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Congruity Between Growth of Sugarcane Production and Functioning of Sugarcane Mills, U.P.

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Agro-Economic Research Centre
University of Allahabad
Allahabad-211002 (India)

PREFACE

Sugar industry is the largest agro-based industry. The mutual inter-dependence between the raw material producer (cane grower) and the industry is complete. A large cross-section of the rural sector is benefited from the development of sugar industry directly or indirectly.

India tops the list of sugar producing countries in the world and U.P. stands second in India. This is a creditable achievement made by the sugar mills in U.P. which are a typical mix of old and new plants with limited influence of modern concepts in sugarcane processing. A basic understanding of these operations is essential.

The study is based on the primary data collected and information acquired from the sugarcane growers, officials of Sugarcane Department and sugar factories. I am thankful to all those who have extended their valuable cooperation during the course of fieldwork. The valuable assistance extended in by the Joint Cane Commissioner, Assistant Cane Commissioner, the sample sugar factory officers and staff and the sugarcane growers are thankfully acknowledged. Full credit is due to all the members of staff of the Centre who have given their 100% to make a creditable piece of research. I express my gratitude to them.

Comments and suggestions for the improvement of the report are welcome and will be thankfully acknowledged.

(S.A. Ansari)
Prof. & Hon. Director

Agro-Economic Research Center
University of Allahabad
Allahabad.

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Introduction

Honey produced by bees was the first known sweetener. When sugarcane was discovered, it was called the reed that produced honey without bees. Sugarcane and sugar-beat are two main crops that contribute approximately 56% and 44% respectively of the total sugar production in the world. Sugarcane and its main product 'sugar' both are used worldwide in a similar manner. Sugar is a product, which is used by all healthy people every day irrespective of climate and landscape variations. Worldwide people are still using sugar as a token of happiness irrespective of the occasion. Sugar is the first taste, which the human being gets after growing up slightly. Since long, all over the world sugar has been having the status of a base product for many industries of high demand. Such industries are biscuit, chocolate and confectionaries etc. After oxygen and water it is only sugar which instantaneously generates energy to all living beings world-wide.

Historical Background of Sugarcane Cultivation and Processing

Till the first quarter of Fifteenth Century Sugarcane cultivation was confined to only few pockets of India and China. Cultivation of Sugarcane had spread to several countries of Asia and Europe during fifteenth and sixteenth century. It is grown as an important commercial crop in most of the countries world-wide having fairly dry, sunny and frost-free wheather condition with adequate rainfall. Presently there are ten prominent sugarcane growing countries in the world. In our country too, sugarcane has developed sufficiently and presently there are nine States (Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Uttar Pradesh, Bihar, Punjab, Haryana and Tamil Nadu) which have attained the status of inter-State comparison in respect of area coverage, production, yield rate, sugar recovery percentage etc apart from its processing capacity and utilization.

In some parts, worldwide as well as in our country too, since medieval period people knew the art of sugarcane processing for making sugar from cane juice by indigenous method. During nineteenth century British Merchants developed numerous indigo plants under operation in the British Colonies as small sugar mills with the help of mechanical technology. The first sugar mill in U.P. was established in Pratappur of Deoria district in the year 1903.

Crop Name Analysis

Crop name 'sugarcane' comprises of two words i.e. sugar and cane. The words sugar and cane prove its worth in a befitting manner to all, its growers, the processors and the consumers depending upon its handling by them.

To the growers sugarcane proves to be sugar, provided the crop is harvested in early winter days with immediate price payment as per the declared rate. Such handling provides the growers sufficient money in hand along with the benefit of the vacant field for cropping a rabi crop timely. Sugarcane turns to be cane to the growers, in case it is harvested late. Under such condition the growers receive the price late and the next crop to be sown in the vacant field also gets entrapped in late sowing curse.

To the processors, sugarcane proves to be sugar provided they receive their raw material (sugarcane) in the early winter days. As during these days sugarcane has comparatively rich recovery percentage which enables to enrich the quantity and quality of output with the added benefit of entering the finished good market at an early date. It enables the processor to fetch the desired price due to less competition. In case of late receipt of sugarcane/raw material, for the processors, production (due to lower recovery percentage) as well as marketing (due to severe competition) gets tough resulting sugarcane to be more a cane rather than sugar.

To the consumers, sugarcane if consumed in a small quantity proves to be sugar in terms of an energy-giving agent till the time consumer has healthy body. In case sugar is consumed in a large quantity then in spite of generating it decreases energy by developing the deadly disease of diabetes and proves to be a cane to the consumer.

Characteristics of Sugarcane, Sugarcane Growers, Sugarcane Processors and Sugarcane Main Product (Sugar):

The mentioned characteristics are based on the observations of the sample groups of sugarcane growers, processors and many others of the sample field.

A. Characteristics of Sugarcane

1. Sugar cane has liberal soil acceptability but is sensitive to climatic suitability. Sub-tropical climatic condition coupled with adequate rainfall is most suitable for healthy growth both in terms of yield and recovery percentage of sugarcane.
2. Sugarcane and its product (sugar) has commercial status in the State, nationally as well as internationally.
3. It has been maintaining the status of the only commercial crop for the State of Uttar Pradesh to most of it growers since many decades.
4. All the parts of sugarcane right from its root upto leaf pay to its growers and nothing is a waste.
5. Since sugarcane crop is an annual crop remaining on the field for nearly more than half a year, it provides a thick green cover to the stretch of the cropped land to promote eco-friendly atmosphere in the catchment area with the added benefit of withholding surface water evaporation wastage along with the soil conservation benefit.
6. Sugarcane is the only crop in our crop husbandry having the benefit of ratoon cultivation culture which benefits the growers in financial terms in respect of cost of cultivation.
7. Sugarcane crop cannot be preserved even for a very short period during the post harvest period, therefore, it bears no storage expense and also it is not prone to major post harvest wastages.
8. On the farm sugarcane has proved to be a hardy crop because draught, flood, hail storm and other similar natural calamities can damage it little in comparison to other parallel crops of the area.

9. World-wide, the finished product (sugar) and also sugarcane furnish energy to people and are also used as medicines for some ailments.

10. Sugarcane is the only commercial crop for which all types of growers and the processors remain in direct contact with each other and are, therefore, saved from the ailment of middleman disease.

11. Level of development of sugarcane depends on the congruity level between growers and the processors apart from its price.

12. Sugarcane is the only crop of the State and the country having two declared prices at the same time-one by the Central Government and the other by the State Government.

13. Sugarcane cultivation being annual, has the potential of two parallel crops, one on the ground (sugarcane) and the other either underground or in the form of creepy vegetables on the same field, enabling the growers the benefit of cost (due to same irrigation, fertilizer and other nutrients) and time saving farming.

14. Since sugarcane is a non-food crop, maximum production is saved from the pressure of self consumption or disguised trading (consumption without trading)

15. Sugarcane is the crop which, in comparison to other crops, elevates financial status of the growers in our country as maximum production undergoes trading.

16. Cane price and also the price of its finished products is fully regulated by the government in our country.

17. Maximum production of sugarcane is ready for consumption only after its processing either partially or fully.

18. It is the only farm product, which from the farm directly and immediately undergoes processing for its finished product.

19. There is no wholesale or retail market of Sugarcane in the State of U.P.

20. Sugarcane is the only farm product, which has the potential of profitability twice to its processors. Once by its product and the other by processing its by-products.

21. The sugarcane growers and its subsequent processors have equal stake during the time it is in its farm form (Sugarcane).

22. Sugarcane has many processors in our country as it undergoes processing in sugarmills, crushers, koluhs and juice units.

23. Sugarcane is the only crop which undergoes no change in its level till harvesting. Only the size of cane grows in between its planting and harvesting stages.

24. Worldwide in taste, shape and size sugarcane does not differ much.

B. Characteristics of Sugarcane Growers:

1. Majority of cane growers practice multi crop culture on their farms in our country.
2. All the categories of farmers i.e. marginal, small, medium and large are sugarcane growers.
3. Majority of growers are not processors.
4. Majority of growers are in direct contact with the processors for selling their produce.

C. Characteristics of Sugarcane Processors:

1. There are many processors. Main processors under operation in India are, open pan (Khandsari), Kolhus (Jeggary/Gur), sugarmills (sugar) and juice units.

2. Sugarmills are the main processing units as they process maximum of the cultivation.

3. All the processing units are under operation for a very limited period of time (maximum of six months) in a year.

4. Most of the processing units operate near the sugarcane fields in order to gain in transport cost and recovery percentage for improving the cost, quantity and quality of the processed product.

5. Sugarcane processing have enabled our country to be a rich producer of centrifugal sugar (18 million tonnes) in the world.

6. Sugarmill is the only agro-industry under operation in the rural areas of our country with a very big and well-equipped infrastructure.

7. Due to co-generation capacity, sugar processing mill units are self-sufficient for the production operation.

8. Sugarmill is one of the largest agro-industry amongst the organized sector-providing livelihood to many lacs of farmers directly and indirectly in our country.

9. Prosperity of other allied industries e.g. sugar mill machinery manufacturing, distilleries, biscuit manufacturing and confectioneries are directly and positively associated with the prosperity of the sugar industry.

10. In our country Sugar industry adds to the Centre and State exchequers handsomely in the form of Excise duty and tax.

11. Since sugarmills have well equipped infrastructure with an off-season period stretching to nearly six or more months coupled with easy availability of many agro-based raw materials at cheap rate, they automatically get enriched through diversification and also have the potentiality of rural area development conveniently at low cost.

D. Characteristic of Sugarcane Product (Sugar)

1. Sugar looks to be nearly the same all over the world.

2. It is used by all healthy people every day irrespective of diversities.

3. It is the source of instant energy after oxygen and water.

4. Sugar is an integral part of celebration worldwide irrespective of the occasion.

5. It is the first taste which human being tastes after growing up slightly after birth.

6. Sugar is a commercial product internationally.

7. Effectiveness of sugar remains the same in all weathers.

8. Sugar is a hardy product, as it remains the same in all weather conditions without extra packing/care.

Sugarcane and its View/Status

Sugarcane and its product (sugar) have been used in the similar manner all over the world since ages.

A. World View/Status

The prominent sugarcane growing countries are Cuba, South Africa, America, India, Philippine, Australia, China, Egypt, Brazil, Pakistan, Maxico and West Indies. Of the total sugar production in the world, sugarcane and sugar-beat are two main crops that contribute approximately 56% and 44% respectively. India is the second largest producer of sugarcane in the world with the total production of around 300 million tonnes. During the last fifty years, production of sugarcane in India has made great strides due to the increased acreage (1.7m/ha. in 1950-51 to 4.2 m/ha.) in 2001-02 rather than its productivity. India is producing over 18 million tonnes of centrifugal sugar.

Table- I-1

Sugarcane and sugar industry At a Glace (1988)

	Item	Unit	India	Philippines	Australia
1	Sugarcane Growers	No	100,00,000	31,000	7050
2	Sugarcane Area	Hectare	30,00,000	550000	280000
3	Workers & Staff	No	30,00, 000	42,000	1650
4	Factories	No	380	42	33
5	Sugar Production	Million Tonnes	6-8	1.6-2.2	3.2
6	Population	Million	750	55	12.5
7	Sugarcane Yield rate	Qtls./Hect.	400-800	400-800	700-1000
8	Other Sweeteners	Name	Gur, Khandsari, 50%	All Sugar	All Sugar
9	Sugar Recovery	Percentage	9.50-12.50	9.00-10.00	12-14
10	Earmarked area for sugarcane	-	No area assigned	No area assigned	Assigned area every year
11	Irrigation	Mode	Canal, pumping set, rain	Rain. Ponds	Rain, Ponds, dams
12	Age of Cane	Months	10-18 months	12-18 months	14-24 months
13	Harvesting	Time	Choice of growers	Maturity-wise	Maturity-wise
14	Technique of – Harvesting	-	Manual	Manual and Mechanical	Mechanical
15	Cane price		Fixed by government	Depends on sugar price and cost of sugar	60 to 70% cost of sugar
16	Feeding of Cane		Mechanical cane unlabour, Tipplers & manual	Mechanical, Manual	All automatic

Source:- A case study by Randhir Singh , U.P. State Sugar Corporation Ltd., Lucknow

The relative status of India's Sugar Mills has been given in Table-I-1. The table clearly shows that in comparison to Philippines and Australia, India is superior in many respects and has purity in processing technology but are more labour intensive for that reason the use of automation, television circuits, micros processors and computers is limited. Earlier the country was dependent on the technical guidance from Java Research Station but with the continuous research and training the indigenous technology has attained a level that was second to none in the world in number of aspects of sugarcane economy.

Presently, India is facing the problem of plenty in sugar production as we maintain a carry-over stock of almost 13.1 million tonnes of sugar and during the current crushing season we expect to produce another 16 million tonnes against a domestic demand of 15.6 million tonnes.

This clearly indicates that we will have to dispose of our surplus sugar in the international market to maintain the health of sugarcane industry and timely payment to sugarcane growers. The crashing sugar prices in the international market add to our worries, as the cost of sugar production in India is higher which makes our sugar non-competitive for export. A two-pronged approach, involving maximization of sugarcane productivity at field level and enhanced recovery at factory level, would help reduce the cost of sugar production. As 1% of increase in recovery percentage makes a gain of nearly one crore rupees, besides, realized cane pricing and product diversification, better utilization of factory by-products will have to be adopted for keeping cane and its economy gainful.

B. National (Inter-State) View/Status

Sugarcane is an agro-industrial crop of the country. It is cultivated in over a wide range of agro-ecological situations, both in tropical and sub-tropical regions encompassing the area of Tamilnadu in south, Punjab in the north, Gujarat in the west and Assam and Nagaland in the East. At present the total production of sugarcane in the country is around 310 million tonnes.

Since 1980-81 during the last three decades (Table1-2) the States of Uttar Pradesh and Maharashtra jointly proved to be the national commander for sugarcane area coverage and

production concentration as it is to the tune of slightly more than sixty percent and 57 to 59 per cent respectively along with first and second national ranks. These top national ranks with rich national shares in respect of cane area coverage and production is attributed chiefly to the natural bliss of Gangetic soil of Uttar Pradesh and climatic suitability of Maharashtra.

Table-1-2
Position of Sugarcane Area and Production of the States in India

Sl. No	States	Area						Production					
		National Share in % & Rank						National Share in % & Rank					
		1980-81		1990-91		99-2000		1980-81		1990-91		99-2000	
		Share	Rank	Share	Rank	Share	Rank	Share	Rank	Share	Rank	Share	Rank
1	U.P	51	1	50	1	41	1	42	1	43	1	39	1
2	Bihar	4	6	4	6	3	6	2	7	3	7	2	8
3	Punjab	3	5	3	7	3	6	3	6	2	8	2	8
4	Haryana	4	6	4	6	3	6	3	6	3	7	3	7
5	Maharashtra	10	2	12	2	15	2	15	2	16	2	18	2
6	Gujarat	3	7	3	7	3	5	3	6	4	6	5	6
7	Andhra Pra.	5	5	5	5	6	4	6	5	5	5	6	5
8	Karnataka	6	4	7	3	8	3	8	4	9	4	10	4
9	Tamilnadu	7	3	6	4	12	3	12	3	10	3	13	3
10	Others	7	-	6	-	6	-	6	-	5	-	2	-
	Total	100	-	100	-	100	-	100	-	100	-	100	-
	All India	2667000 (Hectares)		3686000 (Hectares)		4144000 (Hectares)		154248000 (Tonnes)		241046000 (Tonnes)		309307000 (Tonnes)	

Data Sources:- CACP report 2001-02.

Development of cane cultivation and its processing, directly and positively with instant effects, depends solely, on the axis of its productivity and recovery percentage apart from its price. In respect of productivity Tamilnadu occupied the first rank, with positive national status. Maharashtra and Gujarat remained in the top ranker's race. U.P. with seventh national rank coupled with a negative national status till 1990-91 indicates the need for immediate improvement of the cane productivity as a cheapest and best option for the benefit of its growers

and the processors. Other States needing immediate improvement of its cane productivity are Bihar, Punjab and Haryana as they have poor ranks and negative national status. (Table-I-3)

Table-I-3
Position of Sugarcane Yield of the States in India

Sl. No.	States	Yield in Kg, Hec., National Status* in Kg Hec. And National Rank								
		1980-81			1990-91			1999-2000		
		Yield	Status	Rank	Yield	Status	Rank	Yield	Status	Rank
1	U.P	47,092	-10752	7	55811	-8584	7	62154	-12486	7
2	Bihar	31,412	-26432	9	52490	-12905	9	49817	-24823	9
3	Punjab	55211	-2633	6	59406	-5989	6	63750	-10890	6
4	Haryana	40522	-17322	8	52703	-12692	8	61173	-13467	8
5	Maharashtra	92331	34487	2	86523	21128	3	96176	21536	2
6	Gujarat	59215	1371	5	89600	24205	2	71189	-3451	5
7	Andhra Pra.	75936	18092	4	69562	4167	5	81004	6364	4
8	Karnataka	79367	21523	3	76989	11594	4	94678	20038	3
9	Tamilnadu	101475	43631	1	100817	35422	1	118081	43441	1
	India	57844	-	-	65395	-	-	74640	-	-

Note:- National Status- has been derived basing India's yield.
Data Source:- CACP Report 2001-02

Poor recovery percentage is more a national problem rather than a State affair as most of the States have experienced negative national status since 1981-82. It is only Maharashtra and Gujarat with positive national status and top ranks of first and second in the country that they remained competing with each other. (Table1-4)

Pro-sugarcane natural bliss of Maharashtra (climate) and Uttar Pradesh (Soil) if coupled with a scientific break-through of **gene revolution**, alongwith **efficient crop management practices** with ratoon culture promotion, these two States having the sound base of area coverage will undoubtedly prove their potentials in the international market.

Table-1-4
Position of Sugarcane Recovery Percentage of the States in India

Sl. No.	States	Recovery in %, National Status* in % and National Rank								
		1981-82			1990-91			1999-2000		
		Recovery	Status	Rank	Recovery	Status	Rank	Recovery	Status	Rank
1	U.P	9.14	-0.52	5	9.08	-0.78	7	9.35	-0.89	5
2	Bihar	9.00	-0.66	6	9.07	-0.79	8	9.21	-1.03	7
3	Punjab	9.71	0.05	4	8.95	-0.91	9	9.10	-1.14	9
4	Haryana	8.59	1.07	9	9.44	-0.42	5	9.27	-0.97	6
5	Maharashtra	10.68	1.02	1	10.76	0.90	2	11.42	1.18	1
6	Gujarat	9.72	0.06	3	10.91	1.05	1	10.62	0.38	3
7	Andhra Pra.	8.64	-1.02	8	9.61	-0.25	4	10.09	-0.15	4
8	Karnataka	10.07	0.41	2	10.25	0.39	3	10.77	0.53	2
9	Tamilnadu	8.79	-0.87	7	9.11	0.75	6	9.14	-1.10	8
	All India	9.66	-		9.86	-	-	10.24	-	-

Data source:- CACP Report 2001-02. Note- National Status derived basing India.

Sugarcane is grown in our country chiefly for producing sweeteners, that is, sugar, jaggery (gur) and Khandsari. A small quantity is utilized by the Product Industry. The share of three sweeteners of sugarcane utilization depends upon the market trend, quantity of sugarcane production and also on the disbursement mood of the growers. Currently on an average 47% of sugarcane is utilized for sugar production, about 40% for Gur and Khandsari and rest for other purposes. The fluctuations in the drawal of sugarcane for sugar production, therefore, are very common. Sugarcane being a commercial crop, needs to be handled in such a way that it meets the requirements of the Industry besides giving high returns to its growers.

Sugarcane is an agro-industrial crop of the country with the total production around 310 million tones. The country is producing over 19 million tonnes of sugar, 10 million tonnes of Gur alongwith Khandsari. Sugar industry is the second largest industry in the country after textiles. Sugar and its by- products play a pivotal role in the agro- industrial economy and share nearly 2 per cent of the GDP.

In respect of sugarcane price payment made by the sugar factories, during the mentioned period (1974-75 to 1999-00) in the country in most of the years, Maharashtra State sugar factories paid maximum price to the growers followed by Gujarat (Table 1-5). In the country as rest of the States' sugar factories have also been able to pay maximum price to their cane growers but it had been seldom. This communicates about their price payment capacity. In the

present condition and also for attaining optimum level of congruity between all the cane growers and the sugar mills the **"seldom price payment capacity"** by many States is required to be made a regular practice.

Table-I-5

Maximum Sugarcane Price Range Paid by Sugar Factories State-wise in India

(Rs Per Qtl)

Years	India			
	Maximum Range			
1974-75	13.85	(Punjab)	18.00	(Maharashtra)
1975-76	12.50	(Harayana)	16.00	(U.P.)
1976-77	13.25	(Punjab)	16.60	(Maharashtra)
1977-78	13.50	(Punjab)	17.00	(Karnataka)
1978-79	12.50	(Punjab)	17.75	(Maharashtra)
1979-80	14.12	(Pun. & Karna.)	25.00	(Karnataka)
1980-81	23.00	(Harayana)	33.81	(Maharashtra)
1981-82	23.00	(Punjab)	27.50	(Karnataka)
1982-83	20.50	(U.P.)	25.00	(Maharashtra)
1983-84	20.50	(U.P. & Bihar)	26.00	(Maharashtra)
1984-85	22.00	(Punjab)	25.42	(Gujarat)
1985-86	24.00	(Harayana)	32.19	(Maharashtra)
1986-87	24.50	(Har. & Bihar)	30.15	(Maharashtra)
1987-88	33.50	(Gujarat)	38.60	(Gujarat)
1988-89	31.00	(Pun. & Har.)	49.50	(Gujarat)
1989-90	38.00	(U.P)	62.00	(Maharashtra)
1990-91	42.00	(Punjab)	53.00	(Gujarat)
1991-92	45.00	(U.P.,Pun & Har.)	60.00	(Gujarat)
1992-93	46.50	(Punjab)	71.90	(Gujarat)
1993-94	58.00	(Punjab & U.P)	65.00	(Karnataka)
1994-95	68.00	(Punjab)	73.00	(Gujarat)
1995-96	73.00	(Punjab)	77.00	(Punjab)
1996-97	76.00	(Harayana)	80.00	(Har. & Karnataka
1997-98	78.00	(Har. & Bun.)	110.13	(Gujarat)
1998-99	91.00	(Pun. & Har.)	95.00	(Har. & Pun.)
1999-00	104.00	(Harayana)	110.00	(Harayana)

Data Source- CACP Report 2001-02.

In respect of annual installed sugar production capacity in the country the States of Maharashtra and Uttar Pradesh with top two national ranks and share during the last several decades exhibit their potentials of pushing the nation ahead for sugar production of better quality and quantity because of cane production richness and its continuity (because of cane area coverage richness). For enhancing the national glory in the international platform, these two

States jointly owned more than fifty percent (56 to 61%) of the national annual installed sugar production capacity. (Table 1-6)

Table-I-6
Position of Annual Installed Production Capacity of Sugar Industry of the States in India

States	1985-86		1990-91		1998-99	
	National		National		National	
	Share in%	Rank	Share in%	Rank	Share in%	Rank
U.P.	24	2	25	2	28	2
Bihar	5	6	3	7	3	6
Punjab	1	8	4	6	4	5
Haryana	2	7	3	7	3	6
Maharashtra	32	1	32	1	33	1
Gujarat	7	5	6	5	6	4
Andhra Pradesh	7	5	6	5	6	4
Karnakata	10	3	8	4	6	4
Tamil Nadu	9	4	10	3	9	3
Others	3	-	3	-	2	-
All India Capacity	75.35	-	98.06	-	149.52	-

Data source- CACP Report 2001-02.

Details of utilization of production capacity of sugar industry by different States as given in table 1-6, distinctly confirm the extreme eagerness for utilization of the annual capacity of sugar industry, as during the last three decades all the states have utilized more their installed capacity during the last three decades. (Table I-7).

Table-I-7
Position of Annual Production Capacity Utilization of Sugar Industry by the State in India

States	1985-86			1990-91			1998-1999		
	Annual capacity utilization %age	National		Annual capacity utilization %age	National		Annual capacity utilization %age	National	
		Status/ %age	Rank		Status/ %age	Rank		Status/ %age	Rank
U.P.	92	-1	6	121	-2	5	90	-13	7
Bihar	72	-21	7	121	-2	5	61	-42	8
Punjab	133	40	1	70	-53	7	47	-56	9
Haryana	104	11	4	117	-6	7	94	-9	6
Maharashtra	98	5	5	133	10	1	109	6	4
Gujarat	108	15	3	132	9	2	105	2	5
Andhra Pradesh	72	-21	7	127	4	3	130	27	2
Karnakata	70	-23	8	122	-1	4	140	37	1
Tamil Nadu	125	32	2	118	-5	6	119	16	3
Others	-	-	-	-	-	-	-	-	-
All India capacity utilized %ages	93	-	-	123	-	-	103	-	-

Data source- CACP Report 2001-02

Even for the sugar production, the duo of Maharashtra and U.P. are standing at the top in the country with slightly more than sixty per cent of the national sugar production (Table I-7). These two States, therefore, should make efforts to bring improvement, both quality-wise and cost-wise to capture a lion-share in the international market (Table I-8).

Table-I-8
Position of Annual Sugar Production of States in India

State	1980-81		1990-91		1999-2000	
	National		National		National	
	Share in%	Rank	Share in%	Rank	Share in%	Rank
U.P.	24	2	25	2	25	2
Bihar	4	7	3	7	2	8
Punjab	1	10	2	8	2	8
Haryana	2	8	3	7	3	7
Maharashtra	41	1	34	1	36	1
Gujarat	6	5	7	5	6	6
Andhra Pradesh	5	6	6	6	7	5
Karnakata	7	4	8	4	8	4
Tamil Nadu	8	3	10	3	9	3
Others	2	9	2	9	2	9
All India Production /M.Tonne	51.48	-	120.47	-	179.56	-

C. State (Uttar Pradesh) View/ Status

In the State of Uttar Pradesh, as proportion to the Gross Cropped Area in comparison to the competing (important) crops, sugarcane is lagging behind rice and wheat probably due to the high demand of these cereals and also availability of good quality HYV seeds.

Table-I-9
Agro- Profile of Important Crops of U.P. since 1980-81 to 1999-2000

(In percentages)

Items	Rice	Wheat	Potato	Total Oilseeds	Pulses	Sugarcane
Cropped area range as proportion to gross cropped area	11.25 to 22.48	3.37 to 35.35	1.08 to 1.64	2.86 to 4.89	10.72 to 12.54	5.55 to 8.08
Irrigated area ranged as proportion to cropped area	23.07 to 67.41	81.97 to 93.84	95.38 to 96.71	30.68 to 55.48	20.39 to 28.53	77.93 to 90.02
Growth range of cropped area	- 9.62 to 11.14	-4.19 to 14.87	1.92 to 61.46	1.74 to 80.30	-2.39 to 10.90	9.28 to 54.80
Growth range of irrigated area	15.17 to 235.98	-3.46 to 31.11	1.96 to 66.42	-32.32 to 180.00	-9.45 to 24.86	11.39 to 73.37
Growth range of production	1.36 to 137.85	-4.75 to 96.85	-5.39 to 138.98	-54.74 to –1.15	-10.24 to 12.08	10.41 to 95.23
Growth range of productivity	3.89 to 106.74	- 0.16 to 68.06	-15.94 to 45.65	-5.12 to 69.45	-15.84 to 8.03	-3.05 to 29.72

Note: Growth range has been calculated by taking 1980-81 as base year

In the State, sugarcane is lagging behind rice, wheat and potato in respect of growth of production and productivity also probably because of non-availability of good quality seed. Keenness of cane growers is reflected through the richness of the furnished irrigation to the area under cane (Table-I-9).

The State of U.P. is having the first place nationally in respect of cane area coverage and production coupled with a high percentage share of more than forty during the last few decades (Table I-2, I-10). The rich sugarcane base at the farm level in U.P. signifies that on the one hand the farming community has realized the profitability of cane cultivation and on the other, its marketing is trouble-free through of the optimum congruity level between the growers and the sugarmills. Due to the grower's realization of cane cultivation economics and optimum congruity level between cane growers and the sugarmills, the base of cane cultivation could be enriched easily and the State could achieve the highest national rank and share. (Table -I-10)

Table-I-10
Position of Sugarcane Area and Production of U.P. in India

Year	Sugarcane Area			Sugarcane Production		
	India 000 Hect.	U.P's		India 000 tonnes	U.P's	
		Share %	Rank		Share %	Rank
1980-81	2667	51	First	154248	42	First
1985-86	2849	52	,,	170648	43	,,
1990-91	3686	50	,,	241046	43	,,
1995-96	4148	48	,,	281100	43	,,
1996-97	4174	51	,,	277560	45	,,
1997-98	3930	51	,,	279541	46	,,
1998-99	4076	48	,,	295726	39	,,
199-00	4144	47	,,	309307	39	,,
Growth over the period	+55%	+44%	-	+101%	+87%	-

Data Source:- CACP Report 2001-02.

The State has sufficient space for improving its poor cane productivity as during the previous decades the difference in its yield rates from the prevailing maximum and average yield

rates of the country had been sufficiently negative upto the extent of 155.48 per cent from the maximum and -22.83 per cent from the average (Table I-11)

Table-I-11
Efficiency/ Deficiency in Sugarcane Yield Rate of U.P. from the Prevailing Minimum, Maximum and Average Yield Rates of India

Years	Difference in U.P.'s Yield Rate to India's						
	Minimum rate		Maximum		Average		Yield rate of U.P. Kg./Hect
	Kg./ Hect.	%ages	Kg./ Hect.	%ages	Kg./ Hect.	%ages	
1980-81	+15680	+33.30	-54383	-155.48	-10752	-22.83	47092
1985-86	+15396	+31.41	-55664	-113.56	-10871	-22.18	49018
1990-91	+3321	+59.50	-45006	-80.64	-9584	-17.17	55811
1995-96	+16849	+21.76	-40302	-66.40	-7085	-11.67	60692
1998-99	+15550	+26.35	-50955	-86.34	-10272	-17.41	59016

In respect of sugar recovery percentage the position is similar to that of the yield rate, as it also remained negative (upto the tune of 23.45 per cent) from the maximum recovery of the country. In comparison to the national average recovery though the State differed in negative terms but through out the period it remained in single digit with an increasing order in the range of -5.69 per cent to -9.73 per cent (Table I-12).

Table-I-12
Efficiency/Deficiency in Sugarcane Recovery Percentage Rate of U.P. from the Prevailing Minimum, Maximum and Average Yield Rates of India

Years	Difference in % of U.P. From India's			
	Minimum	Maximum	Average	Recovery % of U.P.
1980-81	+6.02	-16.85	-5.69	9.14
1985-86	+1.15	-17.00	-6.78	9.59
1990-91	+0.11	-20.15	-8.59	9.08
1995-96	+4.25	-20.32	-8.27	8.71
1998-99	+6.08	-23.45	-9.73	9.04

In respect of cost of cultivation the State stands at the bottom to most of the cane growing States except for Haryana. Since all the States have better productivity and recovery percentage,

these States make it imperative for U.P. to opt for better input package by enhancing its cost upto their level for attaining matching or improved productivity and recovery percentages.(Table I-13)

Table-I-13
Cost of Cultivation of Sugarcane and Comparative Status of U.P. to Other States in1998-99

States	Cost of Cultivation		Comparative Status of U.P. in %
	Year	Rs./Hect.	
Andhra Pradesh	98-99	45758.66	-42.45
Haryana	98-99	24824.77	+6.09
Karnataka	97-98	29314.55	-10.16
Maharashtra	98-99	40640.26	-35.20
Tamil Nadu	98-99	51734.35	-49.09
Uttar Pradesh	98-99	26335.82	-

Note: Given cost is based on new methodology.
Source-Report of CACP 2001-2002

The different price ranges (Statutory Minimum Price, State Advised Price and Price Actually Paid by sugar factories) of the State during the last decades (1990-91 to 99-00) show that the State government is committed to the welfare of sugarcane growers, as in all the years State Advised Price range was substantially superior to the declared Statutory Minimum Price.

Table-I-14
Year-Wise Different Sugarcane Price Ranges of U.P.

(in Rs/qtls)

Years	Statutory Minimum Price (SMP)	State Advised Price (SAP)	Price Actually Paid (PAP)
	Range	Range	Range
1990-91	23.00 - 34.62	41.00 – 44.00	41.00 – 44.00
1991-92	26.00 - 32.12	30.00 – 34.00	45.00 – 48.00
1992-93	31.00 - 38.66	45.00 – 48.00	46.00 – 49.00
1993-94	34.50 – 43.84	46.00 – 49.00	58.00 – 61.00
1994-95	39.10 – 48.40	58.00 – 61.00	66.00 – 70.00
1995-96	42.50 – 53.30	66.00 – 70.00	70.00 – 74.00
1996-97	45.90 – 55.02	70.00 – 74.00	67.00 – 76.00
1997-98	48.45 – 60.45	72.00 – 76.00	48.45 – 80.00
1998-99	52.70 – 66.96	75.00 – 80.00	80.00 – 85.00
1999-00	56.10 – 68.64	85.00 – 90.00	62.04 – 90.00

Except 1990-91 in remaining all the years of the period as the price actually paid by the sugar factories was marginally above the State Advised Price. From this it can be safely concluded that in declaring State Advised Price the government has not favoured the growers blindly but has also taken into consideration the paying capacity of the factories as the factories are the chief buyers of the sugar cane. (Table I-14)

On the farms of the State nearly all the crops are having less gross return as compared to that from sugarcane. It proves that the State, inspite of poor productivity of sugarcane but probably due to good cane price and marketing, is able to be at the top in terms of its return. It also indicates that the State has the capacity of enhancing the cost of cultivation easily for achieving the needed improved level in its yield and recovery rates by using better package of inputs. (Table-I-15)

With the installation of first sugar factory in 1903 the State's journey for sugar industry started. Planned and multisectoral development of the sugar industry in the State was initiated since 1950-51 after the enactment of the Industries Act, 1951.

Table-I-15
Gross Return of Important Crops in U.P. and Comparative Profitability to Sugarcane

Crops	Gross Return Rs./Hect.	Comparative profitability of Sugarcane/%
Paddy	16014	153
Wheat	14822	173
Jowar	3655	1009
Maize	5981	578
Arhar	10006	305
G.Nur	9760	315
S.Flower	12760	218
Sugarcane	40531	-

Source Report of CACP 2001-2002

During sixties indigenous manufacturing of sugar mills machinery was started. After 1980 the economically viable capacity of sugar mills was 2500 TCD, which is now 5000 TCD in the State. Prior to 1960-70 economically viable capacity of the sugarmills was 500 to 1000 TCD. For the development of both the sugarcane growers and the processors a long term policy has

been framed in 2001-02 keeping in view the economic and technical upgradation for both i.e. Sugarcane handling and production at the farm and at the processing level. The long term policy of 2001-02 has made provision for an in depth consideration so that both, the cane growers and processors, are able to achieve excellence in physical, technical and financial terms and are able to maintain and upgrade their congruity level easily. (Table I-16) Thus, over a period of a century only, with the help of proper planning, policies and their implementation the State could create development, welfare and State support at par to the cane growers and the processors. It is appreciable for all, the State, the growers and the processors, for making the State rank first in the country (Table I-16) in respect of many dimensions related to sugarcane.

Table-I-16
Progress of Sugar Industry During Pre and Post Independent Period in U.P.

Sl. No.	Year	Development Scenario
1	1903	First sugar factory at Pratapur in Deoria district was installed
2	1930-40	Many sugar mills were installed in the capacity of 500 to 1000 TCD without proper planning for future expansion. Deoria district alone had 14 sugar mills, installed on almost every railway station.
3	1950-51	(A) Planned development of the sugar industry started after the enactment of Industries Act, 1951. (B) Till 1950 all the sugar factories were in private sector. Thereafter factories began to be set up in the Coop. Sector and Public Sector.
4	1960	Indigenous manufacturing of Sugar Mills machinery was initiated.
5	1960-70	Mills geared-up technically with the adoption of labour saving and low cost technology. Economic viability of mills started enhancing from 1250 TCD.
6	1980	After 1980 the economically viable capacity was 2500 TCD which now stands at 5000 TCD
7	2001-02	A long term policy has been framed for the development of both
		Broad Specifications are: 1. Increasing sugarcane production
		2. Increasing productivity by ratoon management.
		3. Increasing Consumption of nutrients + fertilizers
		4. Increasing average sugar recovery.
		5. Increasing Crushing capacity upto economically viable level.
		6. Reorganizing the mills for cost effective production.
		7. Reshaping production
		8. Improving the working of cane development societies.
		9. Merging the societies in order to make them run profitably.
		10. Computerization targeting cane development, marketing and price payment.
		11. Link road construction.
		12. Encouraging the by-products processing.
		13. Encouraging the cane varietal replacement.

Source-State Publications.

The State Government is extending all cares to the sugarcane crop through the seven State organizations which have been working at micro (cane growers and processors) as well as macro (State economy) level since 1912. These organizations, are operating with responsibility for developing both sugarcane and its processing in a balanced way in order to enrich the congruity level between the sugarcane growers and the mills. (Table I-17)

These State organizations are responsibly looking to the execution and implementation of the State policies and programmes; in the establishment, control and monitoring of its mills in the corporate and cooperative sectors; providing services through cane–cooperatives for financial assistance and price payment; providing researches for seed development and its distribution; imparting training for field and mill level developments etc. (Table I-17)

Table –I-17

Main State Organizations Responsible for Sugarcane and Sugar Industry Development in U.P.

Sl. No.	Name	Year of Establishment	Responsibilities
1	The Cane and Sugar Commissioner's Organization	NA	Execution and implementation of State governments policies and programmes in the sugar mill reserved area
2	The U.P. State Sugar Corporation Ltd.	1970-71 for Sick Mills takeover	1. Establishment of sugar mills 2. Closing down the heavy loss incurring mills. 3. Supervision, control and monitoring of its working mills.
3	The U.P Cooperative Sugar Mills Federation Ltd.	Apex body	Controls and supervises the working of sugar mills of the cooperative sector.
4	The U.P Cooperative Can Unions Federation Ltd.	1949, Apex body of Cooperative Cane Development Unions	Providing services through unions to the cane growers for the arrangement of loans/credit, inputs and cane price payment.
5	U.P Council of Sugarcane Research	1912 (Saharnpur) 1975 (Kushinagar)	1. Conducting sugarcane researches for U.P. 2. Produces breeder, foundation primary seeds and also distributes it to the cane growers.
6	U.P. Ganna Kisan Sansthan	1975-76	Imparting training to the sugarcane growers, labourers, officers and employees of sugar mills.
7	U.P. Cane Seed Development Corporation	1975-76	Provides soft loan through Cane Development Societies for purchasing cane seed and inputs.

Source-State Publications.

Till 1950 all the sugar factories were operating only in the private sector in the State with the economic viability capacity mostly of 500 to 1000 TCD. After the enactment of Industries Act, 1951 in the State the sugar mills are operating as Corporations and in the Cooperative, Private and Government of India Sectors. In the State there is growth of only ten per cent in the number of sugarmills, during the period of one decade, (1992-93 to 01-02) (Table I-18) with negative growth of (-6 per cent) in the corporation and (-13 per cent) in the cooperative sector, only the private sector number of sugar mills with a positive growth of six per cent has served the sugar industry nicely. In respect of capacity too the comparative picture of sugarmills operating in different sectors remains the same as in respect of its numbers. In all the years, under consideration, private mills had more than fifty per cent of the total capacity. Capacity had by the Corporation and Cooperative sector mills remained competing to each other in the range of 25 per cent or less in the State.

Table I-18
Development of Sugar Mills and its Capacity in U.P.

Years	Sugar mills in Number/Sector					Capacity in % to Total				
	Corpora tion	Co-operative	Private	G.O.T	Total	Corpora -tion	Co-operative	Private	G.O.T	Total
1992-93	-	-	-	-	108	25	24	51	-	2.33
1993-94	-	-	-	-	110	24	23	53	-	2.48
1994-95	-	-	-	-	112	24	23	51	2	2.53
1995-96	-	-	-	-	117	23	20	55	2	2.83
1996-97	-	-	-	-	119	21	19	58	2	3.11
1997-98	35 (35)	32 (32)	51 (51)	4 (2)	122 (120)	20	17	62	1	3.51
1998-99	35 (30)	32 (32)	54 (53)	4	125 (115)	19	16	63	1	3.68
1999-2000	35 (24)	32 (31)	57 (54)	4	128 (109)	8	7	28	1	3.88
2000-01	33 (22)	28 (27)	54 (51)	4	119 (100)	18	13	68	1	3.89
2001-02	33 (22)	28 (27)	54 (52)	4	119 (101)	17	13	69	1	4.00
Growth in % over the period	- 6	- 13	+ 6	0	+ 10	+ 17	- 8	+ 132	- 17	+ 72

Note: Figures in parenthesis are numbers of working mills.

Salient Features of Sugarcane Management for U.P.

During the field visit after discussing in detail with the sample sugarcane growers and the processors the ways and means of developing sugarcane economically without investing more

money and loosing much time, many needed cane management practices have been worked-out. Most important and immediately needed cane management practices are as under.

A. Harvesting Schedule or Time Management

Harvesting Schedule alertness in U.P. is very important and urgently needed factor for obtaining better quality and quantity in U.P. Since Sugarcane is cultivated under diverse Soil and climatic conditions with varying planting seasons. Therefore, these factors cause variation in the stage of maturity. Under subtropical conditions this phenomenon is more vivid as there are three different planting seasons autumn, spring and summer alongwith many varieties. Besides, early maturity varieties, ratoon gets ready for crushing earlier than the mid/late varieties. Hence, in order to obtain higher sugar recovery percentage throughout the crushing season, ratoon and early variety should be crushed first followed by the plant cane. Similar trends should be followed for mid-late and late varieties in phasing the crushing.

B. Recovery Percentage or Quality Management

Cane staling is the one Single factor which if managed intelligently can lead to immediate and significant improvement in sugar recovery. It is a scientifically established truth that cane should be crushed within 24 hours after harvest to avoid drying and conversion of sugar negatively (gets acidic) as it starts soon after harvesting and inflicts heavy loss to sugarcane, its sugar recovery and ultimately to the processors. It is therefore advised to minimize the “Kill to Mill” period if better quality cane with progressive profit to the processors and higher sugar recovery has been targeted.

The Australian Sugar industry, which has achieved about 14 per cent sugar recovery as against 9.90 per cent in India. Australia manages to mill the cane within 16 hours of its harvesting. Most of our sugar mill units are casual of this important aspect of cane and therefore its returns are not optimum and are affected negatively in terms of both quality and quantity

C. By-Product or Return Management

Processing of by products of sugar industry has emerged to be the need of the present times, as sugar alone seizes to sustain the economic viability of the industry. Thus in terms of economic returns sugar is now becoming a 'by product' and the by-products the main product.

For enhancing the profit and economic efficiency of the sugar mills, proper handling and utilization of 'by-products' is getting popular fast internationally. As bagas, molasses, spent wash, and the like are essentially needed for the manufacturing of hard boards, Plastic, gums and the like. Molasses apart from being used for the manufacture of several by-products of high value can also be utilized for further extraction of sugar. However, India is far behind in making use of such valuable material obtained free. Developed countries extract sugar from molasses by the process of d-sugaring. If we can d-sugar molasses, an additional 30 lakh tonnes of sugar can be produced annually. The sugar mills must be supported by distillery and other high-value production units for being economically progressive and supportive to the cane grower for making their price payment timely with progressive rate.

D. Price-Payment or Congruity Management

In the present times since the traditional approach of farming is getting replaced fast by the commercial approach therefore sugarcane price plays a key role for determining the trends and speed of development of sugarcane, its growers and the processors. Its price management therefore should be meticulously worked-out as a multi sectoral big section of the economy is linked to sugarcane.

Sugarcane price and its payment to the growers is the important factor which determines the congruity level between its growers and the processors. In case, if the cane price is managed to be satisfactory for the growers with timely payment practice then the growers get encouraged to enhance cane area coverage at-once. The increased area coverage results in increasing the volume of raw-material because of more production . This increased quantity of raw material serves the processors an opportunity for earning larger profits along with the benefit of intensive use of their infrastructure without the burden of added activity.

E. Crisis or Latest Technique (Non-Conventional Latest Input/ Latest Knowledge) Management

At the present times of biotechnology, scientific researches are furnishing many valuable research findings frequently for the development of sugarcane and also in processing its product and the by-products. Such scientific findings are required to be handed over immediately to the growers and the processors for enhancing the value of multiplier of their mental physical and financial investments for the sake of improved congruity among all the associates of sugarcane in order to transform the, 'sugarcane -world' as a 'world of mutual gains' and the sugarcane economy 'an economy of gains'. For this exercise the governmental and non-governmental agencies are required to stand parallely on the sugarcane farms with the trays in hand of saplings of latest variety and the packets of latest needed inputs for the improvement in quantity (productivity) and quality (recovery %age) of sugarcane. For the crisis management both the agencies are also required to be ever ready with a pamphlet in hand of detailed latest instructions in respect of sugarcane at the door step of all linked to sugarcane. This way the major investors (cane grower and the processor) will be saving some of their time, energy as well as money in developing sugarcane and its product and by-products.

Rationale of the Study

(i) For both sugarcane area coverage and its production nationally U.P. ranks at the top with a richness percentage share, therefore, an in-depth study of U.P.'s sugarcane for sustaining its national ranks and the riches of percentage share of area coverage and production has become doubly important from both States and the national point of view.

(ii) As the returns of sugarcane and also of its product depends totally and positively on its yield and recovery percentage and since the State of U.P. has a poor national status and rank as well, for both, (the yield and the recovery percentage) therefore to save the land, (cane area) the men, (cane growers and the processors) the only commercial crop of the State (cane itself) and the economy (National and State) from decreasing returns such studies are holistically needed.

(iii) Since the medieval period sugarcane has been processed in U.P. Its processing has undergone changes but still out of 101 sugar mills of the State a number of them have ceased working. Some of them are on the verge of closure. This is a matter of serious

concern not only for the State or the mill owners and the Government but also for the sugarcane growers as the maximum sugarcane is processed by the sugar mills. More or less, the economy of State depends not only on the prospects of sugarcane production but also on its proper processing and marketing. For better prospects of cane growers, processors and the national as well as State economy, it is essential to know the backward and forward linkages between the production of sugarcane and the functioning of sugar mills.

Objectives

1. To study the growth of sugar mills in the State in relation to the production of sugarcane.
2. To examine the performance of sugar mills established in the private, cooperative and public sectors.
3. To study utilization of sugarcane of the reserved area of sugar mills by different processing units.
4. To study the causes of loss to the sugar mills resulting into the non-payment of prices to the sugarcane growers.
5. To study the problems, prospects and diversification of by-products of sugar mills in the State.

Research Methodology

Sugarcane is cultivated mostly in the three regions of the State viz. Western, Central and Eastern. In order to make the study precise and the coverage reasonable, both geographically and economically, the two regions i.e. Western and Eastern have been formed the area of the study. From the Western region, Muzaffarnagar district having maximum area and production of sugarcane and also having sugar mills operating under all the three sectors, have been selected. From the Eastern region Kushinagar district having maximum area and production of sugarcane with mills operating under private and corporation sector have been selected. The nearby district of Mau in the eastern region has been selected to give coverage to the mills operating under co-operative sector. From each region thus, 3 sugar mills have been selected (one each from

Corporation, Cooperative and Private Sector). Thus, in all 6 sugar mills have been selected of which 2 each belong to private, cooperative and corporation sectors. From each sugar mill area two villages on the basis of distance from the concerned sugar mill have been selected. 20 cane growers have been selected on the basis of random table from each selected village. Thus in all, 120 samples have been studied from 12 villages.

The reference year of the study is 2004-05.

Table-I-19
Sample Villages in Selected Sugar mills Area in Two Regions of U.P.

Selected Sugar Mills	Sample Villages	Eastern Region			Western Region		
		Mill Area	Sample Villages		Mill Area	Sample Villages	
			Near Off	Far Off		Near Off	Far Off
Corporation Mill	Name Distance	Khadda	Aharauli Khas (3 Km)	Madanpur (13 Km)	Rohana	Chaukhda (15 Km)	Rai (6 Km)
Co-operation Mill	Name Distance	Ghosi	Maduna (6 Km)	Ramaupur (14 Km)	Morna	Kakrauli (15 Km)	Sikandara (15 Km)
Private Mill	Name Distance	Kaptanganj	Emalia (8 Km)	Pakri (18 Km)	Khatauli	Mandwali Banger (19 Km)	Khadi Quresh (8 Km)

CHAPTER-II

Profile of Sample Sugarcane Growers

The sample sugarcane growers are predominantly from small size group in both the regions (83% in eastern and 70% in western**).** The caste composition of the sugarcane growers in both the regions is different. In the eastern region most dominant caste is OBC (68%) followed by the General Caste (22 per cent). The dominance of General Caste (61%) is superior to the OBC (32%) in the western region. In both the regions SC/ST Caste group (with 10% in eastern and 7% in western) is dormant. Thus, caste-wise OBC in the eastern region and general caste in the western region are the target caste groups for the development of sugarcane at the farm level. (Table-II-1)

As per the total population, the number of persons available on the sample farms is comparatively high in the eastern region both in terms of per farm (9 in eastern & 8 in western) and per hectare (7 in eastern & 5 in western). In respect of various size groups in both regions, the small size group has concentration of population. In terms of adult population, the western region stands superior (61% adult) to the eastern region (58% adult). Among the adults, both the regions enjoy male dominance. Thus, the sample farms, both in terms of age and sex have good workers. Among the three size groups in respect of availability of quality workers (adult male) it is the large size group which is at the top (Table-II-2).

Academic composition, in terms of total literate and illiterate, is similar in both the regions at the aggregate level, (Table-II-3C) as the majority is literate (51% in the eastern, 66% in the western region). In terms of the level of academics, the number of educated VIIIth standard is the highest most and of persons having technical education is the lowest in both the regions.

Number of workers per farm (Table II-4) is higher in the eastern region (4) than the western (3). All the size groups in both the regions have dominance of the male workers. But at the same time the percentage of non-workers in both the regions is higher than that of the workers (Table-II-4).

Table-II-1A; 1B; 1C.

Caste-wise Population Distribution of Sample Farm Households, in the Selected Mills Area in Two Regions of U.P.

Table-II-1A; Eastern Region

Selected Sugar Mills of Eastern Region	Sugar Cane Farm		Caste of Sample Households in Percentages			
	Size groups	Numbers	General	OBC	SC/ST	Total
Corporation Mill (Kadda)	Small	16				
	Medium	2	-	100	-	100
	Large	2	100	-	-	100
	All	**20**	**15**	**55**	**30**	**100**
Co-operative Mill (Ghosi)	Small	17	12	88	-	100
	Medium	2	50	50	-	100
	Large	1	-	100	-	100
	All	**20**	**15**	**85**	**-**	**100**
Private Mill (Kaptanganj)	Small	17	29	71	-	100
	Medium	2	50	50	-	100
	Large	1	100	-	-	100
	All	**20**	**35**	**65**	**-**	**100**

Table-II-1B; Western Region

Selected Sugar Mills of Western Region	Sugar Cane Farm		Caste of Sample Households in percentages			
	Size groups	Numbers	General	OBC	SC/ST	Total
Corporation Mill (Rohana)	Small	14				
	Medium	4	50	50	-	100
	Large	2	100	-	-	100
	All	**20**	**65**	**30**	**5**	**100**
Co-operative Mill (Morna)	Small	13	39	46	15	100
	Medium	5	40	60	-	100
	Large	2	50	50	-	100
	All	**20**	**40**	**50**	**10**	**100**
Private Mill (Khatauli)	Small	15	80	13	7	100
	Medium	3	67	33	-	100
	Large	2	100	-	-	100
	All	**20**	**80**	**15**	**5**	**100**

Table-II-1C; Both Regions

Selected Sugar Mills of Both Regions	Sugar cane Farm		Caste of Sample Households in Percentages			
	Size groups	Numbers	General	OBC	SC/ST	Total
Eastern Region	All	60				
Western Region	All	60	61	32	7	100

Table-II- 2A; 2B; 2C.

Sex -wise Population Distribution of Sample Farm Households in Selected Mills Area in Two Regions of U.P.

Table-II-2A; Eastern Region

Selected Sugar Mills of Eastern Region	Sugar Cane Farm Size groups	Population in % ages						
		Population in Nos.			Adult		Children	Total
		Total	Per Farm	Hect.	Male	Female		
Corporation Mill (Khadda)	Small	169	11	17			49	100
	Medium	19	10	3	32	26	42	100
	Large	18	9	1	33	28	39	100
	All	**206**	**10**	**7**	**27**	**26**	**47**	**100**
Co-operative Mill (Ghosi)	Small	135	8	9	31	29	40	100
	Medium	16	8	3	31	31	38	100
	Large	6	6	1	50	33	17	100
	All	**157**	**8**	**6**	**32**	**29**	**39**	**100**
Private Mill (Kaptanganj)	Small	121	7	14	35	28	37	100
	Medium	31	15	6	23	32	45	100
	Large	12	12	2	33	25	42	100
	All	**164**	**8**	**9**	**32**	**29**	**39**	**100**

Table-II-2B; Western Region

Selected Sugar Mills of Eastern Region	Sugar Cane Farm Size groups	Population in % ages						
		Population in Nos.			Adult		Children	Total
		Total	Per Farm	Hect.	Male	Female		
Corporation Mill (Rohana)	Small	104	7	8	30	32	38	100
	Medium	51	13	5	31	28	41	100
	Large	19	10	2	37	26	37	100
	All	**174**	**9**	**6**	**31**	**30**	**39**	**100**
Co-operative Mill (Morna)	Small	90	7	16	34	27	39	100
	Medium	48	10	4	40	25	35	100
	Large	14	7	1	42	29	29	100
	All	**152**	**8**	**5**	**37**	**26**	**37**	**100**
Private Mill (Khatauli)	Small	104	7	10	30	33	37	100
	Medium	30	10	3	23	30	47	100
	Large	29	15	3	34	28	38	100
	All	**163**	**8**	**6**	**30**	**31**	**39**	**100**

Table-II-2C; Both Regions

Selected Sugar Mills in Both Regions	Sugar Cane Farm Size groups	Population in % ages						
		Population in Nos.			Adult		Children	Total
		Total	Per Farm	Hect.	Male	Female		
Eastern Region	All	527	9	7	30	28	42	100
Western Region	All	489	8	5	32	29	39	100

Table- II-3A; 3B; 3C.

Academic Level-wise Population Distribution of Sample Farm Households in Selected Mills Area in Two Regions of U.P.

Table-II-3A; Eastern Region

Selected Sugar Mills of Eastern Region	Sugar Cane Farm size groups	Per Farm no. of Literates	Figures in % ages of total Population Literacy Levels					Total		Total
			VIIIth	XIIth	Grad -uate	PG.	Tech-nical	Liter-ate	Illete-rate	
Corporation Mill (Khadda)	Small	6	29	14	1	-	-	44	56	100
	Medium	10	37	10	21	-	-	68	32	100
	Large	9	22	17	5	-	-	44	56	100
	All	**10**	**29**	**14**	**3**	**-**	**-**	**46**	**54**	100
Co-operative Mill (Ghosi)	Small	8	31	16	5	-	-	52	48	100
	Medium	8	38	12	-	-	-	50	50	100
	Large	6	50	17	-	-	-	67	33	100
	All	**8**	**32**	**16**	**4**	**-**	**-**	**52**	**48**	100
Private Mill (Kaptanganj)	Small	7	32	22	-	-	-	54	46	100
	Medium	16	48	16	13	7	3	87	13	100
	Large	12	42	41	-	-	-	83	17	100
	All	**8**	**36**	**23**	**2**	**1**	**1**	**63**	**37**	100

Table-II- 3B; Western Region

Selected Sugar Mills of Western Region	Sugar Cane Farm size groups	Per Farm no. of Literates	Figures in % ages of total Population Literacy Levels					Total		Total
			VIIIth	XIIth	Grad-uate	PG	Tech nical	Lite rate	Illete-rate	
Corporation Mill (Rohana)	Small	7	38	25	3	-	-	66	34	100
	Medium	13	20	23	4	-	-	47	53	100
	Large	10	26	21	11	-	-	58	42	100
	All	**9**	**32**	**24**	**4**	**-**	**-**	**60**	**40**	100
Co-operative Mill (Morna)	Small	7	36	14	7	7	-	64	36	100
	Medium	10	36	29	6	-	-	71	29	100
	Large	3	29	36	21	-	7	93	7	100
	All	**8**	**35**	**21**	**8**	**4**	**1**	**69**	**31**	100
Private Mill (Khatauli)	Small	7	32	24	7	2	-	65	35	100
	Medium	10	50	10	-	-	-	60	40	100
	Large	14	48	41	4	-	-	93	7	100
	All	**8**	**39**	**24**	**5**	**1**	**-**	**69**	**31**	100

Table-II-3C; Both Regions

Selected Sugar Mills of Both Regions	Sugar Cane Farm size groups	Per Farm no. of Literates	Figures in % ages of total Population Literacy Levels					Total		Total
			VIIIth	XIIth	Grad -uate	PG	Tech-nical	Liter -ate	Illete-rate	
Eastern Region	**All**	**4**	31	16	3	4	2	51	49	100
Western Region	**All**	**3**	35	23	6	2	2	66	34	100

Table-II- 4A; 4B; 4C.

Workers and Non-Workers-wise Population Distribution of Sample Farm Households in Selected Mills Area in Two Regions of U.P.

Table-II-4A; Eastern Region

Selected Sugar Mills of Eastern Region	Sugar Cane Farm Size groups	Per farm No. of workers	Workers & Non-workers in Percentages					
			Adult		Child-ren	Total workers	Total Non-Workers	Total
			Male	Female				
Corporation Mill (Khadda)	Small	4	24	12	1	37	63	100
	Medium	4	16	10	16	42	58	100
	Large	5	33	12	11	56	44	100
	All	**4**	**24**	**12**	**3**	**39**	**61**	**100**
Co-operative Mill (Ghosi)	Small	3	30	12	-	42	58	100
	Medium	5	31	25	-	56	44	100
	Large	5	50	33	-	83	17	100
	All	**4**	**31**	**14**	**-**	**45**	**55**	**100**
Private Mill (Kaptanganj)	Small	3	29	11	2	42	58	100
	Medium	5	19	13	-	32	68	100
	Large	5	25	17	-	42	58	100
	All	**3**	**27**	**12**	**1**	**40**	**60**	**100**

Table-II-4B; Western Region

Selected Sugar Mills of Western Region	Sugar Cane Farm Size groups	Per Farm no. of Workers	Workers & Non-workers in percentages					
			Adult		Child ren	Total workers	Total Non-Workers	Total
			Male	Female				
Corporation Mill (Rohana)	Small	3	25	11	1	37	63	100
	Medium	4	29	4	-	33	67	100
	Large	2	16	-	-	16	84	100
	All	**3**	**25**	**7**	**1**	**33**	**67**	**100**
Co-operative Mill (Morna)	Small	2	25	9	-	34	66	100
	Medium	4	38	2	-	40	60	100
	Large	4	36	7	7	50	50	100
	All	**3**	**30**	**7**	**1**	**38**	**62**	**100**
Private Mill (Khatauli)	Small	3	27	12	-	39	61	100
	Medium	1	13	-	-	13	87	100
	Large	3	24	-	-	24	76	100
	All	**3**	**24**	**8**	**-**	**32**	**68**	**100**

Table-II-4C; Both Regions

Selected Sugar Mills in Both Regions	Sugar Cane Farm Size groups	Per Farm No. of Workers	Workers & Non-workers in percentages					
			Adult		Child ren	Total workers	Total Non-Workers	Total
			Male	Female				
Eastern Region	All	4	27	12	2	41	59	100
Western Region	All	3	26	7	1	34	66	100

Majority of the sample farm households (Table II-5) have agriculture as their main occupation in both the regions (92% in the eastern and 96% in the western region). In the western region the biggest subsidiary occupation is dairy (43%) but in the eastern region it is labour (13%). (Table II-5)

Agro-profile, of the sample sugarcane growers have been assessed with the help of 'on farm financial status of agricultural assets' (Table II-6), land utilization with cropping intensity (Table II-7), cropping pattern (Table II-8) and irrigation with its sources (Table II-9)

The western region (Rs.69259 Hect.) is better off than the eastern region (Rs.51174 Hect.) in respect of agricultural assets in financial terms (Table II-6). Of the total agricultural asset value, maximum is being contributed for tractor (76% in eastern and 41% in western) fallowed by the buffalo (12% eastern 22% western). Among farm size groups, small farms are superior in respect of agriculture asset value.

For utilization of their owned area, (table II-7) the sample cane growers have preferred sowing, as net area sown, has maximum percentage share (99.06% in eastern and 93.58% in western region). On the sample farms there is no area under current fallow, under other uses and also as the leased out area.

The crop structure (Table II-8) is different in both the regions in respect of return and crops preferred. From the return point of view 56.92 per cent of land is preferred for sugarcane in the western region but the same is only 27.58 per cent in the eastern region. Apart from devoting more land to the commercial crop (sugarcane) in the western region the sample farmers also opted for less cereal (36.14%) crops as compared to the eastern region (66.42%). Among the size groups the large size group sample growers preferred sowing sugarcane in comparison to other size groups in both the regions. (Table-II-8)

The western region farms of sample growers are fully irrigated, as there is no unirrigated area available. In the Eastern region at the aggregate level unirrigated area is 10.87 per cent. In

both the regions canal is the major source of irrigation (70.28% in eastern region and 79.14% in the western region) followed by pump set irrigation. Thus, it seems to be a positive factor for sugarcane cultivation. (Table-II-9)

Table-II- 5A; 5B; 5C.

Main and Subsidiary Occupation wise Population Distribution of Sample Farm Households in Selected Mills Area in Two Regions of U.P.

Table-II-5A. Eastern Region

Selected Sugar mills in Eastern Region	Sugar Cane Farm size groups	Occupations in Percentages												Total
		Main Occupation						Subsidiary Occupation						
		Agri	Ser-vice	Dairy	Lab	Other	Total	Agri	Serv i-ce	Dairy	Lab.	Oth -er	Nil	
Corporation Mill (Khadda)	Small	88	-	-	6	6	100	12	-	-	44	19	25	100
	Medium	100	-	-	-	-	100	-	-	50	-	-	50	100
	Large	100	-	-	-	-	100	-	50	-	-	-	50	100
	All	**90**	**-**	**-**	**5**	**5**	**100**	**10**	**5**	**5**	**35**	**15**	**30**	**100**
Co-operative Mill (Ghosi)	Small	100	-	-	-	-	100	-	6	-	6	12	76	100
	Medium	50	50	-	-	-	100	50	50	-	-	-	-	100
	Large	100	-	-	-	-	100	-	-	-	-	-	100	100
	All	**95**	**5**	**-**	**-**	**-**	**100**	**5**	**10**	**-**	**5**	**10**	**70**	**100**
Private Mill (Kaptanganj)	Small	94	-	-	-	6	100	6	6	-	-	18	70	100
	Medium	50	50	-	-	-	100	50	50	-	-	-	-	100
	Large	100	-	-	-	-	100	-	-	-	-	-	100	100
	All	**90**	**5**	**-**	**-**	**5**	**100**	**10**	**10**	**-**	**-**	**15**	**65**	**100**

Table-II-5B. Western Region

Selected Sugar mills in Western Region	Sugar Cane Farm size groups	Occupations in Percentages												Total
		Main Occupation						Subsidiary Occupation						
		Agri	Ser-vice	Dairy	Lab	Oth er	Total	Agri	Serv -ice	Dairy	Lab.	Oth-er	Nil	
Corporation Mill (Rohana)	Small	93	-	-	-	7	100	7	-	29	29	14	21	100
	Medium	100	-	-	-	-	100	-	-	50	-	-	50	100
	Large	100	-	-	-	-	100	-	-	50	-	-	50	100
	All	**95**	**-**	**-**	**-**	**5**	**100**	**5**	**-**	**35**	**20**	**10**	**30**	**100**
Co-operative Mill (Morna)	Small	92	8	-	-	-	100	8	-	46	23	8	15	100
	Medium	100	-	-	-	-	100	-	-	100	-	-	-	100
	Large	100	-	-	-	-	100	-	-	50	-	50	-	100
	All	**95**	**5**	**-**	**-**	**-**	**100**	**5**	**-**	**60**	**15**	**10**	**10**	**100**
Private Mill (Khatauli)	Small	100	-	-	-	-	100	-	-	47	27	20	6	100
	Medium	100	-	-	-	-	100	-	-	-	-	67	33	100
	Large	100	-	-	-	-	100	-	-	-	-	-	100	100
	All	**100**	**-**	**-**	**-**	**-**	**100**	**-**	**-**	**60**	**15**	**15**	**10**	**100**

Table-II-5C. Both Region

Selected Sugar mills in Both Regions	Sugar Cane Farm size groups	Occupations in Percentages												Total
		Main Occupation						Subsidiary Occupation						
		Agri	Serv -ice	Dairy	Lab.	Oth-er	Total	Agri	Serv i-ce	Dairy	Lab.	Oth-er	Nil	
Eastern Region	All	92	3	-	2	3	100	8	8	2	13	14	55	100
Western Region	All	96	2	-	-	2	100	4	-	43	22	11	20	100

CHAPTER –III

Performance of Sample Sugarcane Growers

The performance of Sampled Sugarcane Growers has been analyzed and studied in the context of Production Performance, Marketing Performance and Financial Performance.

Production Performance

On the basis of average yield rate, for production, (Table-III-1) the sample growers of the western region have performed better (600 qtls/hect.) than their counterpart in the eastern region (499 qtls/ hect.) The range of variation in the average yield in the eastern region of the State is 204 qtls/hectare (from the low of 343 to 547 qtls./ hectare) while the same in the western region is 163 qtls./ hectare (from the low of 523 to the high of 686 qtls./hectare)

In terms of form of Organization of the selected Sugar Mills, the ranking of yield rate is Private Mill (507 qtls./hectare), Corporation Mill (502 qtls./hectare) and Cooperation Mill (486 qtls./hectare) in the eastern region of the State. But the ranks are changed in the western region in as much as the Cooperative Mill has secured the top rank (615 qtls./hectare) followed by Corporation Mill (593 qtls./hectare) and Private Mill (584 qtls./hectare)

Marketing Performance

In both the regions, of the aggregate production only .30 per cent has been used for self-consumption and the rest of the production is either marketable surplus (93% in the eastern region, 92% in the western region) or used as seed (6% in the eastern region 5.40% in the western region). It indicates that in both the regions sample growers have sufficient marketing avenues.

As more than ninety per cent of the production is marketable surplus in both the regions, the growers can be motivated to increase production either by adopting efficient crop management practices or by diverting area to sugarcane from low return crops (Table-I-6). In this way the economic viability of the growers and the processors will be further revamped.

Since only a nominal share of production is used as seed (6% in the eastern region and 5.40% in the western region) therefore, the growers can profitably switch over to the use of good quality seeds.

In both the regions sample growers have overwhelmingly preferred sugar mills for marketing their produce (93% in the eastern and 86% in the western region, Table II-2). In the western region Khandsari units remained more active (12%) than in the eastern region (4%) in respect of cane use. There is marked variation in respect of time involved in the cane supply in both the regions. In the eastern region the maximum supply (52%) has been made during January-February but in the western region 71% of the supply is made during November-December. This variation in cane crushing time is due to the variation in the climate of the two regions. Apart from the level of maturity in the western region, there is competition among the growers who for the sake of early sowing with a good package of inputs make their harvesting payback the earliest.

In respect of marketing cost too, there is variation between the two regions. Since the western region is comparatively richer in respect of bullock carts the farmers mostly use non motorized own mode of transport Marketing cost is, therefore, less in the western region (Rs.5.27/Qtl.) than the eastern region (Rs. 5.65/qtls.). As proportionate share of the total cost, marketing cost remained only 6% in the western region but in the eastern it is 17% at the aggregate level. This variation between the regions is due to the adoption of input rich production by the growers in the western region (Table-III-2).

Financial Performance

There is a marked difference between the two regions in respect of cost. Due to sufficiently high production cost in the western region (Rs.28928/Hect.) the total cost (Rs.30,891 /Hect) also remained much higher than that in the eastern region (Rs.19517/Hect). In respect of the price receipt the western region (Rs.66397/Hect) is better off than the eastern region (Rs.63286/ Hect) mainly due to the higher yield rates attained by the farmers of the western region. (Table III-3)

In respect of net-gain, at the aggregate level eastern region gained (Rs.43769/ Hect) which is 23% higher than that in the western region (Rs.35506/Hect). This is due to lower cost in the eastern region.

In all the size group farms, the sample growers have sufficient net gain which is, at the aggregate level 224 per cent of the cost in the eastern region and 115 per cent of the cost in the western region. (Table-III-3).

CHAPTER-IV

Congruity Between Sugarcane Growth and Functioning of Sugarmills

Among the agro-products, sugarcane is the only crop which has the privilege of direct and positive relationship with its processors. The cane growers and the processors have mutual and instantaneous relationship. Since sugarmill is the biggest processor of sugarcane in the State, (Table-IV-1) the congruity between sugarcane growers and the sugarmills need be analyzed in depth. Except in the private mill in rest all the sample mills of both the regions the growers could provide full feed to the mills in all the years. The private mills being comparatively better off both in respect to capacity and technology therefore for its full feed it purchased sugarcane from elsewhere also. (Table-IV-1)

India tops in the list of sugar production in the world and Uttar Pradesh is second in India. This is a creditable achievement by both the existing sugar mills and the sugarcane producer. Survey of the sample sugarmills, (three each in eastern and western region) revealed that:

- The existing sugarmills are a typical mix of old and new plants in all the sectors (corporation, cooperative and private) with limited influence of latest concepts in sugarcane processing.
- All three, the sugarcane, sugar technology and the sugar industry have developed in a traditional manner.
- In the present era of commercialization, the mills are required to gear up its return for the sake of attaining a healthy growth for themselves, sugarcane and its growers in a short period, in a cost effective manner in an easy way for becoming a development provider to the rural sector. For it Brazil has taken a lead by closely integrating the sugar factory with distillery which enables minimum energy input consumption, generation of substantial surplus electric power and obtaining an additional valuable material in the form of ethyl alcohol. Bagasse can be completely saved and may be used for paper production. Installation of a paper mill would make the industry an ideal integrated sugar-alcohol-paper complex.

Instances of such developments in the state and the country will be indeed encouraging for both, the raw material sector and the product units of the sugar industry.

- A large number of complex chemical engineering principles are employed in the production of sugar and in its related products. A basic understanding of these unit operations is essential not only to carry out a rational process and plant design but also to achieve optimal, plant efficiency and congruity between growth of sugarcane and in functioning of sugarmills.

Since many decades the State of Uttar Pradesh has been maintaining first rank at the national level in terms of farm (Table-I-1, I-9) and it is ranking second in respect of sugar processing capacity (Table-I-5) and sugar production (Table I-7). This continued maintenance of the ranks in terms of raw material (sugarcane) and the product (sugar) is a testimony to the existence of optimum congruity between the two in the State since many decades.

During the last five years, over the period the sample growers have themselves increased the area coverage (70% in the eastern and 4% in the western region) in favour of sugarcane in both the regions. This increasing trend of cane area (except 2003-04) coverage indicates that the cane growers are satisfied with the marketing and payment systems (Table IV-2). In the eastern region the growth ranged between 0% and 92% and in the western region it is between –2% and 12% among the different size groups. This comparatively lower growth rate in the western region is attributed to already high cane coverage (56.92% in the western and 27.58% in the eastern region Table-II-8). At the farm level, in the year 2003-04 in both the regions sample farms had decline in growth as compared to the previous years primarily due to delayed payment (Table IV-2).

All the sample growers opined in favour of utility of the sugar mills and the cane co-operatives in both the regions. Previous payments are reported to be clear along with the opinion of facing no problem in respect to price payment and marketing of cane by all the sample growers in both the regions. Such opinion of the sample growers in respect to price-payment marketing, utility of sugarmills and cane cooperatives confirm existence of optimum congruity level between the cane growers and the sugarmills (Table-IV-3).

Table-IV-3A; 3B.

Opinion of Sample Farms Households in Selected Sugar Mills of the Two Regions of U.P.

Table- IV-3A; Eastern Region

Sl No	Opinion		Figures in Percentage											
			Corporation (Kadda)				Cooperative (Ghosi)				Private (Kaptanganj)			
			S	M	L	All	S	M	L	All	S	M	L	All
1	Cane cooperatives are	A. useful	80	10	10	100	85	10	5	100	85	10	5	100
		B. not useful	-	-	-	-	-	-	-	-	-	-	-	-
2	Sugarcane Mills are	A. Good	80	10	10	100	85	10	5	100	85	10	5	100
		B. Bad	-	-	-	-	-	-	-	-	-	-	-	-
3	Improved seeds will improve area coverage	A. Yes	45	5	10	60	55	-	5	60	40	5	-	45
		B. No	35	5	-	40	30	10	-	40	45	5	5	55
4	Sell cane mostly to	A. Mills	65	10	10	85	80	10	5	95	85	10	5	100
		B. Others	15	-	-	15	5	-	-	5	-	-	-	-
5	Weight taken is mostly	A. Correct	80	10	10	100	60	5	-	65	50	-	-	50
		B Wrong	-	-	-	-	25	5	5	35	35	10	5	50
6	Better sugarcane price will improve area coverage	A. Yes	50	10	5	65	55	-	5	60	40	5	-	45
		B. No	30	-	5	35	30	10	-	40	45	5	5	55
7	In sugarcane marketing mostly face difficulty	A. Yes	-	5	-	5	10	-	-	10	5	-	-	5
		B. No	80	5	10	95	75	10	5	90	80	10	5	95
8	Face problem in price payment	A. Yes	-	-	-	-	10	10	5	25	-	-	-	-
		B. No	80	10	10	100	75	-	-	75	85	10	5	100
9	Face problem in getting slip	A. Yes	5	-	-	5	25	-	5	30	10	-	-	10
		B. No	75	10	10	95	60	10	-	70	75	10	5	90
10	Previous payments have been cleared	A. Yes	75	10	10	95	80	10	5	95	80	10	5	95
		B. No	5	-	-	5	5	-	-	5	5	-	-	5

Table-IV-3B; Western Region

Sl No	Opinion		Figures in Percentages											
			Corporation (Rohana)				Cooperative (Morna)				Private (Khatauli)			
			S	M	L	All	S	M	L	All	S	M	L	All
1	Cane cooperatives are	A. useful	70	20	10	100	65	25	10	100	75	15	10	100
		B. not useful	-	-	-	-	-	-	-	-	-	-	-	-
2	Sugarcane Mills are	A. Good	70	20	10	100	65	25	10	100	75	15	10	100
		B. Bad	-	-	-	-	-	-	-	-	-	-	-	-
3	Improved seeds will increase sugarcane area	A. Yes	55	15	5	75	50	20	10	80	75	15	10	100
		B. No	15	5	5	25	15	5	-	20	-	-	-	-
4	Sell cane mostly to	A. Mills	70	20	10	100	65	25	10	100	75	15	10	100
		B. Others	-	-	-	-	-	-	-	-	-	-	-	-
5	Weight taken is mostly	A. Correct	45	15	10	70	45	15	10	70	60	10	10	80
		B Wrong	25	5	-	30	20	10	-	30	15	5	-	20
6	Better sugarcane price will improve area coverage	A. Yes	70	20	10	100	45	20	5	70	45	10	10	65
		B. No	-	-	-	-	20	5	5	30	30	5	-	35
7	In sugarcane marketing mostly face difficulty	A. Yes	-	-	-	-	-	-	-	-	-	-	-	-
		B. No	70	20	10	100	65	25	10	100	75	15	10	100
8	Face problem in price payment	A. Yes	-	-	-	-	-	-	-	-	-	-	-	-
		B. No	70	20	10	100	65	25	10	100	75	15	10	100
9	Face problem in getting slip	A. Yes	40	10	10	60	45	15	-	60	60	10	10	80
		B. No	30	10	-	40	20	10	10	40	15	5	-	20
10	Previous payments have been cleared	A. Yes	70	20	10	100	65	25	10	100	75	15	10	100
		B. No	-	-	-	-	-	-	-	-	-	-	-	-

Note: S- Small Farms, M- Medium Farms, L- Large Farms.

CHAPTER-V

Prospects of Sugar Mills Diversification

The management (GMs and the Senor Officers) and the staff of all the sample sugar mills unanimously affirm that the sugar industry uses one of the oldest technology which has remained in use without any major break through in innovative modification and development. It has never been under greater pressure to improve its viability. The obsolete technology is no longer an issue of profitability or recovery and productivity. Rather it has become a question of survival. The industry has to pay more and more for sugarcane with the load of leavy. It cannot be fully compensated by only a price increase in sugar. It cannot hope to rationalize labour. At least the working sugarmill, have little hope of gaining from automation and labour saving devices Retrenchment of surplus labour is difficult, if not impossible. Very soon a stage will come when even sugar production will be in excess of our needs and domestic market will not be able to consume the production. At this stage there is an urgent need for scientific investigation. The potential for diversification and judicious use of valuable by-projects obtained free, will have to be taken up compulsorily. The use of modern concepts in sugarcane processing and diversification are already in sight. With fast emerging knowledge of genetics and biochemical engineering, sugar industry offers a great scope for technology innovation.

It is only the sugarmills in the country which posses the potentiality of rendering multidimensional development to the rural section without state expense, in a short period of time, through improvements in process technology, optimal retrieval of all by-products and diversification activities related to development. A similar opinion emerged at a UNIDO international consultation on sugar processing and diversification at Hawan in Cuba.

Sugarmills potency, as multidimensional development provider to the rural sector is based on its strength as details below:

1. Its placement in rural area with good connectivity (rail, road) and communication, strength;
2. Well equipped infrastructure
3. Well guarded huge campus
4. In hand, off-season period of nearly six or more months
5. Huge agro-rich reserved area;
6. Qualified and efficient staff strength;
7. Cane growers strength;
8. Co-generation capacity strength;
9. Cheap rate availability of agro-raw material at door step.
10. In campus availability of valuable by-products free of cost.

By-product related diversification activity are yet to be geared up in our country. The main by-products of sugar industry are- (1) Bagasse (2) Molasses and (3) Press-cake.

(I) Bagasse:- It is a fibrous residue left after the cane is crushed in the sugar mill. It can be used in the manufacture of live-stock feeds, particular board, liquid sugar, alcohol there-from, ethyl alcohol, paper and many chemicals.

(II) Molasses:- It is the mother liquor left over after the crystallization of sugar. It can produce ethyl alcohol, oxalic acid, citric acid, live-stock feed etc.

(III) Press Cake:- It is a rich source of sugarcane wax, which is a good source for manufacturing different kind of polishes, Press cake is also a good raw material for making a balanced fertilizer.

These by-product can be used profitably for making a number of valuable products by establishing various ancillary units. If handled with proper planning and latest know-how, the day is not far-off when the main product will be by-product and the by-product the main product for the sugarmills in terms of return.

Rural sector development targeted diversification activities can be many but few basic are given below.

(i) Agriculture related activities with the help of reserved area and cane growers can produce herbs and aromatic plants for running bio-medicine and aromatic cottage plants. With the help of low cost and door step availability of agro-products sugar mills can successfully run pickle, jam, jelly and soft drink concentrate units. Seed culture in order to obtain superior seeds can be exercised.

(ii) Animal husbandry related diversification activities by utilizing the well guarded campus can be, dairy farming, poultry farming, bee keeping, piggery farming, vermi-culture and gobar gas plant etc

(iii) Institution related diversification activities by utilizing the huge infrastructure and the campus be of running, Soil Testing Labs, Agro-Training Centre, Input-output sale centre, machinery assembly and repair centre, quality school and nursing homes etc.

These diversification activities will enrich the rural sector by providing

1. Low cost agro products
2. Employment avenues to local people
3. Development of cottage industry culture
4. Soil enrichment.
5. Discourage urban migration
6. Health enrichment to local people
7. Knowledge enrichment to local people
8. State income enrichment by selling the products.
9. Income enrichment of local people
10. Sugarmills income enrichment
11. Local market enrichment
12. Skill enrichment of local people
13. By-product enrichment
14. Mill off-season period enrichment
15. Service and repair of agro machinery with convenience at low cost.

CHAPTER-VI

Summary and Findings

Presently, India is facing the problem of plenty in sugar production as it maintains a carry-over stock of about 13.1 million tonnes of sugar and during the current crushing season it is expected to produce another 16 million tonnes against a domestic demand of 15.6 million tonnes.

Sugarcane is an agro-industrial crop of the country. It is cultivated in a wide range of agro-ecological situations, both in tropical and sub-tropical regions encompassing the area of Tamilnadu in the South, Punjab in the North, Gujarat in the West and Assam and Nagaland in the East. At present the total production of sugarcane in the country is around 310 million tonnes.

Since 1980-81 (Table-1-1) the States of Uttar Pradesh and Maharashtra have been in commanding position both in sugarcane area coverage and production concentration.

Development of cane cultivation and its processing are directly and positively dependent its productivity and recovery percentage apart from its price. In respect of productivity Tamilnadu occupied the first rank, with positive national status. Maharashtra and Gujarat have remained in the top ranker's race. Uttar Pradesh, with seventh national rank coupled with a negative national status till 1990-91, indicates the need for immediate improvement of the cane productivity for the benefit of its growers and the processors.

Poor recovery percentage is more a national problem rather than a State affair as most of the States have experienced negative national status since 1981-82. It is only Maharashtra and Gujarat with positive national status and top ranks of first and second in the country that they remained competing with each other.

Pro-sugarcane natural bliss of Maharashtra (climate) and Uttar Pradesh (Soil) if coupled with a scientific break-through of **gene revolution**, alongwith **efficient crop management practices** with ratoon culture promotion, these two States having the sound base of area coverage will undoubtedly prove their potentials in the international market.

In respect of sugarcane price payment made by the sugar factories, during the mentioned period (1974-75 to 1999-00) in the country in most of the years, Maharashtra State sugar factories paid the maximum price to the growers followed by Gujarat (Table 1-4). In the country as rest of the States' sugar factories have also been able to pay maximum price to their cane growers but it had been seldom.

In respect of annual installed capacity in the country, the States of Maharashtra and Uttar Pradesh, with top two national ranks and share during the last several decades, exhibit their potentials of pushing the nation ahead in sugar production, both quality and quantity wise, due to cane production richness and its continuity (because of cane area coverage richness). These two States jointly owned more than fifty percent (56 to 61%) of the national annual installed sugar production capacity.

Even for the sugar production, the duo of Maharashtra and U.P. are standing at the top in the country with slightly more than sixty per cent of the national sugar production (Table I-7). These two States, therefore, should make efforts to bring improvement, both quality-wise and cost-wise to capture a lion's-share in the international market.

In the State of Uttar Pradesh, as proportion to the Gross Cropped Area in comparison to the competing (important) crops, sugarcane is lagging behind rice and wheat probably due to the high demand of these cereals and also availability of good quality HYV seeds.

The State of U.P. is having the first place nationally in respect of cane area coverage and production coupled with a high percentage share of more than forty during the last few decades (Table I-1, I-9). The rich sugarcane base at the farm level in U.P. signifies that on the one hand

the farming community has realized the profitability of cane cultivation and on the other, its marketing is trouble-free through the optimum congruity level between the growers and the sugarmills.

In respect of sugar recovery percentage the position is similar to that of the yield rate, as it also remained negative (upto the tune of 23.45 per cent) from the maximum recovery of the country. In comparison to the national average recovery though the State differed in negative terms but throughout the period it remained in single digit with an increasing order in the range of -5.69 per cent to -9.73 per cent.

Except 1990-91, during the remaining years of the period the price actually paid by the sugar factories was marginally above the State Advised Price. From this it can be safely concluded that in declaring State Advised Price the government has not only favoured the growers blindly but has also taken into consideration the paying capacity of the factories as the factories are the chief buyers of the sugar cane.

On the farms of the State nearly all the crops are having less gross return as compared to that from sugarcane. It proves that the State, inspite of poor productivity of sugarcane but probably due to good cane price and its marketing, is able to be at the top in terms of its return.

With the installation of first sugar factory in 1903 the State's journey for sugar industry started. Planned and multisectoral development of the sugar industry in the State was initiated since 1950-51 after the enactment of the Industries Act, 1951.

The State Government is extending all cares to the sugarcane crop through the seven State Organizations which have been working at micro (cane growers and processors) as well as macro (State economy) levels since 1912.

Salient Features of Sugarcane Management in U.P.

During the field visit after detailed discussions with the sample sugarcane growers and the processors on the ways and means of developing sugarcane economically without investing

more money and losing much time, the following Cane Management Practices have been worked-out:

A. Harvesting Schedule or Time Management

Harvesting Schedule alertness in U.P. is very important and an urgently needed factor to boost up quality and quantity. Since Sugarcane is cultivated under diverse Soil and under climatic conditions with varying planting seasons, these factors cause variation in the stage of maturity. Under sub-tropical conditions this phenomenon is more vivid as there are three different planting seasons- Autumn, Spring and Summer-alongwith many varieties. Besides, early maturity varieties, ratoon gets ready for crushing earlier than the mid/late varieties. Hence, in order to obtain higher sugar recovery percentage throughout the crushing season, ratoon and early variety should be crushed first followed by the plant cane. Similar trends should be followed for mid-late and late varieties in phasing the crushing.

B. Recovery Percentage or Quality Management

Cane Staling is the one single factor which, if managed intelligently, can lead to immediate and significant improvement in sugar recovery. It is the scientifically established truth that cane should be crushed within 24 hours after harvest to avoid drying and conversion of sugar negatively (gets acidic) as it starts soon after harvesting and inflicts heavy loss to sugarcane, its sugar recovery and ultimately to the processors. It is, therefore, advised to minimize the “Kill to Mill” period if better quality cane with progressive profit to the processors and higher sugar recovery has been targeted.

The Australian Sugar industry has achieved about 14 per cent sugar recovery as against 9.90 per cent in India. Australia manages to mill the cane within 16 hours of its harvesting. Most of our sugar mill units are not aware of this important aspect of cane and, therefore, its returns are not optimum and are affected negatively in terms of both quality and quantity

C. By-Product or Return Management

Processing of by products of sugar industry has emerged to be the need of the present times, as sugar alone has ceased to sustain the economic viability of the industry. Thus, in terms of economic returns sugar is now becoming a 'by product' and the by-products the main product.

For enhancing the profit and economic efficiency of the sugar mills, proper handling and utilization of 'by-products' are becoming popular fast internationally. As bagasse, molasses, spent wash, and the like are essentially needed for the manufacturing of hard boards, plastic, gums and the like. Molasses, apart from being used for the manufacture of several by-products of high value, can also be utilized for further extraction of sugar. However, India is far behind in making use of such valuable material obtained free. Developed countries extract sugar from molasses by the process of de-sugaring. If we can de-sugar molasses, an additional 30 lakh tonnes of sugar can be produced annually. The sugar mills must be supported by distillery and other high-value production units for benefits to one and all.

D. Price-Payment or Congruity Management

In the present times since the traditional approach of farming is fast getting replaced by the commercial approach, sugarcane price plays a key role in determining the trends and speed of development of sugarcane, its growers and the processors. Its price management, therefore, should be meticulously worked-out as a large section of the economy is linked to sugarcane.

Sugarcane price and its payment to the growers are the important factor which determine the congruity level between its growers and the processors. In case, the cane price is managed to be satisfactory for the growers with timely payment practice, the growers get encouraged to enhance cane area coverage at-once. The increased area coverage results in increasing the volume of raw material for the mills. This increased quantity of raw material serves the processors an opportunity to earn larger profits along with the benefit of intensive use of their infrastructure without the burden of added activity.

E. Crisis or Latest Technique (Non-Conventional Latest Input/ Latest Knowledge) Management

At the present time, scientific researches are providing many a valuable findings for the development of sugarcane its processing and (for the better utilization of) the by-products. On the basis of such scientific findings the growers and the processors for enhancing the value for improvement in the congruity among all the associates of sugarcane in order to transform the, 'sugarcane -world' as a 'world of mutual gains' and the sugarcane economy 'an economy of gains'. For this exercise the governmental and non-governmental agencies are required to stand parallely on the sugarcane farms with the trays in hand of saplings of latest variety and the packets of latest needed inputs for the improvement in quantity (productivity) and quality (recovery %age) of sugarcane. For the crisis management both the agencies are also required to be ever ready with a pamphlet in hand of detailed latest instructions in respect of sugarcane at the door step of all who are linked to sugarcane. This way the major investors (cane grower and the processor) will be saving some of their time, energy as well as money in developing sugarcane and its product and by-products.

Caste-wise, OBC in the eastern region and general caste in the western region are the target caste groups for the development of sugarcane at the farm level.

As per the total population, the number of persons available on the sample farms is comparatively high in the eastern region both in terms of per farm (9 in eastern region & 8 in western region) and per hectare (7 in eastern region & 5 in western region).

The composition, in terms of total literate and illiterate, is similar in both the regions at the aggregate level, (Table-II-3C) as the majority is literate (51% in the eastern region, 66% in the western region). In terms of the level of academics, the number of educated upto VIIIth standard is the highest while the number of persons having technical education is the lowest in both the regions.

Number of workers per farm (Table II-4) is higher in the eastern region (4) than the western region (3). All the size groups in both the regions have dominance of the male workers.

But at the same time the percentage of non-workers in both the regions is higher than that of the workers.

Majority of the sample farm households (Table II-5) have agriculture as their main occupation in both the regions (92% in the eastern and 96% in the western region).

The western region (Rs.69259/Hect.) is better off than the eastern region (Rs.51174/Hect.) in respect of agricultural assets in financial terms (Table II-6). Of the total agricultural asset value the maximum is being contributed by tractor (76% in the eastern region and 41% in the western region) fallowed by the buffalo (12% in the eastern region and 22% in the western region).

The western region farms of sample growers are fully irrigated, as there is no unirrigated area available. In the Eastern region at the aggregate level unirrigated area is 10.87 per cent.

On the basis of average yield rate, (Table-III-1) the sample growers of the western region have performed better (600 qtls/hect.) than their counterpart in the eastern region (499 qtls/ hect.)

In both the regions, of the aggregate production only .30 per cent has been used for self-consumption and the rest of the production is either marketable surplus (93% in the eastern region, 92% in the western region) or used as seed (6% in the eastern region 5.40% in the western region). It indicates that in both the regions sample growers have sufficient marketing avenues.

In both the regions sample growers have overwhelmingly preferred sugar mills for marketing their produce (93% in the eastern and 86% in the western region, Table II-2). In the western region Khandsari units remained more active (12%) than in the eastern region (4%) in respect of cane use.

In respect of marketing cost too, there is variation between the two regions. Since the western region is comparatively richer in respect of bullock carts the farmers mostly use non-

motorized own mode of transport Marketing cost is, therefore, marginally less in the western region (Rs.5.27/Qtl.) than the eastern region (Rs. 5.65/qtls.).

There is a marked difference between the two regions in respect of cost. Due to sufficiently high production cost in the western region (Rs.28928/Hect.) the total cost (Rs.30,891 /Hect) also remained much higher than that in the eastern region (Rs.19517/Hect). In respect of the price receipt the western region (Rs.66397/Hect) is better off than the eastern region (Rs.63286/Hect) mainly due to the higher yield rates attained by the farmers of the western region.

In respect of net-gain, at the aggregate level eastern region gained (Rs.43769/ Hect) which is 23% higher than that in the western region (Rs.35506/Hect). This is due to lower cost in the eastern region.

The cane growers and the processors have mutual and instantaneous relationship. Since sugarmill is the biggest processor of sugarcane in the State. Except the private mill, all the sample mills of both the regions get full supply from the growers of the area. The private mills, being comparatively better off both in respect to capacity and technology, purchased sugarcane from elsewhere also for its full feed.

Since many decades the State of Uttar Pradesh has been maintaining first rank at the national level in terms of farm (Table-I-1, I-9) and it has been ranking second in respect of sugar processing capacity (Table-I-5) and sugar production (Table I-7). This continued maintenance of the ranks in terms of raw material (sugarcane) and the product (sugar) is a testimony to the existence of congruity between the two in the State since many decades.

During the last five years, over the period the sample growers have themselves increased the area coverage (70% in the eastern region and 4% in the western region) in favour of sugarcane in both the regions. This increasing trend of cane area (except 2003-04) coverage indicates that the cane growers are satisfied with the marketing and payment systems.

All the sample growers opined in favour of utility of the sugar mills and the cane co-operatives in both the regions. Previous payments are reported to be clear along with the opinion of facing no problem in respect to price payment and marketing of cane by all the sample growers in both the regions. Such opinion of the sample growers in respect to price-payment marketing, utility of sugarmills and cane cooperatives confirm existence of optimum congruity level between the cane growers and the sugarmills.

The use of modern concepts in sugarcane processing and diversification are already in sight. With the fast emerging knowledge of genetics and biochemical engineering, sugar industry offers a great scope for technology innovation.

It is only the sugarmills in the country which has the potentiality of rendering multi-dimensional development to the rural section without state expense, in a short period of time.

By-product related diversification activity are yet to be geared up in our country. The main by-products of sugar industry are- (1) Bagasse (2) Molasses and (3) Press-cake.

These by-products can be used profitably for making a number of valuable products by establishing various ancillary units. If handled with proper planning and latest know-how, the day is not far-off when the main product will be by-product and the by-product the main product for the sugarmills in terms of return.

Rural sector development targeted diversification activities or agriculture related activities, with the help of reserved area and cane growers, could produce herbs and aromatic plants for running biomedicine and aromatic cottage plants. Animal husbandry related diversification activities can be dairy farming, poultry farming, bee keeping, piggery farming, vermi-culture and gobar gas plant etc. Institution related diversification activities are of running, Soil Testing Labs, Agro-Training Centre, Input-Output Sale Centre, Machinery Assembly and Repair Centre, Quality School and Nursing Homes etc.

These diversification activities will enrich the rural sector by providing low cost agro products, employment avenues to local people, development of cottage industry, soil enrichment, discourage urban migration, health enrichment, knowledge enrichment, State income enhancement, income enhancement of local people, and finally leading to over-all prosperity.

Study No. 125 **Publication No. 172**

Congruity Between Growth of Sugarcane Production and Functioning of Sugarcane Mills, U.P.

EXECUTIVE SUMMARY

2006

Agro-Economic Research Centre
University of Allahabad
Allahabad-211002 (India)

EXECUTIVE SUMMARY

Honey produced by bees was the first known sweetener. When sugarcane was discovered, it was called the reed that produced honey without bees. Sugarcane and sugar-beat are two main crops that contribute approximately 56% and 44% respectively of the total sugar production in the world.

Crop name 'sugarcane' comprises of two words i.e. sugar and cane. The words sugar and cane prove its worth in a befitting manner to all, its growers, the processors and the consumers depending upon its handling by them.

The States of Uttar Pradesh and Maharashtra have been in commanding position both in sugarcane area coverage and production concentration.

Position of Sugarcane Area and Production of the States in India

Sl. No	States	Area						Production					
		National Share in % & Rank						National Share in % & Rank					
		1980-81		1990-91		99-2000		1980-81		1990-91		99-2000	
		Share	Rank	Share	Rank	Share	Rank	Share	Rank	Share	Rank	Share	Rank
1	U.P	51	1	50	1	41	1	42	1	43	1	39	1
2	Bihar	4	6	4	6	3	6	2	7	3	7	2	8
3	Punjab	3	5	3	7	3	6	3	6	2	8	2	8
4	Haryana	4	6	4	6	3	6	3	6	3	7	3	7
5	Maharashtra	10	2	12	2	15	2	15	2	16	2	18	2
6	Gujarat	3	7	3	7	3	5	3	6	4	6	5	6
7	Andhra Pra.	5	5	5	5	6	4	6	5	5	5	6	5
8	Karnataka	6	4	7	3	8	3	8	4	9	4	10	4
9	Tamilnadu	7	3	6	4	12	3	12	3	10	3	13	3
10	Others	7	-	6	-	6	-	6	-	5	-	2	-
	Total	100	-	100	-	100	-	100	-	100	-	100	-
	All India	2667000 (Hectares)		3686000 (Hectares)		4144000 (Hectares)		154248000 (Tonnes)		241046000 (Tonnes)		309307000 (Tonnes)	

Data Sources:- CACP report 2001-02.

Uttar Pradesh, with seventh national rank coupled with a negative national status till 1990-91, indicates the need for immediate improvement of the cane productivity for the benefit of its growers and the processors.

Poor recovery percentage is more a national problem rather than a State affair as most of the States have experienced negative national status since many decades therefore it should obtain a national policy cover as a remedial measure. It is only Maharashtra and Gujarat with positive national status and top ranks of first and second in the country that they remained competing with each other.

Position of Sugarcane Recovery Percentage of the States in India

Sl. No.	States	Recovery in %, National Status* in % and National Rank								
		1981-82			1990-91			1999-2000		
		Recovery	Status	Rank	Recovery	Status	Rank	Recovery	Status	Rank
1	U.P	9.14	-0.52	5	9.08	-0.78	7	9.35	-0.89	5
2	Bihar	9.00	-0.66	6	9.07	-0.79	8	9.21	-1.03	7
3	Punjab	9.71	0.05	4	8.95	-0.91	9	9.10	-1.14	9
4	Haryana	8.59	1.07	9	9.44	-0.42	5	9.27	-0.97	6
5	Maharashtra	10.68	1.02	1	10.76	0.90	2	11.42	1.18	1
6	Gujarat	9.72	0.06	3	10.91	1.05	1	10.62	0.38	3
7	Andhra Pra.	8.64	-1.02	8	9.61	-0.25	4	10.09	-0.15	4
8	Karnataka	10.07	0.41	2	10.25	0.39	3	10.77	0.53	2
9	Tamilnadu	8.79	-0.87	7	9.11	0.75	6	9.14	-1.10	8
	All India	9.66	-		9.86	-	-	10.24	-	-

Data source:- CACP Report 2001-02. Note- National Status derived basing India.

Pro-sugarcane natural bliss of Maharashtra (climate) and Uttar Pradesh (Soil) if coupled with a scientific break-through of **gene revolution**, alongwith **efficient crop management practices** with ratoon culture promotion will be able to fight out the productivity of recovery percentage problem in a cost defective manner. These two States having the sound base of area coverage will undoubtedly prove their potentials in the international market.

In respect of sugarcane price payment made by the sugar factories, during the mentioned period (1974-75 to 1999-00) in the country in most of the years, Maharashtra State sugar factories paid the maximum price to the growers followed by Gujarat (Table 1-4). In the country

as rest of the States' sugar factories have also been able to pay maximum price to their cane growers but it had been seldom.

In respect of annual installed capacity in the country, the States of Maharashtra and Uttar Pradesh, with top two national ranks and share during the last several decades, exhibit their potentials of pushing the nation ahead in sugar production, both quality and quantity wise, due to cane production richness and its continuity (because of cane area coverage richness). These two States jointly owned more than fifty percent (56 to 61%) of the national annual installed sugar production capacity.

Even for the sugar production, the duo of Maharashtra and U.P. are standing at the top in the country with slightly more than sixty per cent of the national sugar production. These two States, therefore, should make efforts to bring improvement, both quality-wise and cost-wise to capture a lion's-share in the international market.

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Except 1990-91, during the remaining years of the period the price actually paid by the sugar factories was marginally above the State Advised Price. From this it can be safely concluded that in declaring State Advised Price the government has not only favoured the growers blindly but has also taken into consideration the paying capacity of the factories as the factories are the chief buyers of the sugar cane.

Year-Wise Different Sugarcane Price Ranges of U.P.

(in Rs/qtls)

Years	Statutory Minimum Price (SMP)	State Advised Price (SAP)	Price Actually Paid (PAP)
	Range	Range	Range
1990-91	23.00 - 34.62	41.00 – 44.00	41.00 – 44.00
1991-92	26.00 - 32.12	30.00 – 34.00	45.00 – 48.00
1992-93	31.00 - 38.66	45.00 – 48.00	46.00 – 49.00
1993-94	34.50 – 43.84	46.00 – 49.00	58.00 – 61.00
1994-95	39.10 – 48.40	58.00 – 61.00	66.00 – 70.00
1995-96	42.50 – 53.30	66.00 – 70.00	70.00 – 74.00
1996-97	45.90 – 55.02	70.00 – 74.00	67.00 – 76.00
1997-98	48.45 – 60.45	72.00 – 76.00	48.45 – 80.00
1998-99	52.70 – 66.96	75.00 – 80.00	80.00 – 85.00
1999-00	56.10 – 68.64	85.00 – 90.00	62.04 – 90.00

On the farms of the State nearly all the crops are having less gross return as compared to that from sugarcane. It proves that the State, inspite of poor productivity of sugarcane but probably due to good cane price and its marketing, is able to be at the top in terms of its return.

Gross Return of Important Crops in U.P. and Comparative Profitability to Sugarcane

Crops	Gross Return Rs./Hect.	Comparative profitability of Sugarcane/%
Paddy	16014	153
Wheat	14822	173
Jowar	3655	1009
Maize	5981	578
Arhar	10006	305
G.Nur	9760	315
S.Flower	12760	218
Sugarcane	40531	-

Source Report of CACP 2001-2002

With the installation of first sugar factory in 1903 the State's journey for sugar industry started. Planned and multisectoral development of the sugar industry in the State was initiated since 1950-51 after the enactment of the Industries Act, 1951.

The State Government is extending all cares to the sugarcane crop through the seven State Organizations which have been working at micro (cane growers and processors) as well as macro (State economy) levels since 1912.

Main State Organizations Responsible for Sugarcane and Sugar Industry Development in U.P.

Sl. No.	Name	Year of Establishment	Responsibilities
1	The Cane and Sugar Commissioner's Organization	NA	Execution and implementation of State governments policies and programmes in the sugar mill reserved area
2	The U.P. State Sugar Corporation Ltd.	1970-71 for Sick Mills takeover	4. Establishment of sugar mills 5. Closing down the heavy loss incurring mills. 6. Supervision, control and monitoring of its working mills.
3	The U.P Cooperative Sugar Mills Federation Ltd.	Apex body	Controls and supervises the working of sugar mills of the cooperative sector.
4	The U.P Cooperative Can Unions Federation Ltd.	1949, Apex body of Cooperative Cane Development Unions	Providing services through unions to the cane growers for the arrangement of loans/credit, inputs and cane price payment.
5	U.P Council of Sugarcane Research	1912 (Saharnpur) 1975 (Kushinagar)	3. Conducting sugarcane researches for U.P. 4. Produces breeder, foundation primary seeds and also distributes it to the cane growers.
6	U.P. Ganna Kisan Sansthan	1975-76	Imparting training to the sugarcane growers, labourers, officers and employees of sugar mills.
7	U.P. Cane Seed Development Corporation	1975-76	Provides soft loan through Cane Development Societies for purchasing cane seed and inputs.

Source-State Publications.

Caste-wise, OBC in the eastern region and general caste in the western region are the target caste groups for the development of sugarcane at the farm level.

As per the total population, the number of persons available on the sample farms is comparatively high in the eastern region both in terms of per farm (9 in eastern region & 8 in western region) and per hectare (7 in eastern region & 5 in western region).

The composition, in terms of total literate and illiterate, is similar in both the regions at the aggregate level, as the majority is literate (51% in the eastern region, 66% in the western region). In terms of the level of academics, the number of educated upto VIIIth standard is the highest while the number of persons having technical education is the lowest in both the regions.

Number of workers per farm is higher in the eastern region (4) than the western region (3). All the size groups in both the regions have dominance of the male workers. But at the same time the percentage of non-workers in both the regions is higher than that of the workers.

Majority of the sample farm households have agriculture as their main occupation in both the regions (92% in the eastern and 96% in the western region).

The western region (Rs.69259/Hect.) is better off than the eastern region (Rs.51174/Hect.) in respect of agricultural assets in financial terms. Of the total agricultural asset value the maximum is being contributed by tractor (76% in the eastern region and 41% in the western region) fallowed by the buffalo (12% in the eastern region and 22% in the western region).

The western region farms of sample growers are fully irrigated, as there is no unirrigated area available. In the Eastern region at the aggregate level unirrigated area is 10.87 per cent.

On the basis of average yield rate, the sample growers of the western region have performed better (600 qtls/hect.) than their counterpart in the eastern region (499 qtls/ hect.)

In both the regions, of the aggregate production only .30 per cent has been used for self-consumption and the rest of the production is either marketable surplus (93% in the eastern region, 92% in the western region) or used as seed (6% in the eastern region 5.40% in the western region). It indicates that in both the regions sample growers have sufficient marketing avenues.

In both the regions sample growers have overwhelmingly preferred sugar mills for marketing their produce (93% in the eastern and 86% in the western region. In the western region Khandsari units remained more active (12%) than in the eastern region (4%) in respect of cane use.

In respect of marketing cost too, there is variation between the two regions. Since the western region is comparatively richer in respect of bullock carts the farmers mostly use non-motorized own mode of transport Marketing cost is, therefore, marginally less in the western region (Rs.5.27/Qtl.) than the eastern region (Rs. 5.65/qtls.).

There is a marked difference between the two regions in respect of cost. Due to sufficiently high production cost in the western region (Rs.28928/Hect.) the total cost (Rs.30,891 /Hect) also remained much higher than that in the eastern region (Rs.19517/Hect). In respect of the price receipt the western region (Rs.66397/Hect) is better off than the eastern region (Rs.63286/Hect) mainly due to the higher yield rates attained by the farmers of the western region.

In respect of net-gain, at the aggregate level eastern region gained (Rs.43769/ Hect) which is 23% higher than that in the western region (Rs.35506/Hect). This is due to lower cost in the eastern region.

The cane growers and the processors have mutual and instantaneous relationship. Since sugarmill is the biggest processor of sugarcane in the State. Except the private mill, all the sample mills of both the regions get full supply from the growers of the area. The private mills,

being comparatively better off both in respect to capacity and technology, purchased sugarcane from elsewhere also for its full feed.

Since many decades the State of Uttar Pradesh has been maintaining first rank at the national level in terms of farm and it has been ranking second in respect of sugar processing capacity and sugar production. This continued maintenance of the ranks in terms of raw material (sugarcane) and the product (sugar) is a testimony to the existence of congruity between the two in the State since many decades.

During the last five years, over the period the sample growers have themselves increased the area coverage (70% in the eastern region and 4% in the western region) in favour of sugarcane in both the regions. This increasing trend of cane area (except 2003-04) coverage indicates that the cane growers are satisfied with the marketing and payment systems.

All the sample growers opined in favour of utility of the sugar mills and the cane co-operatives in both the regions. Previous payments are reported to be clear along with the opinion of facing no problem in respect to price payment and marketing of cane by all the sample growers in both the regions. Such opinion of the sample growers in respect to price-payment marketing, utility of sugarmills and cane cooperatives confirm existence of optimum congruity level between the cane growers and the sugarmills.

The use of modern concepts in sugarcane processing and diversification are already in sight. With the fast emerging knowledge of genetics and biochemical engineering, sugar industry offers a great scope for technology innovation.

It is only the sugarmills in the country which has the potentiality of rendering multi-dimensional development to the rural section without state expense, in a short period of time.

By-product related diversification activity are yet to be geared up in our country. The main by-products of sugar industry are- (1) Bagasse (2) Molasses and (3) Press-cake.

These by-products can be used profitably for making a number of valuable products by establishing various ancillary units. If handled with proper planning and latest know-how, the day is not far-off when the main product will be by-product and the by-product the main product for the sugarmills in terms of return.

Rural sector development targeted diversification activities or agriculture related activities, with the help of reserved area and cane growers, could produce herbs and aromatic plants for running biomedicine and aromatic cottage plants. Animal husbandry related diversification activities can be dairy farming, poultry farming, bee keeping, piggery farming, vermi-culture and gobar gas plant etc. Institution related diversification activities are of running, Soil Testing Labs, Agro-Training Centre, Input-Output Sale Centre, Machinery Assembly and Repair Centre, Quality School and Nursing Homes etc.

These diversification activities will enrich the rural sector by providing low cost agro products, employment avenues to local people, development of cottage industry, soil enrichment, discourage urban migration, health enrichment, knowledge enrichment, State income enhancement, income enhancement of local people, and finally leading to over-all prosperity.

Suggestions for Policy Implication:-

1. The States of Uttar Pradesh and Maharashtra have been in commanding position both in sugarcane area coverage and production concentration.

2. Uttar Pradesh, with seventh national rank coupled with a negative national status till 1990-91, indicates the need for immediate improvement of the cane productivity for the benefit of its growers and the processors.

3. Poor recovery percentage is more a national problem rather than a State affair as most of the States have experienced negative national status since many decades therefore it should obtain a national policy cover as a remedial measure. It is only Maharashtra and Gujarat with positive national status and top ranks of first and second in the country that they remained competing with each other.

4. Pro-sugarcane natural bliss of Maharashtra (climate) and Uttar Pradesh (Soil) if coupled with a scientific break-through of **gene revolution**, alongwith **efficient crop management practices** with ratoon culture promotion will be able to fight out the productivity of recovery percentage problem in a cost effective manner. These two States having the sound base of area coverage will undoubtedly prove their potentials in the international market.

5. In respect of annual installed capacity in the country, the States of Maharashtra and Uttar Pradesh, with top two national ranks and share during the last several decades, exhibit their potentials of pushing the nation ahead in sugar production, both quality and quantity wise, due to cane production richness with its continuity

6. Even for the sugar production, the duo of Maharashtra and U.P. are standing at the top in the country with slightly more than sixty per cent of the national sugar production. These two States, therefore, should make efforts to bring improvement, both quality-wise and cost-wise to capture a lion's-share in the international market.

7. In the State of Uttar Pradesh, as proportion to the Gross Cropped Area in comparison to the competing (important) crops, sugarcane is lagging behind rice and wheat probably due to the high demand of these cereals and also availability of good quality HYV seeds.

8. The State of U.P. is having the first place nationally in respect of cane area coverage and production coupled with a high percentage share of more than forty during the last few decades

9. Except 1990-91, during the remaining years of the period the price actually paid by the sugar factories was marginally above the State Advised Price. It can be safely concluded that in declaring State Advised Price the government has not only favoured the growers blindly but has also taken into consideration the paying capacity of the factories as the factories are the chief buyers of the sugar cane.

10. On the farms of the State nearly all the crops are having less gross return as compared to that from sugarcane. It proves that the State, inspite of poor productivity of sugarcane but probably due to good cane price and its marketing, is able to be at the top in terms of its return.

11. With the installation of first sugar factory in 1903 the State's journey for sugar industry started. The State Government is extending all cares to the sugarcane crop through the seven State Organizations which have been working at micro (cane growers and processors) as well as macro (State economy) levels since 1912.

12. **The Salient Features of** Sugarcane Management in U.P. **are required to be incorporated and activated with immediate effect are:**

A. Harvesting Schedule or Time Management

Harvesting Schedule alertness in U.P. is very important and an urgently needed factor to boost up quality and quantity. Since Sugarcane is cultivated under diverse Soil and under climatic conditions with varying planting seasons, these factors cause variation in the stage of maturity. Under sub-tropical conditions this phenomenon is more vivid as there are three different planting seasons- Autumn, Spring and Summer-alongwith many varieties. Besides, early maturity varieties, ratoon gets ready for crushing earlier than the mid/late varieties. Hence, in order to obtain higher sugar recovery percentage throughout the crushing season, ratoon and early variety should be crushed first followed by the plant cane. Similar trends should be followed for mid-late and late varieties in phasing the crushing.

B. Recovery Percentage or Quality Management

Cane Staling is the one single factor which, if managed intelligently, can lead to immediate and significant improvement in sugar recovery. It is the scientifically established truth that cane should be crushed within 24 hours after harvest to avoid drying and conversion of sugar negatively (gets acidic) as it starts soon after harvesting and inflicts heavy loss to sugarcane, its sugar recovery and ultimately to the processors. It is, therefore, advised to minimize the "Kill to Mill" period if better quality cane with progressive profit to the processors and higher sugar recovery has been targeted.

The Australian Sugar industry has achieved about 14 per cent sugar recovery as against 9.90 per cent in India. Australia manages to mill the cane within 16 hours of its harvesting. Most of our sugar mill units are not aware of this important aspect of cane and, therefore, its returns are not optimum and are affected negatively in terms of both quality and quantity

C. By-Product or Return Management

Processing of by products of sugar industry has emerged to be the need of the present times, as sugar alone has ceased to sustain the economic viability of the industry. Thus, in terms of economic returns sugar is now becoming a 'by product' and the by-products the main product.

For enhancing the profit and economic efficiency of the sugar mills, proper handling and utilization of 'by-products' are becoming popular fast internationally. As bagasse, molasses, spent wash, and the like are essentially needed for the manufacturing of hard boards, plastic, gums and the like. Molasses, apart from being used for the manufacture of several by-products of high value, can also be utilized for further extraction of sugar. However, India is far behind in making use of such valuable material obtained free. Developed countries extract sugar from molasses by the process of de-sugaring. If we can de-sugar molasses, an additional 30 lakh tonnes of sugar can be produced annually. The sugar mills must be supported by distillery and other high-value production units for benefits to one and all.

D. Price-Payment or Congruity Management

In the present times since the traditional approach of farming is fast getting replaced by the commercial approach, sugarcane price plays a key role in determining the trends and speed of development of sugarcane, its growers and the processors. Its price management, therefore, should be meticulously worked-out as a large section of the economy is linked to sugarcane.

Sugarcane price and its payment to the growers are the important factor which determine the congruity level between its growers and the processors. In case, the cane price is managed to be satisfactory for the growers with timely payment practice, the growers get encouraged to enhance cane area coverage at-once. The increased area coverage results in increasing the

volume of raw material for the mills. This increased quantity of raw material serves the processors an opportunity to earn larger profits along with the benefit of intensive use of their infrastructure without the burden of added activity.

E. Crisis or Latest Technique (Non-Conventional Latest Input/ Latest Knowledge) Management

At the present time, scientific researches are providing many a valuable findings for the development of sugarcane its processing and (for the better utilization of) the by-products. On the basis of such scientific findings the growers and the processors for enhancing the value for improvement in the congruity among all the associates of sugarcane in order to transform the, 'sugarcane -world' as a 'world of mutual gains' and the sugarcane economy 'an economy of gains'. For this exercise the governmental and non-governmental agencies are required to stand parallely on the sugarcane farms with the trays in hand of saplings of latest variety and the packets of latest needed inputs for the improvement in quantity (productivity) and quality (recovery %age) of sugarcane. For the crisis management both the agencies are also required to be ever ready with a pamphlet in hand of detailed latest instructions in respect of sugarcane at the door step of all who are linked to sugarcane. This way the major investors (cane grower and the processor) will be saving some of their time, energy as well as money in developing sugarcane and its product and by-products.

13. Presently, India is facing the problem of plenty in sugar production as it maintains a carry-over stock of about 13.1 million tonnes of sugar and during the current crushing season it is expected to produce another 16 million tonnes against a domestic demand of 15.6 million tonnes.

14. As per the Findings of the Sample Area:

A. Caste-wise, OBC in the eastern region and general caste in the western region are the target caste groups for the development of sugarcane at the farm level.

B. Number of workers per farm (Table II-4) is higher in the eastern region (4) than the western region (3). All the size groups in both the regions have dominance of the male workers. But at the same time the percentage of non-workers in both the regions is higher than that of the workers.

C. Majority of the sample farm households has agriculture as their main occupation in both the regions (92% in the eastern and 96% in the western region).

D. On the basis of average yield rate, the sample growers of the western region have performed better (600 qtls/hect.) than their counterpart in the eastern region (499 qtls/ hect.) If the prevailing average yield rate (499 qtls/ hect. in the eastern region and 600 qtls/ hect. in the western region) is managed to be pulled up to the existing maximum yield level of the area (547 qtls/ hect. in the eastern region 686 qtls/ hect. in the western region) then it comes to an enhancement of 10% and 14% respectively in the aggregate production in a cost effective manner without changing the cropping pattern.

E. In both the regions sample growers have overwhelmingly preferred sugar mills for marketing their produce (93% in the eastern and 86% in the western region. In the western region Khandsari units remained more active (12%) than in the eastern region (4%) in respect of cane use.

15. The use of modern concepts in sugarcane processing and by-product related diversification activities are already in sight. With the fast emerging knowledge of genetics and biochemical engineering, sugar industry offers a great **scope for technology innovation and diversification** related to by products.

It is only the sugarmills in the country which has maximum potentiality of rendering multi-dimensional development to the rural section without state expense, in a short period of time.

The by-products can be used profitably for making a number of valuable products by establishing various ancillary units. If handled with proper planning and latest know-how, the day is not far-off when the main product will be by-product and the by-product the main product for the sugarmills in terms of return.

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These diversification activities will enrich the rural sector by providing low cost agro products, employment avenues to local people, development of cottage industry, soil enrichment, discourage urban migration, health enrichment, knowledge enrichment, State income enhancement, income enhancement of local people, and finally leading to over-all prosperity of the area.