuade the concerned State Governments to start special courses for sugar industry personnel at the artisans and the middle technical levels in ITIs and Polytechnics in regions where large number of factories exist.

(para 25.6.1)

123. The course content in NSI & VSI needs to be suitably revised to include subjects which are relevant to the present day requirements in the sugar industry.

(para 25.6.2)

124. Necessary measures for re-organising the NSI, Kanpur and stregthening the VSI, Pune be taken to make them more efficient instruments for training & Research as recommended in chapter 16.

(para 25.6.3)

125. There is a need for conducting appropriate short courses for existing technical persons in process control, automation and management.

(para 25.6.4)

126. NFCSF Ltd. should convey its concurrence to provide its share of Rs. 25 lacs, so that the Sugar Industry Management and Development Society starts functioning without delay.

(para 25.6.5)

Taxes

127. The existing rate of cess at Rs.14/- per quintal of sugar may continue and any increase may be considered if requirement of any additional funds arises.

(para 26.4.1)

128. Ministry of Food & Consumer Affairs, Department of Sugar & Edible Oils, may try to persuade State Governments in the sub-tropical areas to attempt arriving at uniformity in the rate of purchase tax/cess on sugarcane.

(para 26.4.2)

129. If the system of partial control continues, the State Governments may be requested to levy purchase tax on sugarcane on specific basis where it is at present on ad valorem basis.

(para 26.4.3)

Financing

130. Since cooperative units are joint ventures of numerous farmers, raising of equity for the project to the extent of 40% of capital cost is beyond their capacity and participation of State Government in equity with NCDC help is inevitable. The State Government should, however, insist on payment of dividend by the cooperative mills at rates at which interest is paid by them on non refundable deposits or on loans taken from financial institutions where non refundable deposits have not been created. State Government should encourage redemption of Government share capital by the cooperative mills.

(para 27.6)

131. Financial institutions very often do not sanction loan for new cooperative units in a State if there is default in loan repayment by other cooperative units in the State and State Government who guarantee such loans do not honour them. In order to ensure that promoters of new units get timely loan and prevent cost over runs due to delay in loan sanction and disbursement, State Governments must ensure that cooperaive units are managed on sound lines and do not default in loan repayment and if it still happens, must honour their guarantee.

(para 27.7)

Cooperative Mills

132. Co-operative sugar factories should try to return the share capital contributed by the State Governments at the earliest possible, so as to be free from Government interference in the management.

(para 28.9)

133. So long as the State Governments exercises control over the management of a co-operative sugar factory on account of its share capital contribution, it should appoint professional managers who can identify themselves with the factory and be accountable.

(para 28.10)

Sick Mills

134. Sick mills in the private and government sector are covered by Sick Industries Companies (Special Provision) Act, 1985 and their case for possible rehabilitation is examined by BIFR. Sugar factories in the cooperative sector are not covered by this and no legislation has been enacted to examine the case of sick cooperative units for possible rehabilitation if there is potential viability. Government may consider the desirability of either including the cooperative industrial units within the scope of the Act or enacting a separate legislation for the purpose. Till such enactment, a Committee under Secretary, Deptt. of Sugar and Edible Oils, with representatives from Department of Revenue, NCDC, NABARD, IFCI, Director (STM) and NFCSF may be set up. The concerned State Government representative may be co-opted as a member when the case of a cooperative sugar mill from that State is considered. NCDC may act as the convenor and nodal agency of the Committee. The Committee may examine the cases of sick cooperative sugar mills for recommending revival packages of potentially viable units or merger of non viable units with adjoining mills.

(para 29.4)

135. There are several sick mills in Government sector in Uttar Pradesh and Bihar. The State Government should take urgent steps for modernising and expanding potentially viable units amongst them to economic capacity or privatise them. Potentially unviable units may be closed and their cane area may be transferred to adjoining mills provided the latter have capacity to crush additional cane in normal season.

(para 29.5)

Sugar Trade

136. The Committee recommend that the present system of licensing of wholesale dealers in sugar, which serves no useful purpose and is counterproductive may be abolished. The existing restrictions on stock holding limit and period of turnover may also be simultaneously abolished.

(para 30.4.2)

137. While the Central Pollution Control Board (CPCB) has formulated specific standards for bagasse fired boilers, the State Pollution Control Boards (PCB) have failed to fix any standards for the bagasse fired boilers. It is recommended that the State PCB's may revise and fix standards suitably for bagasse fired boilers such that these are in conformity with the standards fixed by the CPCB. Higher standards may be fixed for sugar factory boilers only under special circumstances eg. in the case of boilers located near inhabited areas or places of tourist interest etc.

(para 31.12.1)

138. The Central Pollution Control Board may restore the relaxation which had earlier been allowed for BOD load of upto 500 ppm. The CPCB may also commission a study to assess the limit of BOD to be allowed for ferti irrigation which may be entrusted to National Environment and Engineering Research Institute (NEERI) or some other competent institute.

(para 31.12.2)

139. The sugar factory effluents contain bio-degradable organic matter without toxic chemicals and it is, therefore, recommended that it should be taken out from the list of hazardous industries.

(para 31.12.3)

140. Pollution control measures are often costly and also require considerable expenditure on their operation and maintenance while these do not lead to any increase in productivity. Necessary loan assistance should be made available from SDF for installation of such measures as already recommended in Chapter - 21.

(para 31.12.4)

141. The existing technology for pollution control is very expensive. Necessary research should be taken up to evolve cost effective technology for pollution control in the sugar industry. Necessary funds should be made available from SDF for the purpose on priority basis.

(para 31.12.5)

Signed this day, the 15th April, 1998.

(B. B. Mahajan)
Chairman

(J. J. Bhagat)
Member Secretary