



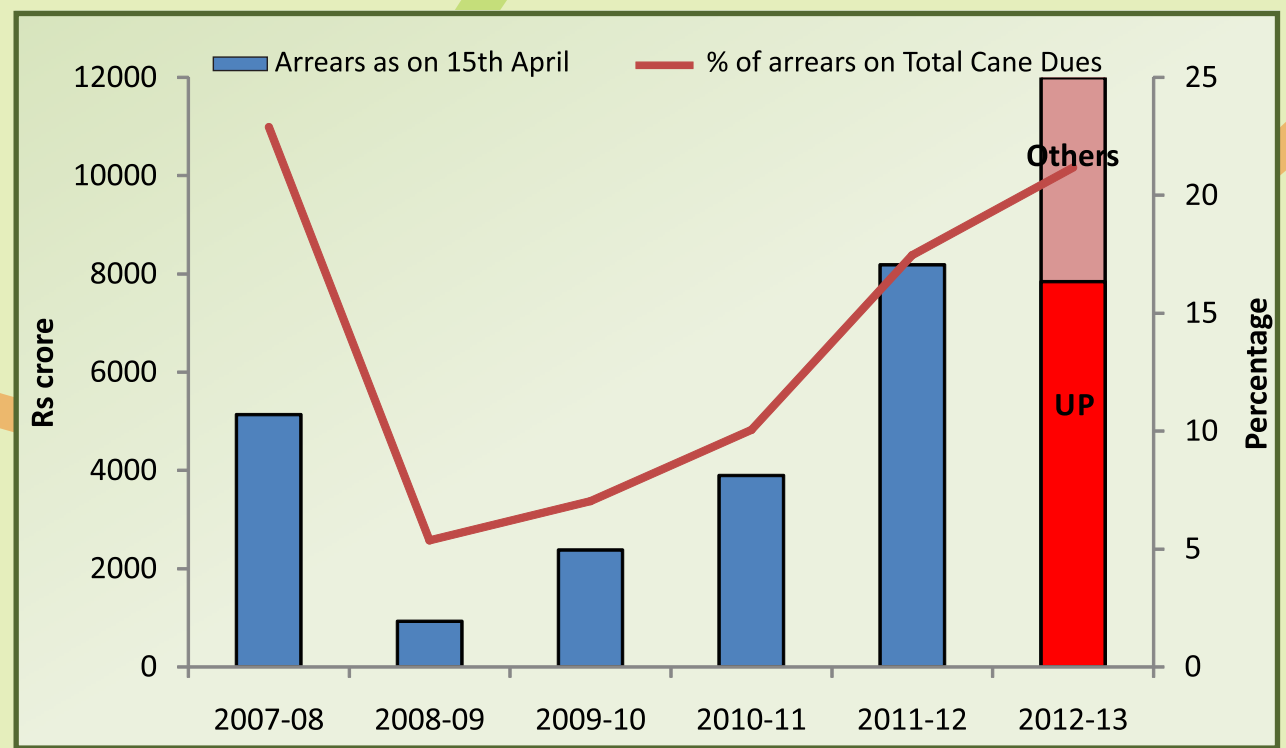
Price Policy for Sugarcane

THE 2014-15 SUGAR SEASON

Price Policy for Sugarcane

THE 2014-15 SUGAR SEASON

Mounting Cane Arrears: Brewing Trouble



COMMISSION FOR AGRICULTURAL COSTS AND PRICES
 Department of Agriculture & Cooperation
 Ministry of Agriculture
 Government of India
 New Delhi
 August 2013

सत्यमेव जयते



COMMISSION FOR AGRICULTURAL COSTS AND PRICES
 Department of Agriculture & Cooperation
 Ministry of Agriculture
 Government of India
 New Delhi
 August 2013

Price Policy *for* Sugarcane

THE 2014-15 SUGAR SEASON



सत्यमेव जयते

COMMISSION FOR AGRICULTURAL COSTS AND PRICES

Department of Agriculture & Cooperation

Ministry of Agriculture

Government of India

New Delhi

August 2013



CONTENTS

S. No.	Description	Page
	Acronyms	i
	List of Tables	iii
	List of Charts	iv
	List of Annex Tables	vi
	Summary of Recommendations	viii
1.	Overview	1
2.	Demand-Supply and Efficacy of Price Policy	10
3.	Trade Competitiveness of Indian Sugar	16
4.	Costs, Returns and Inter-Crop Price Parity	22
5.	Productivity and Costs	29
6.	Recommendations for Price Policy	36
	Annex Tables	40



List of Acronyms

A2+FL	Paid out cost plus imputed value of family labour
AAS	Advanced Authorization Scheme
APEDA	Agricultural and Processed Food Products Export Development Authority
C2	Comprehensive cost including imputed rent and interest on owned land and capital
CACP	Commission for Agricultural Costs and Prices
CIF	Cost, Insurance & Freight
CF	Correction factor
CoP	Cost of Production
CPI-AL	Consumer Price Index for Agricultural Labour
CS	Comprehensive Scheme
CSO	Central Statistics Office
CV	Coefficient of Variation
DAC	Department of Agriculture & Cooperation
DES	Directorate of Economics & Statistics
DFPD	Department of Food & Public Distribution
DGCI&S	Directorate General of Commercial Intelligence and Statistics
DGFT	Directorate General of Foreign Trade



EC Act	Essential Commodities Act
FAI	Fertilizer Association of India
FAO	Food and Agriculture Organization
FOB	Free on Board
FRP	Fair and Remunerative Price
FY	Financial Year
GDP	Gross Domestic Product
GVO	Gross Value of Output
Ha	Hectare
HSDO	High Speed Diesel Oil
ISEC	Indian Sugar Exim Corporation
ISGIEIC	Indian Sugar & General Industry Export Import Corporation Ltd.
ISMA	Indian Sugar Mills Association
LDO	Light Diesel Oil
LIFFE	London International Financial Futures and Options Exchange
MFRP	Minimum Fair and Remunerative Price
Mn	Million
NCDEX	National Commodity and Derivatives Exchange
NFCFSF	National Federation of Cooperative Sugar Factories
NSSO	National Sample Survey Office
OECD	Organization for Economic Co-operation and Development
OEA	Office of Economic Adviser
OGL	Open General License
Q1, Q2, Q3, Q4	Quarters referring to the Sugar Season (Oct-Sept)
Qtl	Quintal
RC	Recovery Certificates
RCAC	Registration-cum-Allocation Certificate
SAP	State Advised Price
SMP	Statutory Minimum Price
TE	Triennium Ending
USDA	United States Department of Agriculture
Wef	With effect from
WPI	Wholesale Price Index
WTO	World Trade Organization



List of Tables

Table No.	Topic	Page No.
Table 2.1	Balance sheet of sugar as a percentage of its use	12
Table 2.2	SMP/FRP as a percentage of Value of Sugar	13
Table 2.3	A Comparative Analysis of Cane Price Paid to Farmers as a percentage of Value of Sugar vis-à-vis Rangarajan Committee Formula of Revenue Sharing	14
Table 3.1	Forecast for International Prices of Sugar	21
Table 4.1	All India Gross and Net Returns over actual cost of cultivation of Sugarcane (Average from 2009-10 to 2011-12)	23
Table 4.2	State-wise and All India Projected Costs of Production for Sugarcane for 2014-15 Sugar Season (Adjusted for Recovery)	26
Table 4.3	Inter-Crop Price Parity in Returns	28
Table 5.1	Land & Water Productivity, and Efficiency Gaps in Cane & Sugar Production, 2012-13	33
Table 5.2	Gap in Yield Level of Sugarcane in India vis-à-vis Benchmark Country	34
Table 6.1	Efficacy of the Current Cane Pricing Policy, 2012-13	38



List of Charts

Chart No.	Topic	Page No.
Chart 1.1	Production of Sugarcane and Sugar in India - 1990-91 to 2011-12	2
Chart 1.2	State-wise Change in Shares in Production of Sugarcane & Sugar, TE 2002-03 & TE 2012-13	3
Chart 1.3	SMP/FRP vs State Cane Prices	4
Chart 1.4	Cane Price Arrears during 2007-08 to 2012-13	5
Chart 1.5	Cumulative cane price arrears in major cane growing States during 2012-13	6
Chart 2.1 (a)	Status of area under sugarcane and Sugarcane crushed	11
Chart 2.1 (b)	Sugar production	11
Chart 3.1	Major Producers of Sugar, TE 2012-13	17
Chart 3.2	Major Exporters & Importers of Sugar, TE 2012-13	17
Chart 3.3	Volume & Value of India's Exports and Imports of Sugar	18
Chart 3.4	International prices Vs Domestic Wholesale Prices of Sugar	20
Chart 4.1	State-wise and All India Rise in Agriculture Labour Wage Rate (In May, 2013 over May, 2012)	24

Chart 4.2	Projected Cost and Supply of Sugarcane by states (in Ascending Order of cost C2) for 2014-15 Sugar Season	26
Chart 5.1	Production and Yield of Sugarcane in India during 2000-01 to 2012-13	30
Chart 5.2	Yield of Sugarcane in Tropical and Sub-tropical Regions of India during 2000-01 to 2012-13	30
Chart 5.3	Land productivity of Sugarcane in Major Cane Producing States during 2000-01 to 2012-13	31
Chart 5.4	Relationship between Cost of Production and Yield Rates for Tropical Region	32



List of Annex Tables

Table No.	Topic	Page No.
Annex Table 1.1	Usage of Total Irrigation Water by Sugarcane in Maharashtra	40
Annex Table 2.1	Sugarcane : Area, Production and Yield	41
Annex Table 2.2	Sugarcane : All India Trends in Area, Production and Yield	43
Annex Table 2.3	State-wise Production of Sugar	44
Annex Table 2.4	Average Recovery of Sugar from Sugarcane (Oct.-Sept.)	45
Annex Table 4.1	State-wise Projected Cost of Production (C2 & A2+FL) - Unadjusted for Recovery of Sugarcane for 2014-15 Sugar Season and their shares in Production in increasing order of Cost	46
Annex Table 5.1	Sugarcane Productivity Adjusted for Crop duration, Recovery Rates and Water Requirements: Cases of Bihar, Karnataka, Maharashtra, Tamil Nadu and UP, 2012-13	47



Summary of Recommendations

Price Policy Recommendations:

S.1 The Commission recommends a fair and remunerative price (FRP) for sugarcane for the sugar season 2014-15 to be Rs 220 per quintal at 9.5 percent recovery level. With every increase in recovery by 0.1 percentage point, the FRP will increase by Rs 2.32 per quintal. This FRP is recommended after careful considerations given to the various factors enumerated in the Sugarcane Control Order of 1966, as amended from time to time, ranging from cost of production of sugarcane to the price of sugar and by-products. The Commission projects that for the 2014-15 sugar season the cost of production of sugarcane A2+FL would be Rs 122.88/qtl and C2 would be Rs 193.13/qtl at 9.5 percent recovery level. Given the surplus situation of sugar at home and in the international markets, the sugar prices are likely to prevail within a range of Rs 3000- 3400 per quintal, unless rupee depreciates significantly and/or import duty on sugar increases further.

S.2 The Commission commends the Government on partially decontrolling the sugar sector (abolishing levy and freeing the monthly release system) after accepting the recommendations of the Rangarajan Committee. The next logical step would be to consider the Committee's recommendation on the cane price and sugar price realization linkage. It becomes all the more significant with record cane arrears in 2012-13 sugar season and the precarious financial position of the sugar industry. Uttar Pradesh, which has the highest State Advised Price (SAP), accounts for more than two-thirds of these cane arrears. High SAP without commensurate increases in sugarcane productivity is a sure recipe for making Indian sugar sector

globally uncompetitive. This would lead to large excess stocks at home, and high cane arrears, bringing uncertainty and instability in sugar sector, and ultimately its fall. It is, therefore the most opportune time to adopt the Hybrid Formula for pricing of sugarcane, which is composed of revenue sharing principle dovetailed with some Minimum FRP (MFRP). The revenue sharing principle will be to distribute the total revenue generated in the cane-sugar value chain from sugar and its first stage by-products (molasses, bagasse and press mud) produced from a quintal of sugarcane, between farmers and millers in the ratio of their relative costs (70:30) incurred in producing sugarcane and converting that sugarcane into sugar and by-products. If the value of by-products is loaded on the value of sugar, then this ratio comes to 75:25. Given the uncertainty about future sugar prices, this revenue sharing principle needs to be combined with MFRP so that farmers are ensured of a minimum price. Adoption of this transparent and scientific Hybrid Formula as the basis of pricing of sugarcane will bring greater stability and rationality in the sugar sector. This, in turn, would attract fresh investments with new technology and take it to higher levels of efficiency and growth. Thus, the SAP needs to be phased out as it has lost its relevance.

Non-Price Recommendations

S.3 Sugarcane is a water intensive crop, and with water becoming increasingly scarce (given that Maharashtra and Karnataka experienced severe droughts last year), it is advisable that cane productivity needs to be optimized not only per unit of land, but also per unit of water. Against this backdrop, the Commission recommends taking up drip irrigation and fertigation on a much higher priority in drought prone belts of Maharashtra and Karnataka, which has the potential to save almost 40 to 50 percent water, 30 percent fertilizers, and about 30 percent energy, along with raising sugarcane productivity by 25 to 50 percent. For this to scale up quickly, there would be need for initial capital subsidy on drip and fertigation by the centre (50 percent) and the states (up to 25 percent), while the remaining being contributed by the farmers. The Commission calculates that these investment subsidies would give high returns and recover these expenses within two to three years, while saving the precious water.

S.4 Further, given that labour availability in agriculture is becoming a problem and farm wages are increasing at almost 20 percent per annum for the last three years, mechanization of farm operations is becoming almost a necessity. From that point of view, cane harvesters need a special mention. But given their high capital costs (ranging from Rs 1 crore to Rs 1.5 crore per harvester), it is out of reach of individual farmers. Sugar companies or any third party (say, cane harvest contractors) will have to work with farmers to re-organize the harvesting operations to optimize on the use of these expensive machines. Also, given that these machines are relatively new in the Indian sugarcane sector, government may have to initially underwrite a part of their cost (say up to 25 percent) with a view to give a fillip to mechanized harvesting of sugarcane.



Chapter-1

An Overview

- 1.1 Drought in Maharashtra in 2012-13, the country's biggest sugar producing state, is likely to pull down India's overall production in the 2013-14 sugar season to 23.7 million tonnes (a fall of 5 per cent as compared to last year)¹. In Maharashtra, sugarcane acreage is expected to fall by 12.5 per cent in 2013-14. This would be on top of the decline of 8 per cent in the acreage in sugarcane in Maharashtra in 2012-13 as it has experienced successive droughts. Sowing in 2013-14 is also down by almost 16 per cent in Tamil Nadu and 8 per cent in Karnataka due to low rainfall. The drought last year in Maharashtra and other tropical regions has focused attention on the need to align sugarcane cultivation with availability and management of water in the country.
- 1.2 In Maharashtra, sugarcane is irrigated mainly through a canal network of dams as compared to by large rivers and higher assured rainfall in Uttar Pradesh. Nearly 80 per cent of Maharashtra's sugarcane is grown in acutely

Need to align sugarcane cultivation with water availability in light of severe drought in tropical regions last year

¹ <http://www.indiansugar.com/uploads/media%20release-esti-2013-14.pdf>

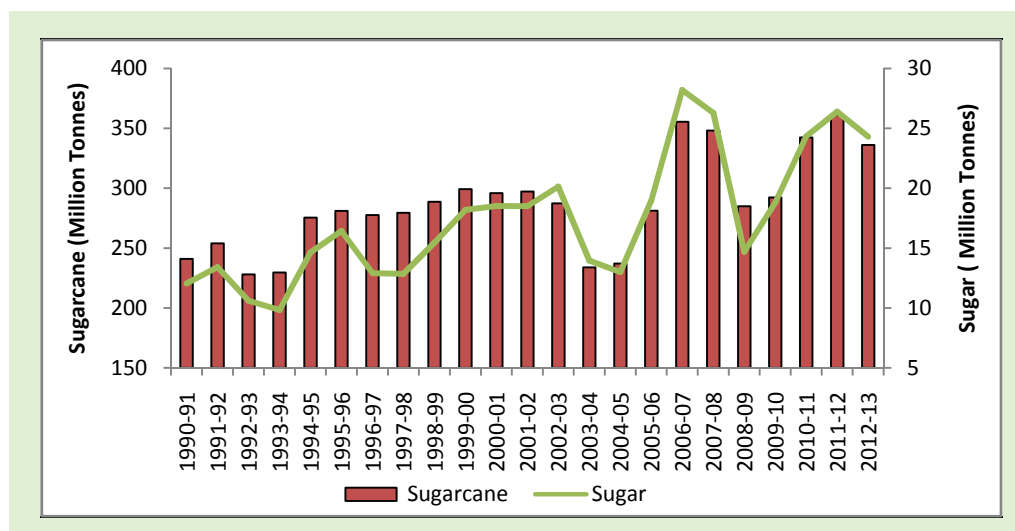
Sugarcane has less than 4 percent of total cropped area in Maharashtra but takes away almost 70 percent of total irrigation water

water-scarce areas². In Maharashtra, sugarcane cultivation, which is on less than 4 percent of the total cropped area of the state, takes away almost 70 percent of irrigation water in the state, leading to massive inequity in the use of water within the state³. Though the recovery rate (sugar produced after crushing 1 tonne of sugarcane) is higher in Maharashtra compared to Uttar Pradesh, productivity of sugarcane in Maharashtra in terms of water usage is almost one-third (details in chapter 5). For a large scale and sustainable development of sugarcane and sugar industry, it is necessary to see that it is developed in areas which have ample water supplies, and in others like Maharashtra and Karnataka, farmers adopt irrigation technologies and farming practices that save on water. Sugarcane being a water-intensive crop, one will have to give special attention to the availability and cost of that water to remain globally competitive. Unfortunately, the current policy regime for the sugar sector does not seem to be conducive to this, and it would be a major challenge to overhaul such policies.

Domestic Production: Sugarcane & Sugar

- 1.3 In India, production of sugarcane has increased from 241 million tonnes in TE 1992-93 to 346.5 million tonnes in TE 2012-13. The production of sugar has increased from 12.0 million tonnes in TE 1992-93 to 25.0 million tonnes in TE 2012-13 (Chart 1.1). It is interesting to note from the chart that sugar and cane production have a cyclical behaviour with two-three years upswing followed by two years downswing. This has happened in the past despite the fact that this sector has been heavily regulated by the government in terms of levy of sugar, monthly releases of non-levy sugar, imports and exports, and pricing of cane, etc. This causes uncertainty to farmers and millers alike with

Chart 1.1: Production of Sugarcane and Sugar in India - 1990-91 to 2011-12



Sugarcane and cane production have a cyclical behaviour with two-three years upswing followed by two years downswing

Source: DES & Directorate of Sugar, DFPD

² Maharashtra Economic Survey, 2012-13

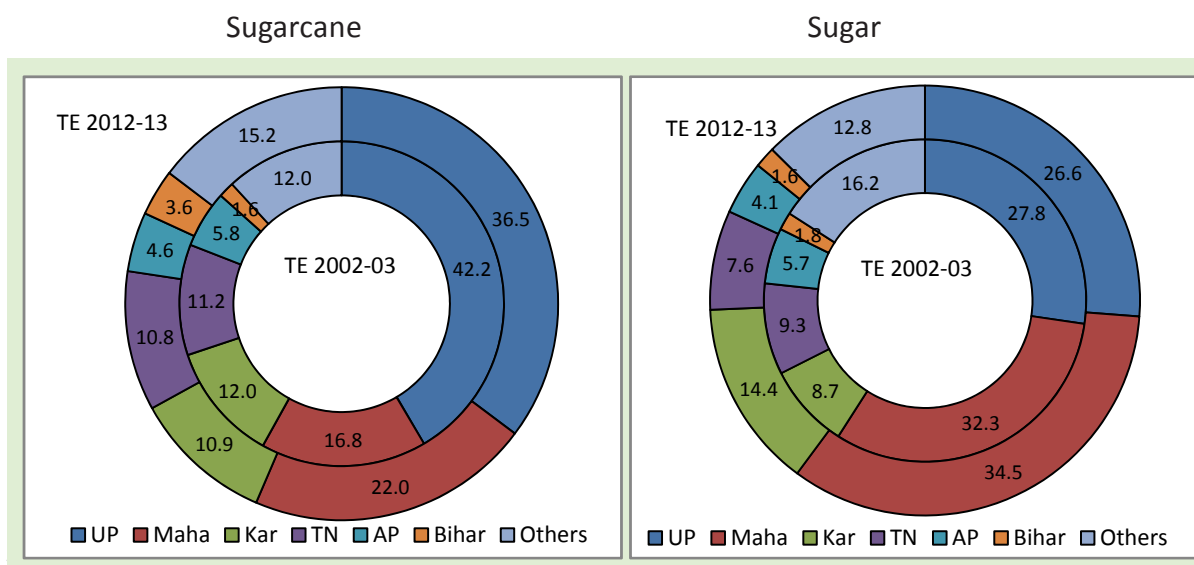
³ Details in Annex table 1.1

an adverse effect on fresh investments in the sector. A close look at chart 1.1 shows that the peak for the latest upward cycle was achieved in 2011-12 and the downward cycle may be imminent.

- 1.4 The biggest producer of sugarcane in the country is Uttar Pradesh (36.5 percent share in TE 2012-13) followed by Maharashtra (22.0 percent). Other major producers of sugarcane in the country are Karnataka (10.9 percent), Tamil Nadu (10.8 percent) and Andhra Pradesh (4.6 percent). In terms of sugar production, Maharashtra is the biggest producer (35.9 percent) followed by Uttar Pradesh (25.6 percent). This is partially due to the high recovery rate in Maharashtra and relatively higher diversion of cane to khandsari and gur production in Uttar Pradesh. Over the 2000s decade, sugarcane cultivation has shown a movement from the sub-tropical region (Gangetic plains) to the tropical region (water scarce areas). The share of Maharashtra in sugarcane production has increased at the expense of Uttar Pradesh. Karnataka has been a major gainer in share of sugar production largely due to its high recovery and rising profitability in the state (see chapter 4 for details).

Over the 2000s decade, sugarcane cultivation has shown a movement from the sub-tropical region to the tropical region

Chart 1.2: State-wise Change in Shares in Production, TE 2002-03 & TE 2012-13



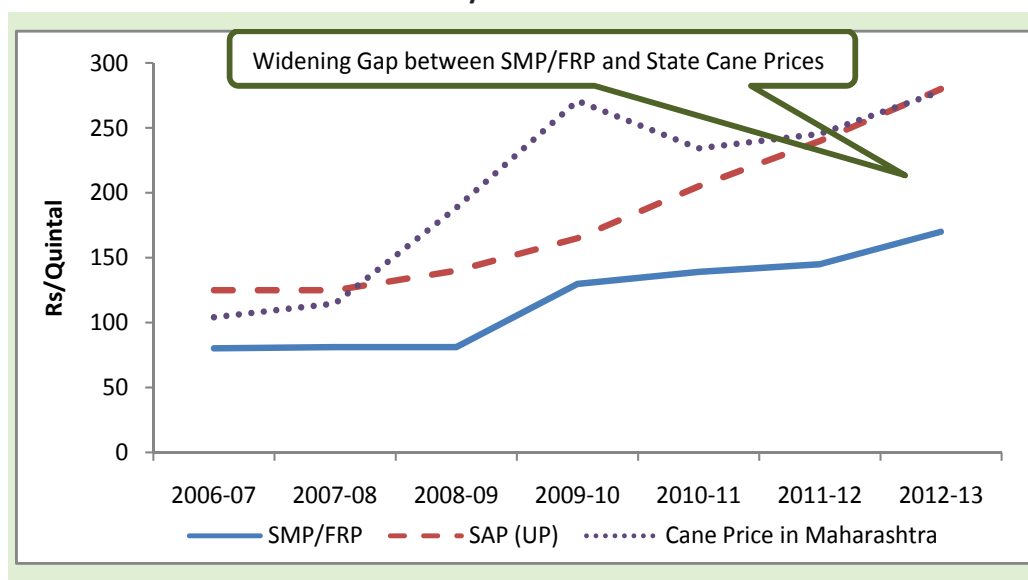
Aligning Price of Sugarcane with Value of Sugar and by-products

- 1.5 Since 2009-10 sugar season, when the concept of Statutory Minimum Price (SMP) was replaced by Fair and Remunerative Price (FRP), there has been a gradual effort to align FRP more closely to the value of sugar and its by-products from one quintal of cane. This has been particularly so during 2012-13 and 2013-14 seasons, when FRP has been increased by 17.2 percent and 23.5 percent respectively. But the prices that are actually received by cane farmers are State Advised Prices (SAP as in states like Uttar Pradesh), or some sort of final 'negotiated price' based on 'surplus sharing' mechanism

There has been a gradual effort to align FRP more closely to the value of sugar and its by-products from one quintal of cane

as in case of Maharashtra sugar cooperatives which are much higher (Chart 1.3). For the 2012-13 season, the cane price in Uttar Pradesh is higher than in Maharashtra despite a lower recovery rate (9.1 percent vis-à-vis 11.4 percent) and a shorter duration crop (9.5 months vis-à-vis 13 months in Maharashtra). No wonder, rising costs of cane has made domestic sugar from UP globally uncompetitive, creating a glut of sugar on one hand and mounting cane arrears on the other. The situation has become precarious, despite 15 percent import duty on sugar, and indications are that it is likely to worsen as global prices remain at subdued levels.

Chart 1.3: SMP/FRP vs State Cane Prices



Source: Directorate of Sugar, DFPD & Cane Commissioner, Pune

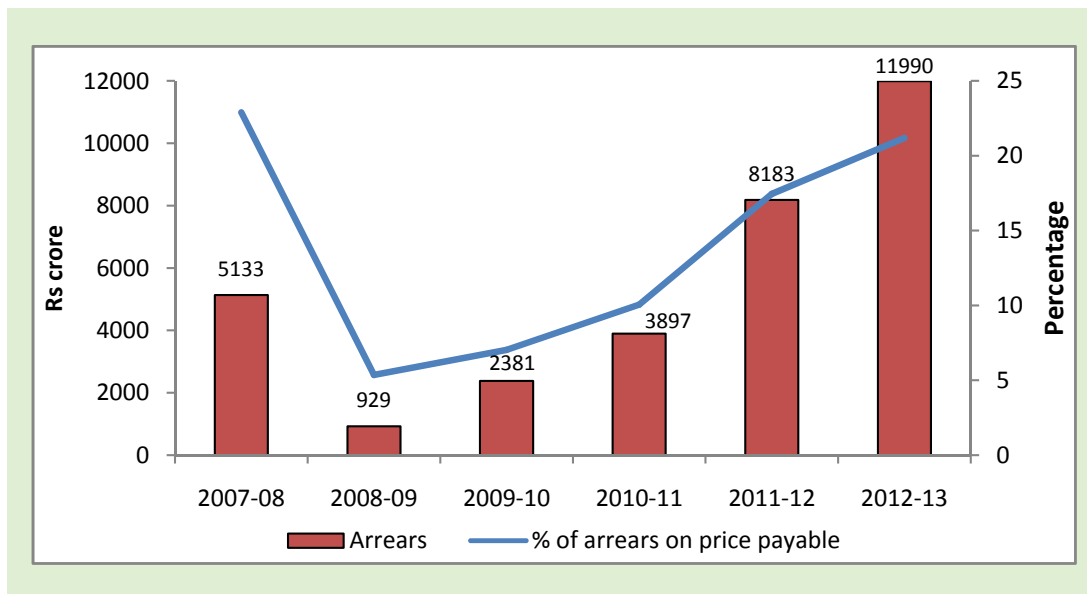
Mounting Cane Arrears

- 1.6 The lack of alignment between the cost of main raw material (sugarcane) and recovered price of the processed product (sugar) has led to record cane arrears in 2012-13. The cane price arrears for 2012-13 sugar season touched a record Rs 11,990 crore by 15th April, 2013 amounting to 21.2 per cent of the total cane dues. Similar situation was earlier witnessed in 2007-08 when these cane arrears were even higher at 22.9 per cent of price payable (chart 1.4). A sharp fall in cane production was experienced, thereafter, in 2008-09 and 2009-10 which should alert us for an impending downward cycle in the sugar sector. The prices announced by some State Governments, most notably Uttar Pradesh in 2012-13, do not reflect any rational linkage either with the cost of production of sugarcane or the value of sugar and its by-products recovered from a quintal of cane. While farmers consider SMP/FRP to be on the lower side, the SAP in Uttar Pradesh seems on the higher side compared to what the sugar factories can afford, given the prices of sugar. And a proof of that lies in mounting cane arrears. If we have one or two years more like this in a row, in

Lack of alignment between the cane price and price of sugar has led to record cane arrears in 2012-13

all likelihood, several sugar factories will start closing down their production lines as no one would like to incur losses on continuous basis. The solution to this problem obviously lies in having the pricing of cane based on revenue sharing formula.

Chart 1.4: Cane Price Arrears during 2007-08 to 2012-13



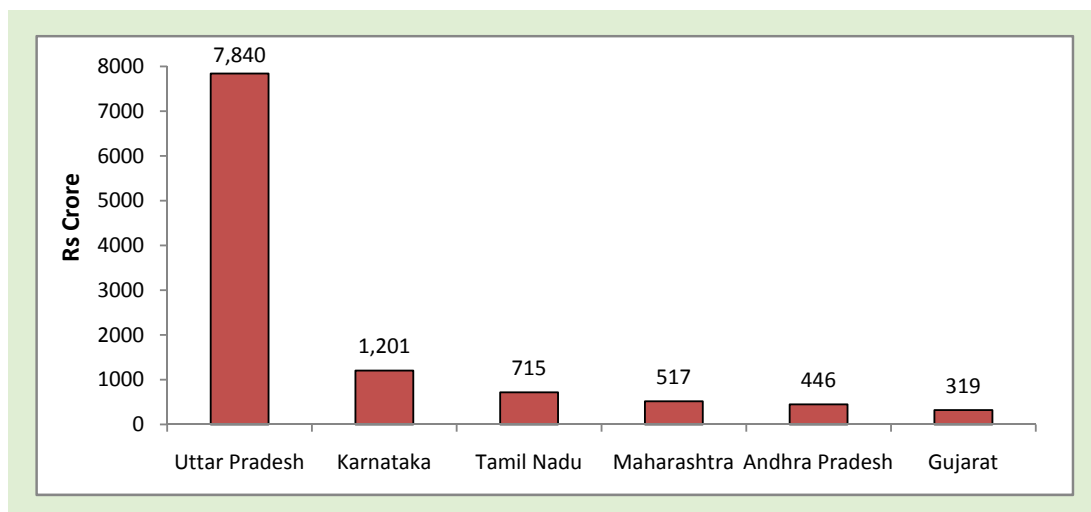
Source: Directorate of Sugar, DFPD

Note: The arrears are as on 15th April of the sugar season

1.7 Uttar Pradesh, the largest producer of sugarcane, alone accounts for around two-thirds of the total arrears at Rs 7,840 crore (Chart 1.5). The state government of Uttar Pradesh, in the backdrop of severe criticism by the Allahabad High Court, has decided to issue Recovery Certificates (RCs) against mills that have defaulted in payment to sugarcane farmers and has threatened to file FIRs against mills that do not pay farmers at least 90 percent of their dues by 31st July, 2013. It may be noted here that Uttar Pradesh has increased its SAP by an average rate of 19.3 percent during the last three sugar seasons (2010-11 to 2012-13), while the ex-mill sugar prices have increased by only 2.6 percent per annum during the same period. This disconnect between the two prices has led to the precarious financial position of sugar mills leading to accumulation of cane arrears. This would become unsustainable in the long run and lead to financial sickness and ultimately demise of the sugar industry as had happened earlier in Bihar. It must be realized that sugar sector cannot run sustainably on arbitrary pricing of cane without taking into account the revenue realization from its main products, and certainly not by court orders. In this context, it should also be realized that with gradual evolution of FRP, the rationale of SAP is no more justified. If any state wants to give some extra support to its cane farmers, an investment subsidy or income support policy would be better and not the price policy which distorts the markets.

Uttar Pradesh, the largest producer of sugarcane, alone accounts for around two-thirds of the total arrears

Chart 1.5: Cumulative cane price arrears in major cane growing States during 2012-13



Source: Directorate of Sugar, DFPD

Note: The arrears are as on 15th April of the sugar season

Inherent Bias in the Current FRP System

Existing FRP formula at 9.5 percent recovery rate cannot do full justice simultaneously to the two main states producing sugar which have a wide variation in their recovery levels

- 1.8 As an illustrative example, for 2013-14 sugar season, for Uttar Pradesh, if the ex-factory sugar price stays around Rs 33/kg, the revenue sharing formula would suggest a price of the cane to be at 75 percent of the value of sugar from one quintal of cane assuming a minimum recovery ratio of 9.5 percent. This would amount to Rs 235 per quintal ($=Rs\ 33 \times 9.5 \times 0.75$), even if the recovery ratio is below 9.5 percent. For Maharashtra, assuming that the recovery ratio is around 11.5 percent and ex-factory sugar price is around Rs 30/kg, the corresponding cane price through revenue sharing formula will be Rs 259 per quintal ($=Rs\ 30 \times 11.5 \times 0.75$). The announced FRP of Rs 210 per quintal at 9.5 percent recovery ratio will mean Rs 210 per quintal for Uttar Pradesh, but Rs 254 per quintal for Maharashtra ($=Rs\ (210/9.5) \times 11.5$). If the FRP is increased to Rs 235 per quintal (as determined by revenue sharing in Uttar Pradesh), then the corresponding price for Maharashtra would be Rs 284 per quintal ($= (235/9.5) \times 11.5$). This cane price in Maharashtra would amount to 82.4 percent share of farmers in the value of sugar ($=284 \times 100 / (30 \times 11.5)$) which would price out the sugar industry. The purpose of this illustration is to show that the existing FRP formula at 9.5 percent recovery rate cannot do full justice simultaneously to the two main states producing sugar which have a wide variation in their recovery levels. Therefore, it would be in the best interest of both the states to adopt revenue sharing formula, as it would bring in rationality, certainty and stability in the system and would surely give them better price than FRP. But if they go by SAP, as Uttar Pradesh is doing, and announcing a much higher price for cane than what could be given based on the value of sugar and its by-products, then the sugar sector would soon run into trouble, which will not be in the interest of either the farmers or millers.

Shifting Cropping Pattern of Sugarcane

1.9 Sugarcane is the most profitable crop vis-à-vis its competing crops like wheat, paddy and cotton (see chapter 4). This has led to expansion of sugarcane in Maharashtra and Karnataka despite these states being water stressed. The drought in 2012-13 clearly showed that something serious will have to be done in these states with regard to water management for sugarcane. Sugarcane being a very water intensive crop and the fact that per capita water availability in India is shrinking very fast and in the years to come India will be increasingly short of water, it is critical to develop sugar industry in an area that has plenty of water, and where water productivity of cane is high. But in Uttar Pradesh (and Bihar), the lopsided pricing policy of cane has the potential to jeopardize the growth of this industry. In Bihar, most of the sugar mills had fallen sick, while high cane arrears in Uttar Pradesh do not portend well for this sector. Curiously, where the pricing policy for cane has some semblance with revenue sharing formula (as in Karnataka and Maharashtra), the sugar industry is growing despite severe shortage of water. The long term growth of this sector in water scarce regions of Maharashtra and Karnataka will not be possible unless the farmers adopt drip irrigation (with fertigation) so that they can maximize more cane/sugar for every drop of water. This needs long term vision of the policy makers in these states, if they want to take sugar sector to a higher trajectory.

Critical to develop sugar industry in an area that has plenty of water, and where water productivity of cane is high

Partial Decontrol

1.10 The Central Government has partially decontrolled the sugar sector in line with the recommendations of the Rangarajan Committee. The dismantling of the levy obligation (for two years) and the deregulated sugar release mechanism will lead to a more competitive, efficient and profitable sugar sector, thereby benefiting all stakeholders – the growers, the millers and the consumers. Removal of the burden of levy sugar will give the industry an annual savings of about Rs 3000 crore, whereas abolition of regulated release mechanism will reduce inventories and ensure better cash flows. Increase in ethanol prices through competitive bidding will also benefit the sugar industry. These much awaited reforms will improve liquidity with millers which, in turn, will ensure better and timely payment of cane price to farmers. But pricing of cane remains central to the sugar sector, and unless that is put on a scientifically sound and transparent principle, by linking sugarcane prices to end-product prices, sugar sector will remain victim of instability, and thereby cannot realize its true potential. This has to be recognized by all cane growing states, especially Uttar Pradesh.

Dismantling of the levy obligation and the deregulated sugar release mechanism would benefit all stakeholders

Hybrid Pricing Formula

1.11 Currently, SMP/FRP is announced based on the recommendations of CACP but the State Governments announce their own SAP/negotiated price which

Rationalizing sugarcane pricing along revenue sharing lines will help to reduce volatility in sugar production and farmer income

is not based on any rational formula. As in respect of any other produce, the revenues realized from the sale of all the products and by-products should be equitably shared among producing stakeholders, and consumers too should get a competitive price. Based on this premise, Rangarajan⁴ committee had carefully estimated the relative share of costs incurred by farmers and millers and recommended sharing of 70 percent of the revenue from sale of sugar, molasses, bagasse and press-mud produced from a quintal of cane, to rationalize pricing of cane. Loading the value of by-products on value of sugar, this pricing formula worked out to about 75 percent of the ex-mill value of sugar produced from a quintal of cane. Under the revenue sharing formula, sugarcane growers will, in the first place, be paid some Minimum Fair and Remunerative Price (MFRP) as fixed by the Commission, with the balance paid at a later stage after realization of revenues⁵. Rationalizing sugarcane pricing along these lines will help in reducing volatility in sugar production and farmer income. This is a practice followed throughout the major sugar producing nations, and 75 percent of the value of sugar produced from one quintal of cane would perhaps be one of the highest prices of cane offered anywhere in the world. The Commission's calculations show that this will not only ensure a fair and stable return to farmers, but also assure mills a reasonable return on their investments. Karnataka has already decided to adopt a revenue sharing formula, which deserves credit. The Commission is given to understand that Maharashtra is also moving in that direction, and hopefully they will also adopt this formula. It is high time that the states in the north, especially Uttar Pradesh, also make a note of this and start moving in that direction in the overall interest of this sector's growth with stability.

Futuristic Vision of the Sugar Sector

1.12 The sugar sector of tomorrow has to be envisioned as an energy hub producing not only sugar but also ethanol from molasses and power from bagasse. Increase in ethanol pricing from Rs 27 per litre to now about Rs 33-36 per litre will help sugar sector to improve its viability and thus give a better return to farmers. In order to tap its full potential, molasses need to be fully freed from movement restrictions or reserved allocation for potable liquor. In Uttar Pradesh, e.g., almost 20 percent of molasses are reserved for potable liquor and the price paid is less than one-fourth of the market price being offered by the chemical industry. It is akin to sugar sector subsidizing the potable liquor sector. Such perverse policies need to be fully overhauled. But two issues will remain central to sugar sector's future growth: (a) How best one can align sugarcane production with better and more efficient usage of water; and (b) how rationally we can align sugarcane pricing with revenue sharing formula. If these issues are tackled rationally and quickly,

⁴ http://eac.gov.in/reports/rep_sugar1210.pdf

⁵ *Sugarcane Price Policy Report, 2013-14 Sugar Season, CACP*

sugar sector can double its worth in the next 5-7 years. Else, it will remain besieged in uncertainty, wide fluctuations and only limited growth.

Structure of the Report

1.13 Accordingly, this report focuses on the need for full decontrol of the sugar sector and adoption of a scientific and transparent pricing formula. Chapter 2 delineates the demand-supply situation of sugar, indicating growing surplus, and also efficacy of the existing price policy for cane. Chapter 3 looks at domestic sugar prices in relation to international prices and trade policies with a view to have efficient pricing of cane in a way that promotes globally competitive sugar sector. Chapter 4 presents cost projections for sugarcane for 2014-15 season. Chapter 5 looks at the relation between yields adjusted for water usage and real costs of production. Finally in chapter 6, major highlights of all chapters are presented leading to the key price and non-price policy recommendations.

Sugar sector of tomorrow has to be envisioned as an energy hub producing not only sugar but also ethanol from molasses and power from bagasse





Chapter-2

Demand-Supply and Efficacy of Pricing Policy

Domestic Market Scenario

- 2.1 Sugarcane is produced primarily for sugar in India. Therefore, the demand and supply situation of sugar plays an important role in the pricing of sugarcane. Demand for sugar basically emanates from two sources of market, viz., domestic and external. Demand for external market/ export depends largely on the price competitiveness of the sugar in the international market, whereas need for domestic market arises basically from direct household consumption and from bulk buyers like beverage companies, confectionaries etc.
- 2.2 As per NSSO Survey (66th Round), per capita consumption of sugar directly by households per month was 705 gm in rural areas and 820 gm in urban areas in 2009-10 (July-June). Considering that 68.8 percent of population lives in rural areas, all-India weighted average per capita direct household consumption of sugar would work out to 741 gm per month and 11.2 million tonnes per year for the country (for a population of 1.24 billion). As per estimates by the sugar industry the total consumption (absorption) of sugar in the country, including by households, bulk buyers, and others, is about 22.5 million tonnes per year. Thus, considering the household requirement of 11.2 million tonnes

Total consumption of sugar in the country, including by households, bulk buyers, and others, is about 22.5 million tonnes per year

per year, the balance of about 11 million tonnes or 50 percent of the total consumption is by bulk buyers ranging from small street corner sweet shops (confectionaries) in the informal sector to large beverage companies, etc. We do not know the exact break up between these informal sector small shops and the large beverage companies. Efforts should be made by the Directorate of Sugar to find out these consumption patterns beyond the NSSO's data on household consumption.

- 2.3 Supply of sugar, however, remains largely volatile depending on the weather condition and prices that farmers get for sugarcane. There have been surplus years of sugar production since 2010-11 after a steep fall in production during 2008-09 and 2009-10 (Chart 2.1(a) & (b)). This surplus has to be either exported or added to carry over stock for the next season. But exports of sugar have been tightly regulated only to be freed in May, 2012 (details in chapter 3). Thus, this surplus has added to the carryover domestic stocks. In 2012-13, there has been a fall of (-) 6.4 percent in sugarcane production and (-) 8.0 percent fall in sugar production. The total sugar production in the country in the sugar season (October to September) 2012-13 is expected to be about 24.8 million tonnes which is still more than the domestic consumption.

Supply of sugar remains largely volatile depending on the weather condition and prices that farmers get for sugarcane

Chart 2.1 (a) Status of area under sugarcane and Sugarcane crushed

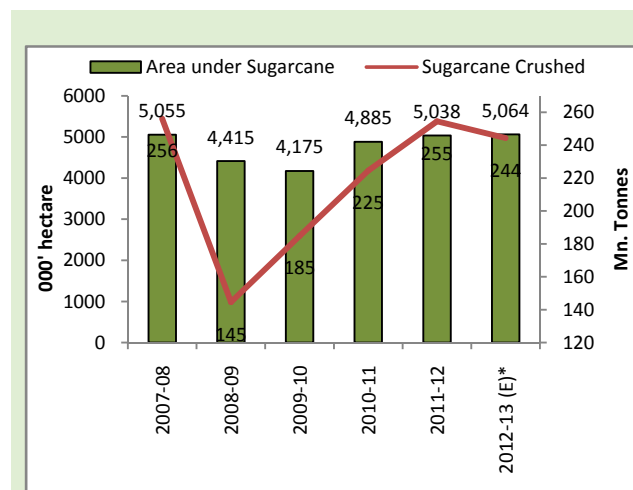
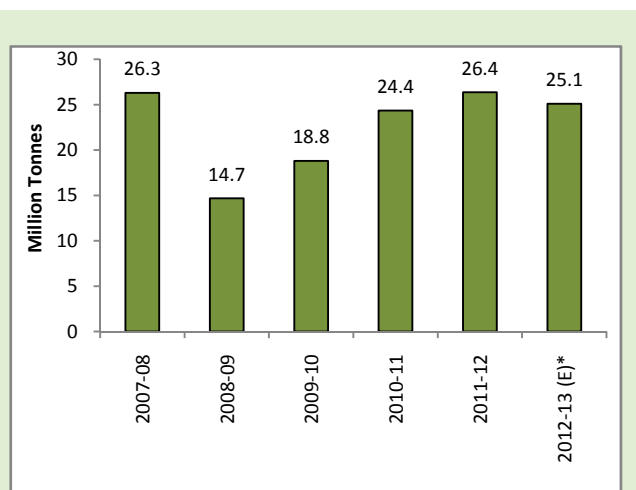


Chart 2.1 (b) Sugar production



* (E): Estimated by Directorate of Sugar (upto 30th June)

Source: DES and Directorate of Sugar, DFPD

Note: The years refer to sugar season

- 2.4 Against the demand, supply and production situation as above, the balance sheet of sugar showing stock-to-use ratio during 2010-11 to 2012-13 is given in table 2.1. The stock-to-use ratio at about 37 percent during 2012-13 indicates a very comfortable position (excess supply) of sugar availability in the country. The higher stock to use ratio in 2012-13 is mainly because of higher carry over stock, surplus domestic production, imports of sugar (against nil import in 2011-12) and

Estimated closing stock for sugar in 2012-13 is around 9 million tonnes indicating surplus availability

lesser exports during the sugar season compared to 2011-12. There is a global sugar surplus and international prices are depressed which has led to higher imports and lower exports. However, such higher stock to use ratio may also signal the impending crisis in the sugar industry. With about 9 million tonnes of estimated closing stock in 2012-13 and likely surplus production during 2013-14, it may result in further stock piling of sugar and increase in inventory in the sugar mills besides mounting cane arrears. The domestic prices of sugar are, therefore, expected to remain under downward pressure in 2013-14 sugar season.

**Table 2.1: Balance Sheet of Sugar As a Percentage of its Use
(Sugar Year - October to September)**

(Lakh tonnes, percent)

Sr. No.	Particulars	2010-11	2011-12P	2012-13E
1	Carry-over Stocks with Sugar Mills from previous season	51.25	62.96	66.27
2	Less - Adjusted 5% due to damages/ unusable stocks	2.56	0	0
3	Net Opening Stock (1-2)	48.69	62.96	66.27
4	Export allowed during the previous season but physically exported during the current sugar season	0	4.42	0
5	Net Adjusted opening stock (3-4)	48.69	58.54	66.27
6	Production of Sugar	243.5	263.43	248.00
7	Imports	0	0	15.11*
8	Estimated Total Availability (5+6+7)	292.19	321.97	329.38
9	Estimated Releases for Internal Consumption	208	227.25	230.00
10	Export against ALS/AAS obligation and OGL / bilateral agreement with Maldives	26	27.76	10.46**
11	Estimated non-levy sales as per Court Order	0	8	0
12	Total Estimated Releases (9+10+11)	234	263.01	240.46
13	Estimated Closing Stock on 30th Sept. (8-12)	58.19	58.96	88.92
14	Stock to Use ratio (%) {(13/12)*100}	24.87	22.42	36.98

Source: Directorate of Sugar, DFPD

P= Provisional; E=Estimated

Closing balance of one season is different from opening balance of next season to account for damaged/wet sugar and sugar sold under Court orders etc.

* It comprises 5.8 lakh tonnes import under OGL and 9.31 lakh tonnes imported under Advance Authorization Scheme (AAS).

** It comprises 1.15 lakh tonnes export under OGL and 9.31 lakh tonnes imported sugar under Advance Authorization Scheme (AAS) for re-export.

There is wide variation in the cane prices paid to farmers by different states

Efficacy of Pricing Policy

2.5 The Commission, as mandated, has been recommending the prices for sugarcane (SMP/FRP) keeping in view the cost of production of sugarcane, return from alternative crops, availability of sugar at fair price, recovery of sugar from sugarcane, realization made from sale of by-products, reasonable margins for sugarcane growers etc. The Central Government decides about the SMP/FRP for sugarcane based on the recommendation of the Commission, which is

expected to be adopted by all sugarcane growing states after due adjustments to recovery rates. However, in reality, there is wide variation in the cane prices paid to farmers by different states. For instance most of the states in the sub-tropical belt, especially Uttar Pradesh, announce their own State Advised Prices (SAPs) which are some sort of 'negotiated prices'. In certain years, these SAPs turn out to be much higher (as in 2012-13) in relation to the prices of sugar and its by-products being produced from cane, leading to large cane arrears. In the tropical belt, especially of Maharashtra, Karnataka, etc. cane pricing has some semblance with revenue sharing formula, albeit not very transparent and explicit. The effect is evident with two-thirds of the cane arrears concentrated in the sub-tropical states, especially Uttar Pradesh.

- 2.6 If we analyze the SMP/FRP at all-India recovery rate as a proportion of total value of sugar (table 2.2), we find that on an average over five years, the value comes to be only around 50 percent. In recent years, there has been a gradual effort to align FRP more closely to the value of sugar and its by-products from one quintal of cane. This has been particularly so since 2011-12, as the cane price has been increased by 44.8 percent in two years. In 2013-14 season, the FRP of Rs 210 per quintal gives a 70 percent share of the value of sugar at the all India level and to the farmers in Uttar Pradesh (at an ex-factory sugar price of around Rs 33/kg) and 74 percent in Maharashtra (with recovery ratio at 11.5 percent and ex-factory sugar price of around Rs 30/kg). However it needs to be appreciated here that SMP/FRP, customarily, has to be kept towards a lower side as sugar prices can go up or down but FRP may not be revised downward.

FRP has been increased by 44.8 percent in two years since 2011-12

Table 2.2: SMP/FRP as a percentage of Value of Sugar

Sugar Season	All India Ex-Mill Sugar Prices (Rs/Qtl)	All India Recovery Rate (%)	Total Sugar Value from one quintal of cane (Rs/Qtl)	SMP/FRP (Rs/Qtl)	SMP/FRP at All India Recovery rate	SMP/FRP as percentage of Value of Sugar (%)
(1)	(2)	(3)	(4)=(2)*(3)	(5)	(6)=(5)*(3)/Basic Recovery Rate	(7)=(6)*100/(4)
2008-09	2127	10.05	213.76	81.18	90.65	42.41
2009-10	2980	10.20	303.96	129.84	139.41	45.86
2010-11	2659	10.17	270.42	139.12	148.93	55.07
2011-12	3070	10.27	315.29	145.00	156.75	49.72
2012-13	3150	10.27	323.51	170.00	183.78	56.81
2013-14 (E)	3150	10.27	323.51	210.00	227.02	70.18

Source: Directorate of Sugar, Ministry of Consumer Affairs, Food and Public Distribution and State Replies

Note: 1. Basic Recovery Rate was 9% till 2008-09 and 9.5% years thereafter

2. The recovery rate for 2012-13 & 2013-14 is assumed to be the same as 2011-12 which is the latest available

3. The ex-mill price for 2013-14 is assumed to be similar to 2012-13.

4. E: Estimated

Farmer's share in UP in the value of sugar has fluctuated widely from 58 percent in 2009-10 to 92 percent in 2012-13

2.7 As noted earlier, Uttar Pradesh announces its own SAP. An attempt is made in table 2.3 to compare the farmer's share (in terms of cane price paid) in the total value of sugar derived from one quintal of cane in Uttar Pradesh to the Revenue Sharing Formula recommended by Rangarajan Committee. It is observed that over a period of five years, the average share of farmers in the sugar value obtained by farmers has been 74 percent in Uttar Pradesh. This is very close to the 75 percent share recommended by the Rangarajan Committee. But on a yearly basis, farmer's share fluctuated widely from 58 percent in 2009-10 to 92 percent in 2012-13. This uncertainty in the share, to the farmers and the millers, hampers fresh investments and adoption of new technology. Therefore, the Commission feels that Rangarajan Committee recommendation of revenue sharing formula would be more effective, transparent and rational as was also recommended in its Report last year.

Table 2.3: A Comparative Analysis of Cane Price Paid to Farmers as a percentage of Value of Sugar vis-à-vis Rangarajan Committee Formula of Revenue Sharing in UP

Rs/qtl

Sugar Season	Ex-Mill Sugar Price	Cane Price Paid to Farmers (SAP)	State Recovery Rate (%)	Total Sugar Value from one quintal of cane		Farmer's Share in Total Revenue (Cane Price Paid to Farmers/Total Sugar Value)*100		Cane Price payable to farmers under Revenue Sharing Formula of Rangarajan Committee (75 % of Total Sugar Value from 1 quintal of cane)
				At State Recovery rate	At 9.5% Recovery rate	At state Recovery rate	At 9.5% Recovery rate	At 9.5% Recovery rate
(1)	(2)	(3)	(4)	(5)=(2)*(4)	(6)=(2)*9.5	(7)=(3)*100/(5)	(8)=(3)*100/(6)	(9)=0.75*(6)
2008-09	2230.83	140.00	8.91	198.77	211.93	70.43	66.06	158.95
2009-10	3121.67	165.00	9.13	285.01	296.56	57.89	55.64	222.42
2010-11	2806.67	205.00	9.15	256.81	266.63	79.83	76.88	199.98
2011-12	3076.46	240.00	9.09	279.65	292.26	85.82	82.12	219.20
2012-13	3335.94	280.00	9.09	303.24	316.91	92.34	88.35	237.69
Average						77.26	73.81	

Source: Directorate of Sugar, Ministry of Consumer Affairs, Food and Public Distribution and State Replies

Note: 1. The ex-mill price for 2012-13 is up to May, 2013

2. Annual ex-mill Sugar price has been calculated on the basis of monthly averages of price range provided by Directorate of Sugar

3. Basic Recovery Rate was 9% till 2008-09 and 9.5% years thereafter

4. Rangarajan Committee assumes a basic minimum recovery rate of 9.5%

5. The recovery rate for 2012-13 is assumed to be the same as 2011-12 which is the latest available

- 2.8 It is, therefore, essential that an appropriate pricing formula is devised so as to ensure a fair sharing of the value created in the cane-sugar value chain by protecting the interest of both farmers and millers. To bring in greater certainty, stability and transparency into the sugar industry, and to rationalize the pricing of sugarcane, Rangarajan Committee has recommended for sharing the revenue pot of value created in the sugarcane value chain between the farmers and millers in the ratio of their relative costs and has suggested that 70 percent of the value of sugar and each of its three major by-products, namely bagasse, molasses and press mud (all *ex-mill*), be fixed as the cane dues payable to the farmer. Loading the value of by-products on sugar value, this amounts to roughly 75 per cent of the *ex-mill* value of sugar alone produced from a quintal of cane. The Rangarajan Committee however has also recommended moving towards the hybrid formula, i.e., revenue sharing principle dovetailed with some sort of a Minimum FRP, keeping in view of the fact that sugar prices are quite volatile.
- 2.9 The Commission is of the view that in order to keep pace with best international practices and to avoid uncertainty and volatility in sugar prices and sugar cycles, India needs to move from the existing system of fixed pricing of cane towards hybrid pricing by adopting the recommendations of the Rangarajan Committee early.

An appropriate pricing formula is required so as to ensure a fair sharing of the value created in the cane-sugar value chain





Chapter-3

Trade Competitiveness of Indian Sugar

Global Scenario: Production and Trade

Sugarcane

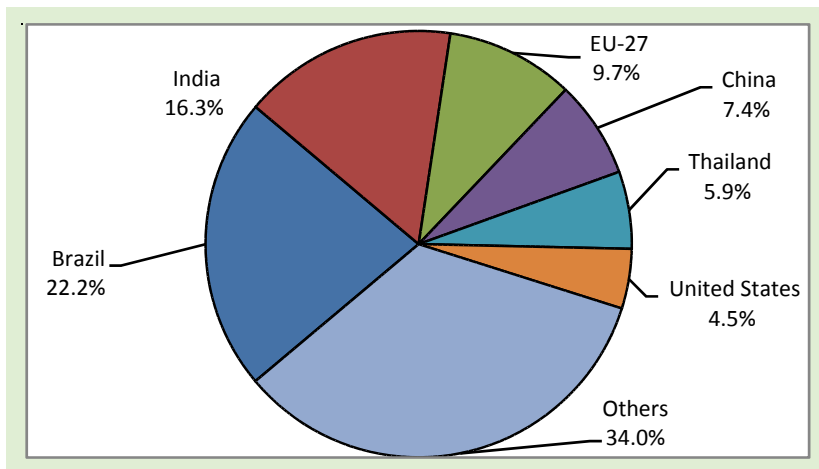
Brazil is the biggest producer of sugarcane and sugar followed by India

- 3.1 Global production of sugarcane, as per FAO, was 1.7 billion tonnes in TE 2011. Brazil is the biggest producer of sugarcane accounting for 41.4 per cent of the world sugarcane production followed by India (17.7 per cent). Other major producers of sugarcane are China (6.6 per cent), Thailand (4.5 per cent), Pakistan (3.0 per cent) and Mexico (2.9 per cent). Sugarcane and sugar beet are the two main sources of sugar. Sugarcane is cultivated in tropical and sub-tropical climates while sugar beet is cultivated in temperate climates. As per FAO, global production of sugar beet was 0.2 billion tonnes in TE 2011. EU-27 is the biggest producer of sugar beet with a share of 46.3 per cent followed by Russia (13.0 per cent), USA (11.3 per cent), Turkey (7.0 per cent) and Ukraine (5.8 per cent). At present, it is estimated that 79 per cent of sugar is produced from sugarcane and remaining 21 per cent is produced from sugar beet. However, as per OECD-FAO Outlook 2013-2022, sugarcane is expected to account for virtually all the additional sugar production and to represent nearly 88 per cent of sugar output in 2022.

Sugar

3.2 As per USDA, global output of sugar was 169.5 million tonnes in TE 2012-13 out of which about 33.0 per cent is traded. Brazil was the biggest producer of sugar accounting for 22.2 per cent share of the world sugar production followed by India (16.3 per cent) in TE 2012-13 (Chart 3.1). Other major producers of sugar in the world are EU-27 (9.7 per cent), China (7.4 per cent), Thailand (5.9 per cent) and USA (4.5 per cent).

Chart 3.1: Major Producers of Sugar, TE 2012-13



Source: USDA

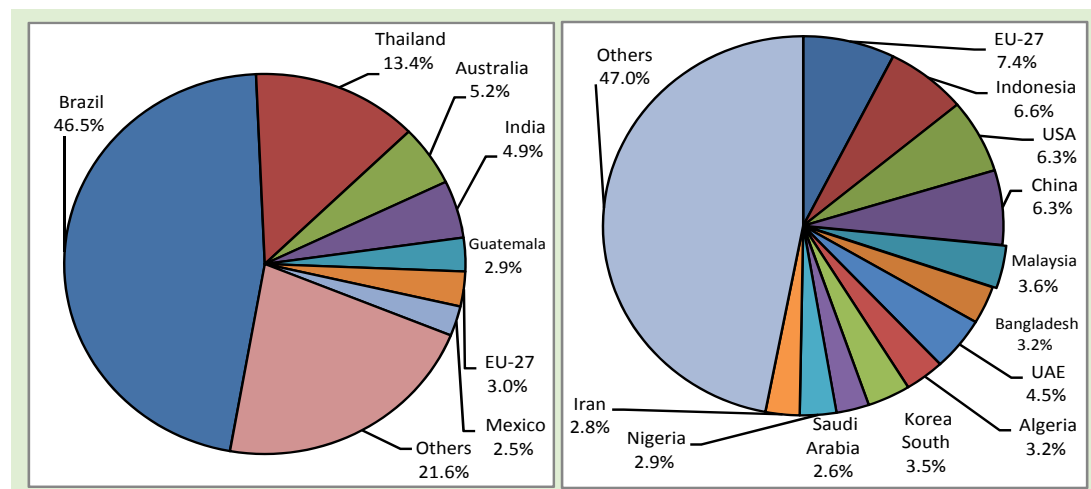
Brazil is the biggest exporter of sugar in the world followed by Thailand

3.3 Total global export of sugar was 56.0 million tonnes in TE 2012-13 with Brazil as the biggest exporter of sugar in the world with 46.5 per cent share followed by Thailand (13.4 per cent) (Chart 3.2). Other major exporters of sugar were Australia (5.2 per cent), India (4.9 per cent), EU-27 (3.0 per cent), Guatemala (2.9 per cent) and Mexico (2.5 per cent). EU-27 is the biggest importer of sugar with a share of 7.4 per cent closely followed by Indonesia (6.6 per cent), U.S.A. (6.3 per cent), and China (6.3 per cent) in TE 2012-13 (Chart 3.2).

Chart 3.2: Major Exporters and Importers of sugar in TE 2012-13

Exports

Imports



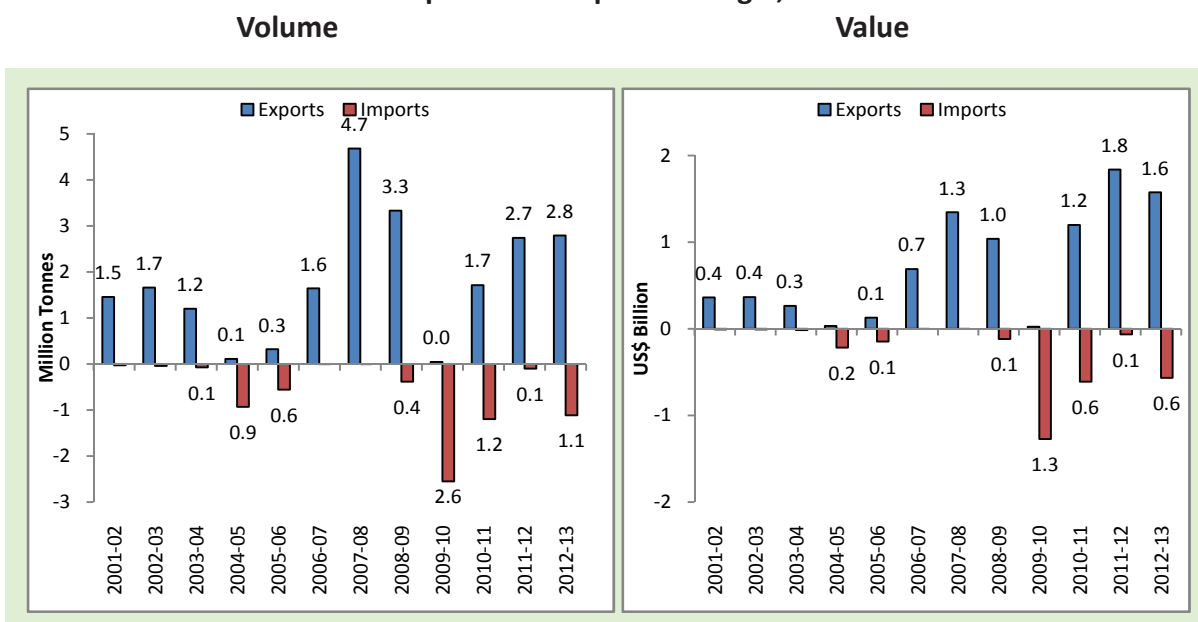
Source: USDA

India's Trade in Sugar

3.4 India is currently the fourth largest exporter of sugar in the world. India is an occasional importer of sugar too, depending upon the demand and supply situation at home. During the period from 2001-02 to 2012-13, India has been a net exporter of sugar, except during the year 2004-05, 2005-06 and 2009-10 when India was a net importer of sugar (Chart 3.3). During this period, India's exports of (4.7 million tonnes) of sugar were highest in the FY 2007-08, whereas, India had to import 2.6 million tonnes of sugar in the FY 2009-10. But in terms of value, sugar exports earned a record US\$ 1.8 billion in FY 2011-12 due to the high international prices of sugar in that year. This has been despite constant government interventions in external trade of sugar with intermittent ban on exports.

During the period from 2001-02 to 2012-13, India has been a net exporter of sugar

Chart 3.3: India's Exports and Imports of Sugar, 2001-02 to 2012-13



Source: DGCI&S

Note: The years pertain to financial year

Trade Policy

Export Policy:

3.5 Exports of sugar were canalized through the notified export agencies, viz. Indian Sugar and General Industry Export Import Corporation Ltd. (ISGIEIC) and State Trading Corporation of India (STC) till 15th January, 1997 when they were decentralized and permitted subject to obtaining Registration-cum-Allocation Certificate (RCAC) from Agricultural and Processed Food Products Export Development Authority (APEDA). This requirement of issue of RCAC by APEDA was dispensed wef 1st April, 2001 and exports of sugar were allowed after obtaining the export release order from Directorate of Sugar.

- 3.6 Exports of sugar were banned wef 22nd June, 2006 because the domestic prices of sugar surged between January–June, 2006. Only exports through the Indian Sugar Exim Corporation (ISEC), the joint body of Indian Sugar Mills Association (ISMA) and the National Federation of Cooperative Sugar Factories (NFCFSF), were permitted subject to the quantitative ceiling notified by DGFT from time to time. Due to high production in sugar season 2006-07, the ban on export of sugar against advance licenses was lifted wef 4th January, 2007 and then for exports under OGL wef 23rd January, 2007. Within a span of six months, due to the cyclicity in production of sugarcane and consequently sugar, trade policy was changed from complete ban on exports to open exports through OGL. As 2007-08 was a good production year, the requirement of obtaining export release orders from Directorate of Sugar (except for export to EU and USA) was also relaxed wef 31st July, 2007 to be again re-introduced wef 1st January, 2009. This was done in view of the lower estimated production of sugar in 2008-09 and 2009-10 sugar seasons. Sugar production improved in 2010-11 and 2011-12 and due to comfortable sugar stocks in the country, exports of 1.5 million tonnes of sugar were allowed under OGL during 2010-11 sugar season and 2 million tonnes during November, 2011 to February, 2012. Free exports of sugar have been allowed subject to prior registration of quantity with Directorate General of Foreign Trade (DGFT) wef 14th May, 2012.

Free exports of sugar have been allowed subject to prior registration of quantity with DGFT wef 14th May, 2012

Import Policy:

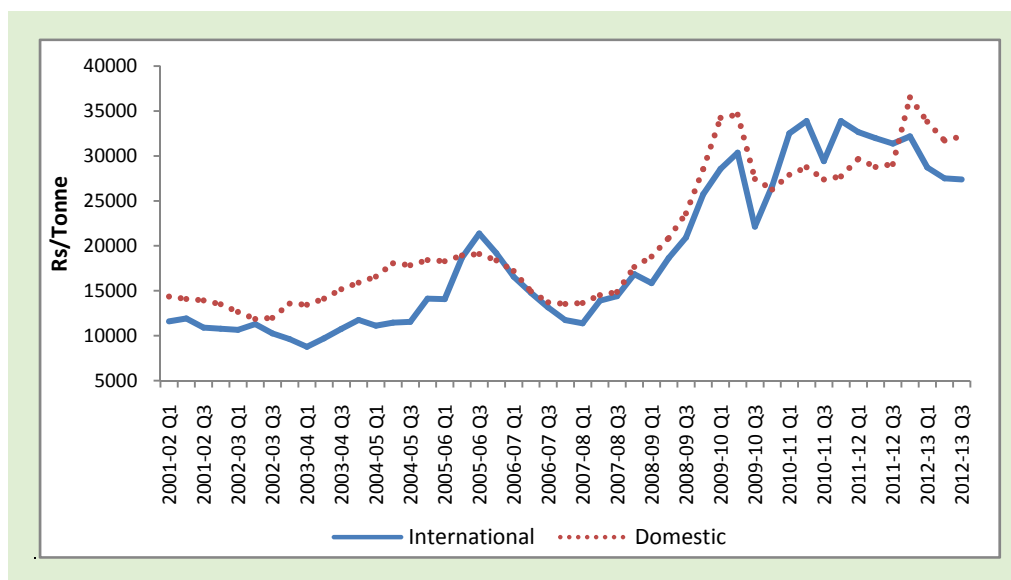
- 3.7 The imports of sugar were placed under OGL with zero duty in March, 1994. A basic customs duty of 5 per cent and a countervailing duty of Rs 850 per tonne was imposed on imported sugar wef 28th April, 1998 which was gradually increased from 20 per cent wef 14th January, 1999 to 60 per cent wef 9th February, 2000 along with continuance of countervailing duty of Rs.850 per tonne (increased to Rs 950 per tonne wef 1.3.2008 plus 3 per cent education cess). In order to augment stocks for 2004-05 and enable the Government to meet the normative three months consumption requirement of the country, the Advance License Scheme was liberalized for raw sugar imports, in as much as the imported raw sugar under Advance License was allowed to be processed into white sugar, sold in the domestic market, and further allowing such importers to fulfill export obligation within 24 months period or such extended period as allowed by DGFT by exporting indigenously manufactured white sugar. Such a severance of physical link between imported raw material and export product came to be known as ton-to-ton policy.
- 3.8 The domestic sugar production declined in 2008-09 sugar season and so in order to augment the domestic stocks of sugar, the government allowed import of raw sugar under Advance Authorization Scheme by sugar mills at zero import duty from 17th February, 2009 to 30th September, 2009 and also allowed import of raw sugar at zero import duty under OGL wef 17th April, 2009. The import duty was raised to 10 percent wef 13th July, 2012 in view of a declining trend

in international prices of sugar to purportedly give protection to the domestic industry. This was further raised to 15 per cent wef 8th July, 2013 due to the sluggish trend in international prices and to prevent cheap raw sugar imports.

- 3.9 Domestic wholesale prices of refined sugar (Mumbai) have been compared with International prices of refined sugar traded at LIFFE during the period from 2001-02 (Q1) to 2012-13 (Q3). It may be observed from chart 3.4 that the domestic wholesale prices of refined sugar (Mumbai) have been generally higher than international prices of refined sugar (LIFFE) during the period from 2001-02 (Q1) to 2012-13 (Q3). However, India's exports are mainly to neighboring countries like Pakistan, Bangladesh and Sri Lanka and the countries such as UAE, Yemen, Saudi Arabia, Iran, Sudan, Djibouti, Somalia, Kenya and Tanzania which are comparatively nearer to India than the main competitors like Brazil, Thailand and Australia. Because of less freight charges, it has become easier for India to export sugar to these countries.

Domestic wholesale prices of refined sugar have been generally higher than the international prices

Chart 3.4: International prices versus domestic wholesale prices of sugar



Source: 1. International refined white sugar traded at the London Futures Exchange (LIFFE)
2. Directorate of Sugar, DFPD for domestic wholesale prices at Mumbai
3. The years pertain to sugar season viz., October-September

A consumer-oriented trade policy for sugar as imports were allowed at zero import duty since August 2009 (till July, 2012) while exports of sugar were tightly controlled

- 3.10 In a nutshell, the Government broadly has followed a consumer-oriented trade policy for sugar as imports were allowed at zero import duty since August 2009 (till July, 2012) while exports of sugar were tightly controlled and were subject to release orders from the Directorate of Sugar until recently. This was despite the surplus production during the years of 2010-11 and 2011-12. Since mid-2012, the international prices are settling to their trend level after reaching higher levels in 2010-2011 but the domestic prices of sugar are still higher. This is due to the higher cost of the raw material of sugarcane in some states, which is not linked with the prevailing prices of sugar. The Government has raised the import

duty to 15 percent recently to protect the domestic industry against cheaper imports but this may hurt the consumers. A higher import duty may just be a short term reprieve for the industry as higher costs of domestic production are hitting the international competitiveness of Indian sugar. The solution to this muddle lies in reforming the domestic pricing policies as detailed in chapter 2. In terms of international trade, a stable, liberal and neutral (towards producers and consumers) trade policy with only moderate duties of 5-10 percent is required.

Global Outlook

3.11 According to OCED-FAO Agricultural Outlook 2013-2022, world sugar production is projected to increase by 1.9 per cent, per annum, over the projection period to reach about 212 million tonnes in 2022-23. Brazil and India will remain the leading producers of sugar based on sugarcane. Bio-fuel production is projected to consume a growing share of global production of sugarcane (28 per cent) by 2022. The likely international prices of sugar, as per projections of OCED-FAO Agricultural Outlook 2013-2022 are indicated in Table 3.1. World sugar prices have followed a downward trend during 2012-13, with lower price volatility, due to global sugar surplus. As per OECD-FAO Agricultural Outlook 2013-2022, world sugar prices are expected to continue to drift downward in 2013-14 before commencing a turnaround and following a moderately upward trend in the following years, as sugar consumption continues to grow.

World sugar prices are expected to continue to drift downward in 2013-14

Table 3.1: Forecast for International Prices of Sugar

Commodity	Price forecast (US \$/tonne)			
	2013-14	2016-17	2019-20	2022-23
Raw Sugar	410.2 (24612)	414.0	444.5	438.7
Refined Sugar	498.8 (29928)	512.5	545.2	536.4

Source: OCED-FAO Agricultural Outlook for 2013-2022

Note: 1. Raw sugar world price, ICE Contract No.11 nearly, October/September.

2. Refined sugar price, Euronext, Liffe, Contract No.407 London, Europe, October/September.

3. The figures in brackets are in Rs/tonne assuming the exchange rate of 1US\$=60

3.12 The bearish global market in the short-term and domestic surplus is exerting a downward pressure on the domestic prices too. NCDEX futures show that domestic prices of sugar would remain stable in the range of Rs 3050-3070 by the beginning of sugar season 2014-15. Despite the recent depreciation of the Indian Rupee, the domestic prices are expected to be higher than the international prices. This needs to be kept in mind while considering the price of sugarcane for the 2014-15 season.

The bearish global market in the short-term and domestic surplus is exerting a downward pressure on the domestic prices of sugar



Chapter-4

Costs, Profitability and Inter-Crop Price Parity

- 4.1 For pricing of sugarcane, i.e., in arriving at a fair and remunerative price (FRP), the Commission considers not only the cost of production but also the demand-supply situation of both sugarcane and sugar, trends in market prices of sugar in domestic as well as in international markets, and the price realized from sale of sugar and its by-products, viz., molasses, bagasse and press-mud produced from a quintal of sugarcane. Apart from these factors, allowance is made for profit and risk margins in arriving at FRP as per the mandate given under Sugarcane (Control) Order, 1966.
- 4.2 As part of this exercise, the Commission uses the cost of cultivation/production estimates generated under the Comprehensive Scheme (CS) being implemented by the Directorate of Economics and Statistics (DES). These estimates are normally received with a lag of two to three years. The latest estimates are available for the year 2011-12 for major sugarcane growing states of Andhra Pradesh, Haryana, Karnataka, Maharashtra, Tamil Nadu, Uttar Pradesh and Uttarakhand.
- 4.3 In order to arrive at the projected cost of production of cane for the year 2014-15 for its FRP recommendation, the Commission has used the actual data for latest three years, from 2009-10 to 2011-12, and projected each one of them for the year 2014-15, for each sugarcane growing state, based on specially constructed input price index. Thus, there are three estimates of projected costs for each state, each one based on 2009-10, 2010-11 and 2011-12 respectively, which are then

*Cost estimates
are generated
by DES under
CS*

averaged. In this exercise, the construction of input price index is most critical. This is based on input prices data for the latest years, and projected for 2014-15.

- 4.4 The Commission takes into account latest input price data for various inputs from different sources, viz., Labour Bureau, Shimla, replies from State governments, Office of the Economic Adviser (OEA), Ministry of Commerce and Industry, Fertilizers Association of India (FAI), National Seeds Corporation (NSC) etc. The all India paid out cost including family labour (A2+FL) per quintal and overall C2 cost per quintal are arrived at by taking weighted average of respective state specific estimated costs, weights being shares of production of each state in absolute quantity in total production.
- 4.5 Despite best methodology and assumptions, projections could turn out to be different from the reality, which will be known only when actual costs are available usually after three years. Therefore, Commission also incorporates a 'correction factor' (CF) based on the difference between actual and projected costs for latest three years data in a rolling fashion in its projections to arrive at more accurate projections. These projected cost estimates are then presented for various states.

Actual estimates of cost of production generated under CS are available for the year 2011-12

Costs and profitability of Sugarcane during 2009-10 to 2011-12

- 4.6 It is pertinent to point that the gross value of output in the methodology of cost calculation is estimated at the prevailing market prices during harvest season in the village/cluster of villages where crops are grown and harvested. With this stipulation, an analysis of the profitability and the rate of return over costs A2+FL and C2 has been done for cane during 2009-10 to 2011-12, the latest years for which actual cost data is available (Table 4.1).

Table 4.1: All India Gross and Net Returns over actual cost of cultivation of Sugarcane (Average from 2009-10 to 2011-12)

State	Cost A2+FL (Rs/ha.)	Cost C2 (Rs/ha.)	GVO (Rs/ha.)	Gross Returns over A2+FL (Rs/ha)	Rate of Gross Returns over A2+FL (%)	Net Returns over C2 (Rs/ha)	Net Rate of Returns over C2 (%)
Andhra Pradesh	72139	118322	151576	79436	110	33254	28
Haryana	44838	95294	157789	112951	252	62495	66
Karnataka	52379	91014	177170	124790	238	86156	95
Maharashtra	87875	134343	202761	114885	131	68418	51
Tamil Nadu	89028	114745	188562	99533	112	73817	64
Uttar Pradesh	36618	67211	124210	87592	239	56999	85
Uttarakhand	39492	74735	137626	98134	248	62891	84
ALL-INDIA Wt. Avg.	55270	90899	153285	98015	177	62386	69

Source: Comprehensive Scheme (CS) for studying the Cost of Cultivation of principal Crops, DES

Notes: A2+FL cost includes all expenses in cash and kind on account of hired human labour, bullock labour, machine labour, seed, insecticides & pesticides, manure, fertilizers, irrigation charges and miscellaneous expenses including family labour.

C2 cost includes A2+FL cost, imputed rental value of owned land, imputed interest on fixed capital etc.

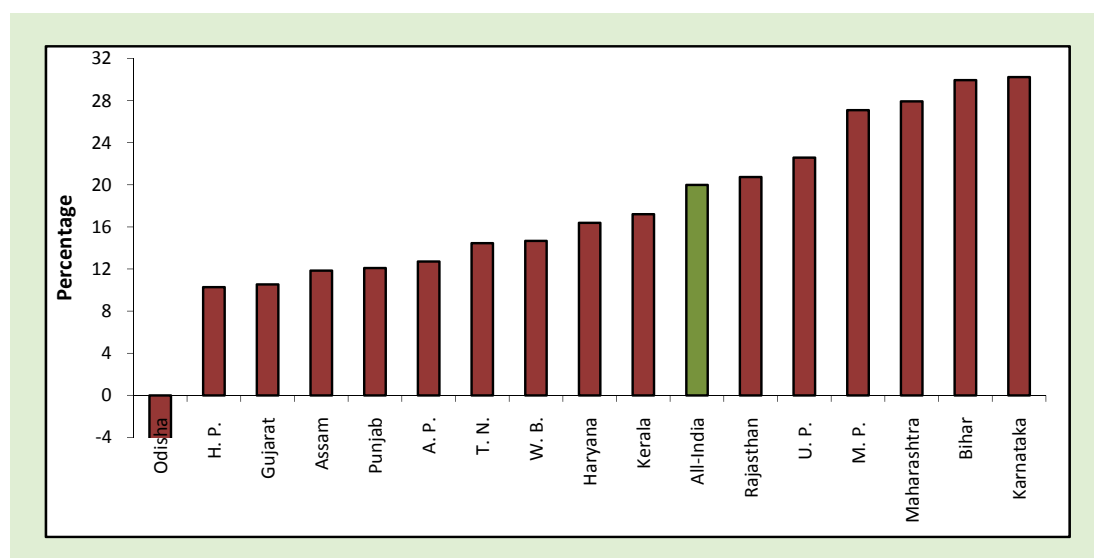
Two major sugar growing states of UP and Maharashtra show a sharp difference in profitability

4.7 During the period 2009-10 to 2011-12 at all-India level, gross returns over A2+FL cost is Rs. 98015/ha, the highest level is for Karnataka at Rs. 124790/ha and lowest for Andhra Pradesh at Rs. 79436/ha. The rate of return over C2 cost during this period stands at 69 percent at all India level, and ranges from 28 percent in Andhra Pradesh to 95 percent in Karnataka. Two major sugar growing states of Uttar Pradesh and Maharashtra (with 41 percent and 25 percent share respectively in all India production) show a sharp difference in profitability, with Uttar Pradesh showing profitability at 85 per cent and Maharashtra at 51 percent over C2. The sharp difference in profitability in these two states is attributed to proportionately higher cost of cultivation (C2) for Maharashtra relative to that of Uttar Pradesh, despite its yield level higher than that of Uttar Pradesh.

Labour and Input Price Movement

4.8 The Commission has made an assessment of average daily wage rates for agriculture labour, based on the data furnished by the Labour Bureau, Shimla for which the latest data available is up to May, 2013. Compared to the corresponding month of previous year, the wage rate has increased by 20 percent at all India level, with highest for Karnataka by 30.2 per cent followed by Bihar, Maharashtra, Madhya Pradesh, Uttar Pradesh and Rajasthan all greater than 20 percent (All India level of percent hike in wage rate) and lowest for Odisha by (-) 4.5 percent. In absolute terms, Kerala has the highest wage rate at Rs. 489.16 per day, followed by Punjab at Rs. 272.78 per day and lowest for Gujarat at Rs. 130.93 per day during the month of May, 2013 (latest month wage rate reported by Labour Bureau). Chart 4.1 represents the increase in wage rate at All India level and by states in May, 2013 over May, 2012.

Chart 4.1: State-wise and All India Rise in Agriculture Labour Wage Rate (Rs/day) (In May, 2013 over May, 2012)



Source: Labour Bureau, Shimla

- 4.9 The Commission observes the price trends of farm inputs to assess how they impinge on cost of production. Wholesale price index (with base year 2004-05=100) for major farm inputs during the period May, 2012 to May, 2013 has shown an upward trend, except light diesel oil (LDO) (with decrease of 9.7 per cent). As per the above index, fertilizer prices have escalated by 7.1 percent, electricity for irrigation by 36.2 percent; pesticides by 3.0 percent; tractors, by 3.9 percent; lubricants, by 7.1 percent; high speed diesel oil (HSDO) by 21.2 percent; fodder by 18.5 percent; cattle feed by 19.3 per cent.

Cost Projections of Sugarcane for 2014-15 Sugar Season

- 4.10 Following the methodology of cost projection as detailed earlier, the projections of sugarcane for seven major states are made on the basis of the latest base level data for the year 2011-12 and that for the preceding years of 2010-11 and 2009-10 of actual estimates of cost of cultivation/production made available to the Commission under the CS by DES. The details of actual cost estimates for 2011-12 compared to those of the previous years are available on the website of the Commission (www.cacp.dacnet.in).

- 4.11 The projected cost varies widely across states due to huge variations in their yields and costs of cultivation. These costs by states are averaged to arrive at all India weighted cost of production with weights being relative shares of the states in the total production (which is the average of latest three years production data available on rolling basis). The C2 cost of production of sugarcane (unadjusted for recovery) at all India level for the year 2014-15 is projected to be Rs 202/qtl. This is a weighted average of state level costs, with Andhra Pradesh at Rs 245/qtl, Haryana at Rs 237/qtl, Uttarakhand at Rs 223/qtl, Uttar Pradesh at Rs 215/qtl, Maharashtra at Rs 200/qtl, Karnataka at Rs 176/qtl and Tamil Nadu at Rs 163/qtl. The A2+FL Cost, unadjusted for recovery, at all India level is projected at Rs 129/qtl.

All India projected C2 cost for 2014-15 sugar season, adjusted at 9.5 per cent recovery, comes to Rs 193.13/qtl and A2+FL cost comes to Rs 122.88/qtl

- 4.12 All the state level projected costs for the year 2014-15 have been adjusted at uniform recovery rate of 9.5 per cent. The all India projected C2 cost, adjusted at 9.5 per cent recovery, comes to Rs 193.13/qtl and A2+FL cost comes to Rs 122.88/qtl. However, if transportation cost of Rs.16.38/qtl and insurance premium of Rs. 3.13/qtl are included then the all India weighted average cost C2 comes out to be Rs. 212.64/qtl. The coefficient of variation, showing the spread of costs across states around the average cost at all India level, comes to 19 per cent in case of cost C2, and 15 percent in case of cost A2+FL. Table 4.2 gives the projected cost (A2+FL & C2) adjusted for recovery rate of 9.5 per cent of sugarcane for 2014-15 sugar season by states and at all India level.

Table 4.2: State-wise and All India Projected Costs of Production for Sugarcane for 2014-15 Sugar Season (Adjusted for Recovery)

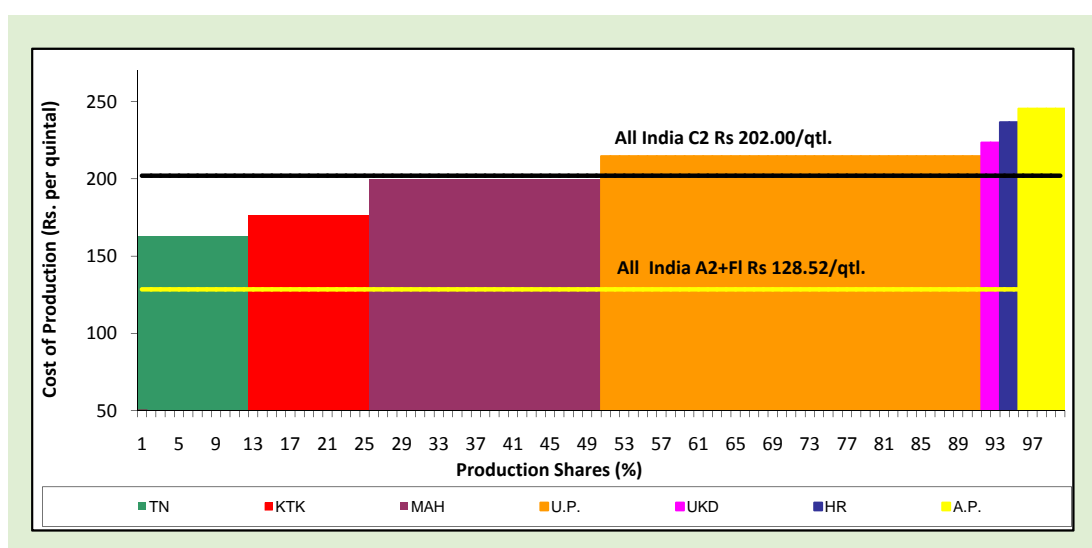
(Rs/qrtl)

State/All India	Projected Cost at 9.5% recovery	
	A2+FL	C2
Andhra Pradesh	143.89	234.51
Haryana	121.83	239.08
Karnataka	96.12	161.15
Maharashtra	106.03	165.22
Tamil Nadu	137.82	168.61
Uttar Pradesh	134.44	222.78
Uttarakhand	139.53	233.24
All-India	122.88	193.13
Coefficient of Variation (%)	14.94	18.86

Source: Computed by the Commission

4.13 Chart 4.2 represents the overall cost of production (C2) without adjustment for recovery by states as well as at all India level in increasing order of cost with their corresponding relative shares in total all India production for sugarcane. This chart illustrates the percentage of cost of major sugar growing states that is covered by all India weighted cost of production in terms of relative share of production of those states. As is apparent from chart 4.2, all India cost of production (C2) for sugarcane is Rs 202 per quintal (unadjusted for recovery). If adjusted for 9.5% recovery, it is Rs 193.13 per quintal which is covering cost of about 50 percent of production of major producer states.

Chart 4.2: Projected Cost and Supply of Sugarcane by states (in Ascending Order of cost C2) for 2014-15 Sugar Season



Inter-crop price parity

4.14 Table 4.3 gives a picture of comparative returns on crops competing with sugarcane. It appears that sugarcane is the most profitable crop vis-à-vis its competing crops like wheat, paddy and cotton. Net rate of return (over C2) turns out to be 69 per cent in sugarcane during 2009-10 to 2011-12 at all India level, compared with paddy (15 percent), cotton (36 percent) and wheat (36 percent). However, sugarcane is basically an irrigated crop, and it needs to be compared only with fully irrigated paddy or wheat or cotton. Also, it needs to be kept in mind that sugarcane cultivation is about 13 months crop duration in Maharashtra/Karnataka (southern belt) and about 10 months in the northern one. So it bears a longer risk cycle compared to wheat or rice which are typically four month crops. Since sugarcane crop cycle on an average is about three times that of wheat and paddy, the returns over A2+FL and C2 have been normalized for time duration, i.e. returns per month have been derived for these competing crops. Sugarcane being fully irrigated, it is compared to paddy and wheat grown in fully irrigated tracks of Punjab and Haryana. As can be seen from table 4.3, per hectare returns over C2 for sugarcane at all-India level stands at Rs 5199 per month as against Rs 4871 and Rs 5181 for paddy grown in Punjab and Haryana respectively and Rs 5072 for wheat grown in Haryana. Even after taking into account these things, the inter-crop parity of sugarcane will be very near to irrigated wheat and paddy.

The inter-crop parity of sugarcane is very near to irrigated wheat and paddy

Table 4.3: Inter-Crop Price Parity in Returns

Crop	Cost A2+FL (Rs/ha)	Cost C2 (Rs/ha)	GVO (Rs/ha)	Profits (Gross Returns on A2+FL basis) (Rs/ha)	Profitability (Gross Returns as % of A2+FL)	Profits (Net Returns on C2 basis) (Rs/ha)	Profitability (Net Returns as % of C2)	Per Month Returns over A2+FL (Rs/ha)	Per Month Returns over C2 (Rs/ha)
SUGARCANE* (Average between 2009-10 to 2011-12)									
All-India	55270	90899	153285	98015	177	62386	69	8168	5199
Uttar Pradesh	36618	67211	124210	87592	239	56999	85	7299	4750
Karnataka	52379	91014	177170	124790	238	86156	95	10399	7180
Maharashtra	87875	134343	202761	114885	131	68418	51	9574	5702
PADDY ((Average between 2008-09 to 2010-11)									
All-India	22986	33697	38741	15756	69	5044	15	3939	1261
Punjab	28327	49074	68559	40233	142	19486	40	10058	4871
Haryana	26838	48070	68794	41957	156	20725	43	10489	5181
Andhra Pradesh	33287	50719	58862	25575	77	8143	16	6394	2036
Uttar Pradesh	19880	30924	37798	17918	90	6874	22	4479	1718
Karnataka	28849	41071	53492	24643	85	12422	30	6161	3105
COTTON (Average between 2008-09 to 2010-11)									
All-India	28352	42143	57455	29103	103	15311	36	7276	3828
Gujarat	31242	46031	73555	42312	135	27524	60	10578	6881
Maharashtra	29493	40507	46520	17027	58	6012	15	4257	1503
WHEAT (Average between 2009-10 to 2011-12)									
All-India	21360	35470	48094	26734	125	12624	36	6684	3156
Punjab	22999	43522	60300	37301	162	16779	39	9325	4195
Haryana	24357	45062	65349	40992	168	20287	45	10248	5072
Uttar Pradesh	23028	37314	47082	24054	104	9768	26	6013	2442
Maharashtra	26966	37447	40192	13226	49	2746	7	3307	686

*Sugarcane as a whole is about 12- month crop and paddy as well as wheat are about 4 –months crops.

4.15 The all-India weighted average cost C2, adjusted at 9.5 per cent recovery for the sugar season 2014-15 comes to Rs 193.13/qtl. This is 8 per cent higher than the previous years' projected cost of Rs 179.15/qtl. The cost of Rs 193.13/qtl (adjusted for recovery at 9.5 percent) has been derived from the unadjusted cost of Rs 202/qtl. When transportation charges and insurance premium is added, all India weighted average cost C2 comes out to be Rs 212.64/qtl.



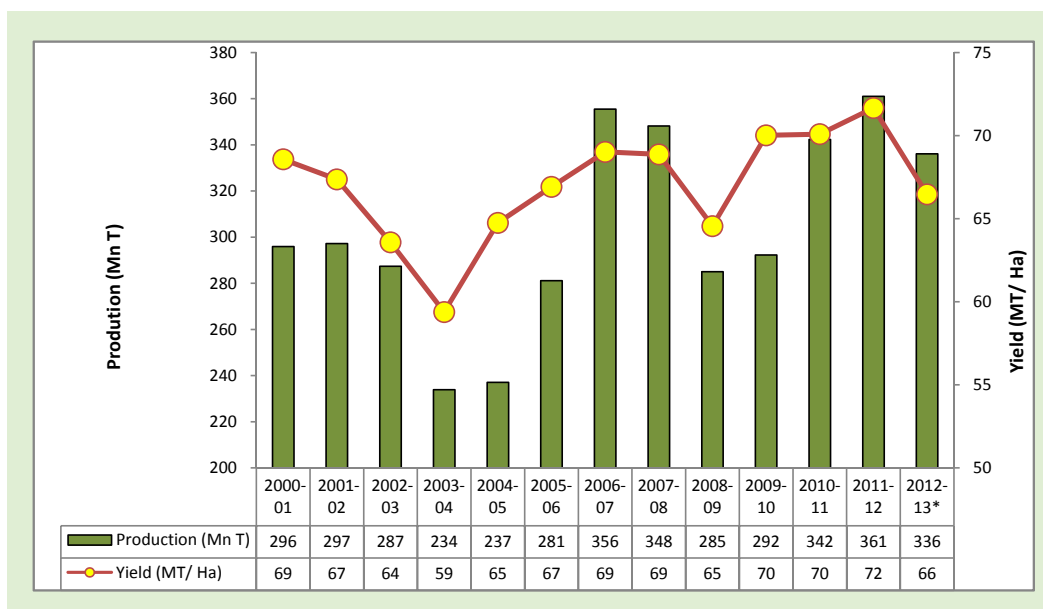
Chapter-5

Productivity and Costs

- 5.1 The long term average annual rate of growth of land productivity of sugarcane at all India level has decelerated to 0.21 percent per annum during the decade of 2000s (2000-01 to 2011-12) compared to 0.85 percent per annum during the preceding decade of 1990s (1990-91 to 1999-2000). This further dips to (-) 0.36 percent per annum if 2012-13, an abnormal year in the sense of sub-optimal performance of monsoon, is also taken into account while working out growth during the decade of 2000s. The volatility (CV) in the productivity levels marginally increased to 4.9 percent during 2000s compared to 4.7 percent and 4.1 percent during the decades of 1980s and 1990s respectively. The year-wise production and land productivity during 2000-01 to 2012-13 are depicted in chart 5.1.

Long term average annual rate of growth of land productivity of sugarcane at all India level is 0.21 percent per annum during the decade of 2000s

Chart 5.1: Production and Yield of Sugarcane in India during 2000-01 to 2012-13

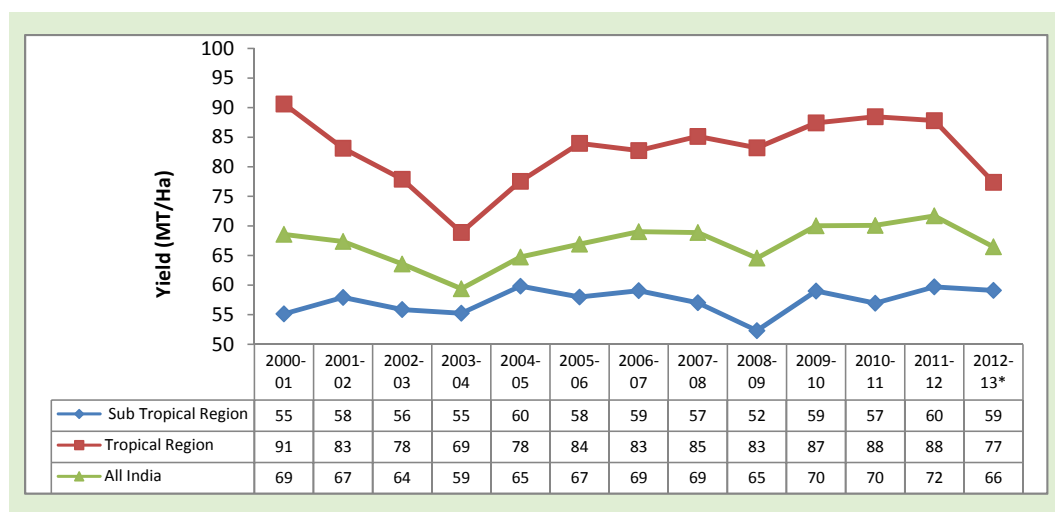


Source: DES

Note: *The figures for 2012-13 are Third Advance Estimates

5.2 Disaggregated analysis shows that productivity improvement is more pronounced in tropical region compared to sub-tropical region (chart 5.2). The Yield levels dipped significantly three times during last 13 years at an average periodicity of 4.3 years.

Chart 5.2: Yield of Sugarcane in Tropical and Sub-tropical Regions of India during 2000-01 to 2012-13



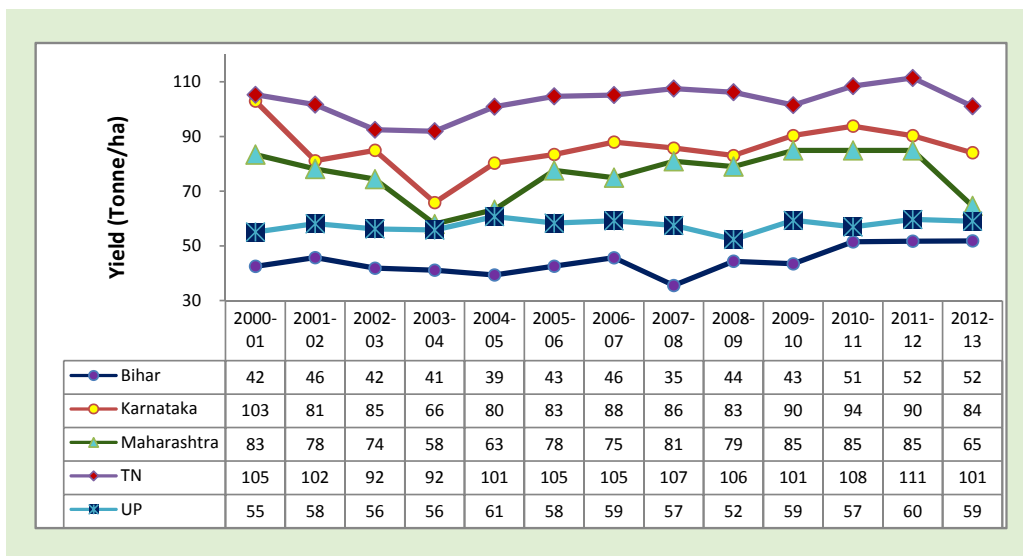
Source: DES

Note: *The figures for 2012-13 are Third Advance Estimates

5.3 The tropical region has posted higher yield levels by 44 percent, on an average, compared to those of sub-tropical region during the decade of 2000s. Based

on state-wise analysis, it emerges that Tamil Nadu outstrips other major cane producing states on land productivity score (chart 5.3).

Chart 5.3: Land productivity of Sugarcane in Major Cane Producing States during 2000-01 to 2012-13



Source: DES

Note: The figures for 2012-13 are Third Advance Estimates

5.4 However, these land productivities are not directly comparable as crop durations vary a great deal from state to state. This needs to be appreciated, given that land use has an opportunity cost. In any case, it is a matter of further investigation to explore whether this magnitude of yield differentials can be attributed to climatic and soil conditions alone or there are some other factors that would explain this.

Relationship between Cost of Production and Yield Rates

5.5 The cost of production (CoP) is one of the factors, though not the sole factor that determines FRP of sugarcane. Given the fact that CoP has been monotonously increasing over the years, demand from cane cultivators for higher FRP has been intensifying. A prudent response to tackle increasing CoP is to enhance yield levels as, on a priori basis, one would expect an inverse relationship between real cost of production and yield levels.

5.6 To test the hypothesis of existence of inverse relationship between real CoP and yield levels, regression analysis on panel data (for 2000-01 to 2010-11 across all major cane producing states) has been undertaken by fitting the following regression model:

$$\text{Log CoP} = a + e \cdot \log y$$

where CoP = real Cost of Production,
y = yield rate,
e = elasticity; and
a = constant

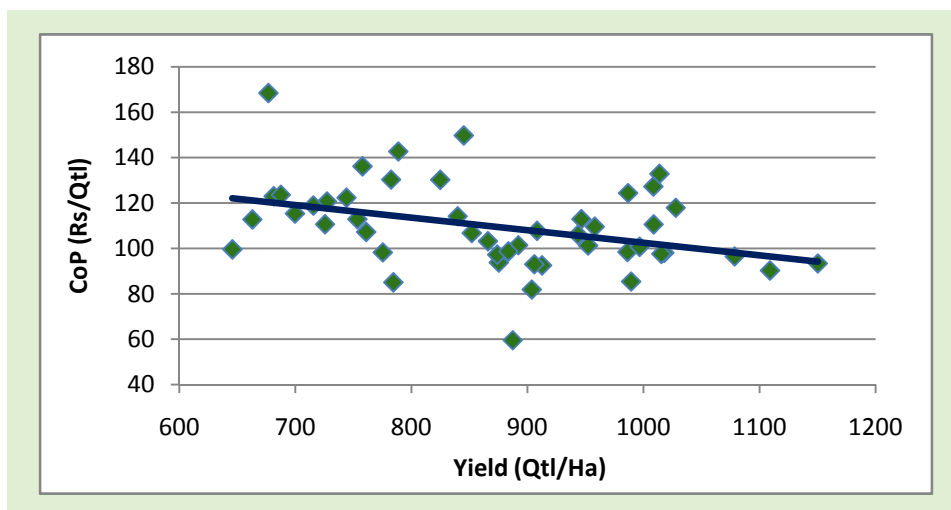
An inverse relationship between real cost of production and yield levels exists

5.7 The above regression model was tested on entire panel data and also separately on its two sub-sets viz. tropical region and sub-tropical region. Of these three regressions, only the regression analysis for tropical region⁶ gave the statistically significant (with 95% level of confidence) result which is presented hereunder:

$$\text{Log CoP} = 7.573331 - 0.42776 * \log y$$

5.8 This regression equation implies that real cost (CoP) can be decreased by 4.3 percent if yield level in tropical region increases by 10 percent. The behaviour of CoP in real terms (constant prices 2010-11 =100) with respect to yield level of cane is depicted in scatter diagram (chart 5.4). A study to deepen the understanding of dynamics between yield levels and costs needs to be undertaken.

Chart 5.4: Relationship between Cost of Production and Yield Rates for Tropical Region (Constant Prices 2010-11 =100)



Source: DES

Land productivity is normalized for the time duration of the crop, its water intake, and its recovery rate

Land Productivity: Adjusting for Time, Water Intake and Recovery Ratio

5.9 Land productivity is uni-dimensional parameter. As the duration of cane in the field varies across states, and since it requires very different quantities of water for irrigation leading to different recovery rates, need is felt to analyze other dimensions of land productivity after adjusting for the duration of the crop, its water intake, and its recovery rates. As land and water are increasingly becoming scarce in India with high opportunity costs, it is imperative that land productivity is normalized for the time duration of the crop, its water intake,

⁶ As results of entire panel data and also for sub-tropical region remained statistically insignificant, the relevant results are not reported here.

and its recovery rate. With this in view, 'adjusted yields' of sugarcane in five major cane producing states of Bihar, Karnataka, Maharashtra, Tamil Nadu and Uttar Pradesh have been worked out (Annexure). The summary of the results is presented in table 5.1.

Table 5.1: Land & Water Productivity, and Efficiency Gaps in Cane & Sugar Production, 2012-13

State	Land & Water Productivity					Efficiency Gaps (%) in				
	Land Productivity (Q/Ha)	Normalising land productivity for crop duration {Q/ (Ha* month)}	Normalising land productivity for crop duration & water {Q/(Ha* month *lakh litres)}	Production of sugar (q/ha)	Water requirement (litres) of cane for production of one kg of sugar	Land Productivity	Normalising land productivity for crop duration	Normalising land productivity for crop duration & water	Production of sugar	Water requirement of cane for production of one kg of sugar
1	2	3	4	5	6	7	8	9	10	11
Bihar	518	43	1.2	46	812	49	53	0	52	0
Karnataka	841	71	0.3	87	2940	17	23	76	10	262
Maharashtra	646	51	0.3	73	2515	36	44	76	24	209
Tamil Nadu	1010	93	0.3	97	3066	0	0	73	0	277
UP	590	62	1.1	53	1049	42	33	4	45	29

Notes: 1. Notes: 1 Efficiency gap = $(1-e)*100$ if $e < 1$, else $(e-1)*100$, where e = performance of a state being compared / performance of 'Benchmark' state.

2. States/figures in bold symbolize 'benchmark' on the corresponding parameter.

5.10 On careful perusal of table 5.1, it is noted that Bihar is less efficient to the tune of 49 percent compared to Tamil Nadu when land productivity is worked out without any reference to crop duration, recovery rate of cane and water consumed in cultivation of the crop. However, when land productivity is normalized for both crop duration, and water consumption, Tamil Nadu turns out to be less efficient compared to Bihar by 73 percent when land productivity is measured on the basis of per lakh litre of water consumed, after duly adjusting for crop duration.

5.11 On working out water requirement of cane for production of sugar, it is found that it takes 812 liters of water in Bihar and 1049 liters in UP compared to 2940 liters in Karnataka, 2515 liters in Maharashtra and 3066 litre in Tamil Nadu for producing a kilogram of sugar which implies that Bihar is more efficient by 277 percent compared to Tamil Nadu. It is pertinent to add here that sugar produced in Maharashtra comes from 12.5 months' cultivation of cane as compared to 9.5 months' in UP (crop duration in case of other 3 states lie in this range, details may be seen in Annex table 5.1) which is not adjusted for sugar production at factory level, though crop duration has been adjusted for cane cultivation at farm

Bihar & UP are more efficient producers of sugarcane if we account for the cost of water

level. In any case, this analysis has high relevance for India, as sugarcane is a very water intensive crop, its long term development must ensure that it is in line with availability of sufficient water. Given real cost of water in western/southern states is at least 2 to 3 times higher than those in Bihar/UP, it raises an issue of comparative advantage. But western India, especially Maharashtra is not blessed with natural endowment of water, as eastern UP or Bihar. Therefore, our futuristic policy needs to be aligned with natural endowment of resources.

Benchmarking Productivity: India vis-à-vis other Leading Cane Producing Countries

5.12 In a globalised scenario, relative performance in yield improvement is as critical as temporal improvement in productivity levels. The role of productivity in enhancing competitiveness is critical as it can reduce cost and thus prices. Therefore, it would be interesting to envision India's standing vis-à-vis other major cane producing countries on land productivity scale. This would help in benchmarking productivity standards, and set our targets accordingly with a view to gain greater competitiveness in production of sugar. With this end in view, India's position vis-à-vis other leading countries producing this crop is tracked and is presented in table 5.2.

Table 5.2: Gap in Yield Level of Sugarcane in India vis-a-vis Benchmark Country, TE 2011

India's Rank in Sugarcane Production in the world in terms of		Other leading Countries (Yield, share in world production)
Production	Yield	
1	2	3
2 nd	11 th	Colombia (113 T/Ha, 2%), Guatemala (90 T/Ha, 1%), Philippines (85 T/Ha, 2%), Australia (79 T/Ha, 2%), Brazil (79 T/Ha, 41%), USA (74 T/Ha, 2%), India (68 T/Ha, 18%)

Source: Collated from FAO

1. Above figures are based on TE2011
2. Paired figures in parentheses in col (3) indicate yield and share of production respectively in the total world production.
3. Countries with less than 1% share in total world production have not been considered.
4. Yield level for India, as given in col(3) marginally varies from what is reported in charts 5.1 and 5.1 due to difference in reference period.

5.13 It may be seen from table 5.2 that India is positioned second after Brazil in terms of its share in the total world production of sugarcane but stands way behind in respect of land productivity compared to that of benchmark country (Colombia). The efficiency gap of 40 percent exists in India's land productivity. In order to enhance the domestic productivity level, the pattern of agricultural practices of benchmark countries needs to be followed keeping in view their suitability to our country.

Efficiency gap of 40 percent exists in India's land productivity if we compare it with the international benchmark

5.14 To sum up, it emerges that Bihar/UP, major cane producing states in sub-tropical region, are far more efficient compared to Karnataka, Maharashtra and Tamil Nadu in tropical region, when land productivity is normalized for the time duration of the crop, its water intake, and its recovery rate, especially from the point of view of water required per unit of sugar produced. In view of projection made by the International Water Resources Group (IWRG) that India will be 50 percent short of water by 2030 coupled with the fact that sugarcane is a water guzzling crop, its long term development must ensure that it is in line with availability of sufficient water and its cost. It is, therefore, recommended that in states like Karnataka, Maharashtra and Tamil Nadu, sugarcane productivity needs to be maximized per unit of water and its cost. From that perspective, drip irrigation needs to be promoted which can save almost 40 to 50 percent water. Water thus saved, like any other resource, can be used for other competing crops. Also, there is need to give high priority in evolving such varieties which use less water, and get our water pricing policies right so that sugarcane crop follows a sustainable trajectory of growth with cost effectiveness.

Drip irrigation with fertigation needs to be promoted which can save almost 40 to 50 percent water and also increase productivity



Chapter-6

Recommendations for Price Policy

- 6.1 The Commission formulates its price policy for sugarcane within the scope of its mandate and the terms of reference given to it under the Sugarcane (Control) Order, 1966 issued under the EC Act, 1955. Prior to 2009-10 sugar season, the Central Government was fixing the Statutory Minimum Price (SMP) of sugarcane and farmers were also entitled to share profits of a sugar mill on 50:50 basis. The sharing provision was introduced in the Control Order as Clause 5A in September, 1974 with a well intended purport to empower farmers to equally share the dividends of the mills. However, it remained virtually unimplemented mainly on account of delays in the announcement of profits by the mills. The Sugarcane (Control) Order, 1966 was amended vide notification 22.10.2009 and the concept of SMP was replaced by the Fair and Remunerative Price (FRP) of sugarcane. For this purpose of working out FRP, a new item 'reasonable margins for growers of sugarcane on account of risk and profits' was inserted in Clause 3(1) vide notification dated 22.10.2009 and made effective from 2009-10 season. Clause 5A relating to sharing of profits between sugar factories and farmers was thus deleted.
- 6.2 As per the amended provisions of Clause 3(1) of the Sugarcane (Control) Order, 1966, *"The Central Government may, after consultation with the*

*authorities, bodies or associations as it may deem fit, by notification in the official Gazette, from time to time, fix the **Fair and Remunerative Price** of sugarcane to be paid by producers of sugar or their agents for the sugarcane purchased by them, having regard to -*

- (a) the cost of production of sugarcane;*
- (b) the return to the grower from alternative crops and the general trend of prices of agricultural commodities;*
- (c) the availability of sugar to the consumers at a fair price;*
- (d) the price at which sugar produced from sugarcane is sold by producers of sugar;*
- (e) the recovery of sugar from sugarcane;*
- (f) the realization made from sale of by-products viz. molasses, bagasse and press mud or their imputed value (inserted on 29.12.2008)*
- (g) reasonable margins for growers of sugarcane on account of risk and profits (inserted on 22.10.2009)*

6.3 Accordingly, the Commission is required to pay due regard to the statutory factors listed in the Control Order. It may be worth emphasizing that this includes taking into account not only the recovery and pricing of sugar, but also its by-products namely molasses, bagasse and press mud. Thus, revenue sharing of sugar factories is expected to be reflected in sugarcane pricing. As detailed in the Commission's earlier report for the marketing season 2013-14 and also chapter 2 of this Report, the current system of FRP has not proved to be very effective. The share of FRP in the value of sugar for the sugar season 2012-13 comes out to be only 56.0 percent for UP and 58.3 percent for Maharashtra. This is at least 20 percentage points less than the 75 percent share of cane price in sugar value realized devised by the Rangarajan Committee. On the other extreme, in UP, in 2012-13, the SAP has led to a 92.3 percent share of farmers in the value of sugar. No wonder, it has led to mounting cane arrears in UP, and brought the sugar mills on the brink of a financial crisis. One or two such years in a row can start a downward spiral of shutting down of sugar mills, a beginning of the downfall of sugar sector in UP. In Maharashtra, the cane price paid has a share of 79.5 percent which is relatively closer to the Rangarajan Committee estimate. But the problem with these SAPs is that they are not based on any transparent or scientific basis and lead to wide fluctuations in returns to farmers and miller alike as elucidated in chapter 2. The solution to this lies in evolving a hybrid approach dovetailing FRP with revenue sharing as recommended by the Rangarajan Committee, and phasing out SAP.

SAPs are not based on any transparent or scientific basis and lead to wide fluctuations in returns to farmers and miller alike

Table 6.1: Efficacy of the Current Cane Pricing Policy, 2012-13

(Rs/Qtl)

State	Recovery Rate (%)	Effective FRP	State Cane Price	Ex-mill Sugar Price	Value of Sugar from 1qtl of cane	Share of FRP in Value of Sugar (%)	Share of actual Cane Price in Value of Sugar (%)
(1)	(2)	(3)	(4)	(5)	(6)=(5)*(2)	(7)=(3)*100/(6)	(8)=(4)*100/(6)
UP	9.1	170	280	3336	304	56.0	92.3
Maharashtra	11.4	204	278	3069	350	58.3	79.5

Note: 1. The FRP has been adjusted for Maharashtra as it has a higher recovery rate than the basic recovery rate of 9.5%

2. The state cane price for Maharashtra pertains to only cooperative sugar mills

Source: Computed by the Commission based on data from Directorate of Sugar and Cane Commissioner, Maharashtra

6.4 For the sugar year 2013-14, already FRP of sugarcane is announced at Rs 210 per quintal at minimum 9.5 percent recovery level. Indications on sugar prices are that they are not likely to improve compared to what prevailed in 2012-13. They could even go down, given the surplus sugar at home and globally in 2013-14. For Maharashtra, this FRP of Rs 210 per quintal would turn out to be Rs 254 per quintal $(= (210/9.5) \times 11.5)$, assuming a recovery ratio of 11.5 percent. At a sugar price of Rs 30/kg, this would amount to roughly 74 percent of the value of sugar produced from a quintal of cane, very close to what would work out under revenue sharing formula (75 percent). But the SAP of cane in UP, if increased further from the existing Rs 280/qtl in 2012-13 to a higher level in 2013-14, and if sugar prices remain where they are, this can spell disaster in the sugar sector, and needs to be avoided in the long term interest of the sugar sector. Even the existing SAP is unsustainable in the face of current sugar prices, and rising cane arrears is a signal that trouble is brewing up in the sugar sector.

Existing SAP in UP is unsustainable in the face of current sugar prices

6.5 The stock-to-use ratio at about 37 percent at the end of 2012-13 sugar season indicates a very comfortable position (excess supply) of sugar availability in the country. With about 9 million tonnes of estimated closing stock in 2012-13 and likely surplus production during 2013-14, there is going to be excess supply, putting downward pressures on sugar prices unless rupee depreciates further or international market improves.

The closing stock of 9 million tonnes in 2012-13 and likely surplus production during 2013-14 points to excess supply

6.6 The Commission has carefully examined the projections of domestic and international agencies for sugar prices in 2014-15, and believes that the prices of sugar may be within a broad range of Rs 30 to Rs 34 per kg in the domestic market. NCDEX futures show that domestic prices of sugar (Grade M crystal sugar) would remain stable in the range of Rs 3050-3070 by the beginning of sugar season 2014-15. On the international price front, markets are adjusting to a third consecutive year of a global sugar surplus. The international price of refined sugar as given in OECD-FAO Agricultural Outlook for 2013-2022, in

equivalent rupee terms (with exchange rate assumed at 1US\$=Rs 60) is forecast at Rs 30 per kg for 2014-15 season.

- 6.7 The projected cost of production (C2) of sugarcane at all India level (weighted average), adjusted at 9.5 per cent recovery is Rs 193.13 per quintal. As regards inter crop price parity it is evident that at all-India level net return as percentage of C2 during the period 2009-10 to 2011-12 comes to 69 percent and net returns in absolute terms, Rs 62386 per hectare. It is clear that sugarcane is the most profitable crop vis-à-vis its competing crops like wheat, paddy and cotton. Even when it is compared to the fully irrigated tracts of Punjab and Haryana, it is still found that returns on sugarcane are higher than paddy and wheat.
- 6.8 After having analyzed the factors in all their aspects, the Commission recommends that FRP of sugarcane for the year 2014-15 be fixed at Rs 220 per quintal linked to basic recovery of 9.5 per cent (an increase of 4.8 percent). It may be noted that the FRP during the last two sugarcane seasons has already been increased by 44.8 percent. For each 0.1 per cent increase in recovery over and above 9.5 per cent, the FRP would be increased by Rs 2.32 per quintal. All India average recovery rate being 10.27 per cent achieved in 2011-12, the FRP recommended would come to Rs 237.83. .

(Ashok Gulati)
CHAIRMAN

(Ashok Vishandass)
MEMBER

(D.S. Raghu)
MEMBER

(Kaibalya Pradhan)
MEMBER

(Anandi Subramanian)
MEMBER SECRETARY

14th August, 2013

Table 1.1
Usage of Total Irrigation Water by Sugarcane in Maharashtra

Major Crops	Area under the Crop (Lakh ha)	Share in GCA (%)	Irrigated Area Under The Crop (Lakh ha)	% Area Irrigated Under The Crop	Number of Irrigations (of 7.5 cm each)	Total water Requirement per ha* (Lakh Litres)	Total Water Usage (Lakh Litre-ha)	Share of the Crop in Total Water Usage (%)
(1)	(2)	(3)=(2)*100/ Total GCA	(4)	(5)=(4)*100/(2)	(6)	(7)=(6)*7.5	(8)=(7)*(4)	(9)=(8)*100/ Total Water Usage
Rice	15.2	6.3	4.0	26.1	5	37.5	148.5	5.9
Jowar	40.6	16.9	3.9	9.5	3	22.5	87.1	3.4
Wheat	13.1	5.4	9.7	73.9	4	30.0	289.8	11.5
Other cereals	21.1	8.7	1.7	7.8	3	22.5	37.1	1.5
Sugarcane	9.7	4.0	9.7	100.0	25	187.5	1809.4	71.5
Cotton	39.4	16.4	1.1	2.7	6	45.0	48.2	1.9
Pulses	40.4	16.8	3.8	9.4	3	22.5	85.7	3.4
Oilseeds	36.5	15.2	1.5	4.0	3	22.5	33.1	1.3

Source: Land Use Statistics, DES

Note: 1. The Figures are for the year 2010-11 which is the latest available

Note:2.1 ha=100,00 square metre. For 1 cm (0.01m) height, the volume of water required for 1 ha would be 100 cubic metre. As 1 cubic metre of water = 1000 litres, 1 ha would require 1 lakh litres of water for 1 cm height.

3.The number of irrigations per crop is assumed as an average indicative figure.

4. The Gross Cropped area in 2010-11 in Maharashtra was 240.69 lakh ha

5. Area under Fruits & Vegetables has not been accounted for, but since quite a bit of area under fruits (especially banana is under drip irrigation, results may not change much. The share of sugarcane may come down to roughly 66% (two-thirds)

Table 2.1
Sugarcane : Area, Production and Yield

Area: '000 hectares
Production : '000 tonnes
Yield : Kg. per hectare

State	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13*
1	2	3	4	5	6	7	8	9	10	11	12	13
SUB-TROPICAL REGION												
Area	2577	2734	2545	2382	2569	2736	2662	2474	2323	2635	2663	2769
Production	149268	152740	140591	142498	148982	161605	151756	129398	137050	150018	159031	168634
Yield	57917	55873	55249	59825	57990	59064	57017	52305	58999	56959	59712	60905
UTTAR PD.												
Area	2035	2149	2030	1955	2156	2247	2179	2084	1977	2125	2162	2212
Production	117982	120948	112754	118716	125470	133949	124665	109048	117140	120545	128819	134851
Yield	57976	56281	55541	60733	58201	59626	57212	52326	59251	56727	59583	60964
UTTARAKHAND												
Area	126	134	128	107	101	121	124	107	96	107	108	110
Production	7555	7332	7651	6441	6134	6100	7686	5590	5842	6498	6311	6718
Yield	60010	54551	59773	60196	60733	50413	61984	52243	60854	60896	58435	61073
BIHAR												
Area	113	107	104	104	101	130	109	112	116	248	218	263
Production	5211	4521	4286	4112	4338	5956	3855	4960	5033	12764	11289	14738
Yield	45953	42130	41370	39460	42822	45953	35496	44324	43422	51466	51711	56080
PUNJAB												
Area	142	154	123	86	84	99	110	81	60	70	80	83
Production	9250	9290	6620	5170	4860	6020	6690	4670	3700	4170	5653	4890
Yield	65141	60325	53821	60116	57857	60808	60818	57654	61667	59571	70663	58916
HARYANA												
Area	161	189	160	130	127	140	140	90	74	85	95	101
Production	9270	10650	9280	8060	8180	9580	8860	5130	5335	6042	6959	7437
Yield	57578	56349	58000	62000	64409	68429	63286	57000	72095	71082	73253	73634

State	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13*
1	2	3	4	5	6	7	8	9	10	11	12	13
TROPICAL REGION												
Area	1700	1653	1264	1141	1482	2244	2211	1775	1698	2086	2204	2126
Production	141323	128726	87079	88456	124463	185684	188234	147670	148456	184529	193553	162124
Yield	83141	77898	68902	77545	83960	82739	85128	83199	87419	88460	87803	76276
MAHARASHTRA												
Area	578	573	443	324	501	1049	1093	768	756	965	1022	937
Production	45140	42617	25668	20475	38853	78568	88437	60648	64159	81896	86733	62175
Yield	78097	74375	57941	63194	77551	74898	80912	78969	84866	84866	84866	66355
GUJARAT												
Area	176	203	176	197	197	214	211	221	154	190	202	185
Production	12465	14071	12669	14570	14580	15630	15190	15510	12400	13760	12750	13350
Yield	70902	69351	71820	74072	74010	73037	71991	70181	80519	72421	63119	72162
ANDHRA PD.												
Area	218	233	209	210	230	264	247	196	158	192	204	196
Production	18082	15387	15070	15739	17656	21692	20296	15380	11708	14964	16686	15680
Yield	82945	66182	72105	74948	76765	82167	82170	78469	74101	77938	81794	80000
KARNATAKA												
Area	407	383	243	178	219	326	306	281	337	423	430	425
Production	33017	32485	16015	14276	18267	28670	26240	23328	30443	39657	38808	35732
Yield	81122	84885	65826	80202	83411	87944	85752	83018	90335	93752	90251	84075
TAMIL NADU												
Area	321	261	192	232	335	391	354	309	293	316	346	383
Production	32620	24165	17656	23396	35107	41124	38071	32804	29746	34252	38576	35188
Yield	101620	92446	91910	100845	104671	105123	107484	106197	101452	108392	111362	91993
ALL INDIA												
Area	4412	4520	3938	3662	4202	5151	5055	4415	4175	4885	5038	5064
Production	297208	287383	233862	237088	281172	355520	348188	285029	292302	342382	361037	338963
Yield	67370	63576	59380	64752	66919	69022	68877	64553	70020	70091	71667	66940

* : Fourth Advance Estimates

Source : Directorate of Economics & Statistics, Ministry of Agriculture

Table 2.2
Sugarcane : All India Trends in Area, Production and Yield

Area: '000 hectares

Production : '000 tonnes

Yield : Kg. per hectare

	Area	Production	Yield
T.E.1992-93	3701	241025	65130
T.E.2002-03	4416	293516	66468
T.E.2012-13	4995	347460	69556
Compound Growth Rate			
1992-93 to 2002-03	1.78	1.99	0.20
2002-03 to 2012-13	1.24	1.70	0.46
1992-93 to 2012-13	1.51	1.85	0.33
Fitted Growth Rate			
1992-93 to 2002-03	2.33	2.43	0.04
2002-03 to 2012-13	2.07	3.25	1.16
1992-93 to 2012-13	1.44	1.44	0.04
Coefficient of Variation			
1992-93 to 2002-03	8.34	9.59	4.15
2002-03 to 2012-13	11.35	15.07	5.36
1992-93 to 2012-13	11.79	13.78	4.68

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.3
State-wise Production of Sugar

State	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13 (P)
1	2	3	4	5	6	7	8	9	10	11	12	13
Sub-tropical Region	72.6	78.6	62.5	61.8	70.4	105.9	91.9	50.7	61.5	71.5	85.3	92.8
Uttar Pradesh	52.6	58.7	46.1	49.0	54.6	83.5	73.2	41.5	51.7	57.6	68.8	74.8
Uttarakhand	4.4	4.6	3.9	3.2	4.1	5.3	4.0	2.2	2.9	3.1	3.3	3.4
Bihar	3.4	4.2	2.8	2.6	4.1	4.8	3.4	2.2	2.6	3.9	4.5	5.1
Punjab	5.9	5.1	3.9	3.2	3.8	5.5	5.3	2.4	1.8	3.0	3.9	4.4
Haryana	6.2	6.0	5.9	3.8	3.8	6.8	6.0	2.3	2.5	3.9	4.9	5.1
Tropical Region	110.8	120.9	75.0	66.1	117.1	172.9	167.6	94.8	125.2	168.3	175.0	149.8
Maharashtra	55.9	61.6	32.0	21.9	51.7	90.1	90.8	46.0	70.4	90.7	88.8	78.8
Gujarat	10.6	12.4	10.8	7.9	12.2	13.9	13.7	10.2	11.9	12.7	12.7	11.5
Andhra Pradesh	10.5	11.9	8.8	11.5	12.5	19.2	13.4	5.9	5.1	10.1	11.0	9.1
Karnataka	15.5	18.0	11.6	10.8	19.7	25.4	28.4	16.8	25.1	36.4	38.7	33.7
Tamil Nadu	18.4	17.0	11.9	14.0	21.0	24.2	21.4	16.0	12.7	18.4	23.8	16.6
Others	-	1.8	2.0	2.1	2.1	3.2	3.5	1.2	1.4	3.8	3.3	8.5
All India	185.0	201.3	139.6	130.0	189.6	282.0	263.0	146.8	188.0	243.5	263.6	251.0

(Lakh Tonnes)

P : Provisional (as on 05.08.2013).

Source: Directorate of Sugar, Ministry of Consumer Affairs

Table 2.4
Average Recovery of Sugar from Sugarcane (Oct.-Sept.)

State	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(P)
1	2	3	4	5	6	7	8	9	10	11	12	13
Uttar Pradesh	9.71	9.53	9.54	9.82	9.79	9.49	9.49	9.30	8.91	9.13	9.15	9.09
Uttarakhand	-	9.42	9.47	9.75	9.63	9.42	9.54	9.80	9.20	9.19	9.34	9.14
Bihar	9.11	8.82	9.05	9.33	9.58	9.48	8.67	9.20	9.30	9.49	9.30	9.28
Punjab	9.70	9.45	9.72	9.72	9.79	9.19	9.54	9.30	9.33	8.59	8.80	9.24
Haryana	9.80	9.95	10.13	10.47	10.16	9.78	9.74	9.90	9.05	9.37	9.02	9.14
Maharashtra	11.63	11.60	11.68	10.93	11.39	11.66	11.39	11.80	11.52	11.51	11.30	11.67
Gujarat	10.42	10.79	10.58	10.93	10.76	10.82	10.68	10.90	9.50	10.52	9.99	10.61
Andhra Pradesh	10.36	10.01	10.15	10.32	10.65	10.05	9.69	10.10	9.88	9.28	9.77	9.81
Karnataka	10.75	10.72	10.80	10.21	10.11	10.83	10.69	10.10	10.30	10.67	10.92	11.16
Tamil Nadu	9.64	9.61	9.87	9.92	9.64	9.24	9.31	9.30	9.56	8.94	9.10	9.34
All India	10.48	10.27	10.38	10.22	10.17	10.22	10.16	10.30	10.05	10.20	10.17	10.27

P: Provisional

Source : Directorate of Sugar, Ministry of Consumer Affairs, Food and Public Distribution.

Table 4.1

Statewise Projected Cost of Production (C2 & A2+FL) - Unadjusted for Recovery of Sugarcane for 2014-15 Sugar Season and their shares in Production in increasing order of Cost

Rs./qtl.

States	A2+FL	C2	Relative Shares in Production(%)
1	2	3	4
Tamilnadu	133.18	162.93	12.19
Karnataka	105.23	176.42	13.00
Maharashtra	128.35	200.00	24.82
Uttar Pradesh	129.48	214.57	41.15
Uttrakhand	133.65	223.42	2.15
Haryana	120.55	236.56	2.22
Andhra Pradesh	150.56	245.37	5.17
All India Wtd. Avg.	128.52	202.00	

Note:- This projected cost is exclusive of cost of marketing, transportation and crop insurance premium

Annex Table 5.1
Sugarcane Productivity Adjusted for Crop duration, Recovery Rates and Water Requirements: Cases of Bihar, Karnataka, Maharashtra, Tamil Nadu and UP, 2012-13

State / Variety of cane	Crop duration (months)	Area (Lakh ha)	Relative area (% Share)	No. of standard irrigations of 7.5 cms each) per ha.	Water Requirement (lakh liters of irrigation per ha. [7.5 times no. of standard irrigations])	Land Productivity (Q/Ha)	Production (lakh MT)	Relative prod. (% Share)	Normalising land productivity for crop duration {Q/(Ha* month)} {col.(8)/col.(3)}	Normalising land productivity for crop duration & water {Q/ (Ha* month* lakh liters)} {col.(11)/col.(7)}	Recovery Rate (%)	Production of sugar (q/ha) {col.(8)*col.(13)}/100	Water requirement of cane for production of one kg of sugar [col.(7)/col.(14)]* 100000/100]
2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bihar	12.0	2.5	100.0	5.0	37.5	518.0	130.8	100.0	43.2	1.2	8.9	46.2	812
Karnataka													
Co86032	12.0	1.8	42.4	35.0	262.5	800.0	141.6	40.4	66.7	0.3	11.0	88.0	2983
Co62175	12.0	1.0	23.3	35.0	262.5	950.0	92.2	26.3	79.2	0.3	9.0	85.5	3070
CoC671	10.0	0.5	10.8	30.0	225.0	800.0	36.0	10.3	80.0	0.4	11.5	92.0	2446
Co8011	12.0	0.3	7.2	30.0	225.0	800.0	24.0	6.8	66.7	0.3	10.5	84.0	2679
Co91010	12.0	0.2	3.6	35.0	262.5	900.0	13.5	3.9	75.0	0.3	10.5	94.5	2778
Co740	12.0	0.2	3.6	35.0	262.5	800.0	12.0	3.4	66.7	0.3	10.0	80.0	3281
others	12.0	0.4	9.1	35.0	262.5	824.7	31.3	8.9	68.7	0.3	10.0	82.5	3183
Total/ Weighted Average	11.8	4.2	100.0	34.1	255.8	840.7	350.6	100.0	71.3	0.3	10.3	87.0	2940
Maharashtra													
Adsali	17.0	0.6	6.7	32.5	243.8	965.4	60.5	10.0	56.8	0.2	12.3	118.7	2053
Pre-Seasonal	14.5	2.5	26.7	27.5	206.3	725.9	181.5	30.0	50.1	0.2	12.0	87.1	2368

State / Variety of cane	Crop duration (months)	Area (Lakh ha)	Relative area (% Share)	No. of standard irrigations of 7.5 cms each per ha.	Water Requirement (lakh liters of irrigation per ha. [7.5 times no. of standard irrigations])	Land Productivity (Q/Ha)	Production (lakh MT)	Relative prod. (% Share)	Normalising land productivity for crop duration {Q/(Ha* month)}	Normalising land productivity for crop duration & water {Q/ (Ha* month* lakh liters)} {col.(11)/col.(7)}	Recovery Rate (%)	Production of sugar (q/ha) {col.(8)*col.(13)}/100	Water requirement of cane for production of one kg of sugar [{col.(7)}/col.(14)]* 100000/100]
2	3	4	5	6	7	8	9	10	11	12	13	14	15
Suru	12.0	1.9	20.4	22.5	168.8	633.4	121.0	20.0	52.8	0.3	11.5	72.5	2327
Ratoon	11.0	4.3	46.2	22.5	168.8	558.4	241.9	40.0	50.8	0.3	10.5	58.6	2878
Total/Weighted Average	12.5	9.4	100.0	24.5	183.8	645.6	604.9	100.0	51.5	0.3	11.3	73.1	2515
Tamil Nadu													
Co 86032 (E)	11.0	3.3	85.0	40.0	300.0	972.4	324.8	81.9	88.4	0.3	9.62	93.5	3207
Co 99004 (E)	11.0	0.2	4.0	40.0	300.0	1272.3	20.0	5.0	115.7	0.4	9.32	118.6	2530
Co 99006 (ML)	11.0	0.1	2.0	40.0	300.0	1272.3	10.0	2.5	115.7	0.4	9.38	119.3	2514
CoC 24 (ML)	10.0	0.1	3.0	35.0	262.5	1017.8	12.0	3.0	101.8	0.4	9.35	95.2	2758
CoSi7 (E)	10.0	0.1	2.0	35.0	262.5	1526.7	12.0	3.0	152.7	0.6	9.56	146.0	1799
CoG 5 (E)	10.0	0.1	2.0	35.0	262.5	1145.0	9.0	2.3	114.5	0.4	9.29	106.4	2468
Co 94008 (ML)	10.0	0.1	2.0	35.0	262.5	1159.8	9.0	2.3	116.0	0.4	9.54	110.6	2372
Total/Weighted Average	10.9	3.9	100.0	39.6	296.6	1010.0	396.8	100.0	92.6	0.3	9.58	96.8	3066
UP													
Plantation	10.0	10.7	48.3	8.0	60.0	597.0	638.1	48.9	59.7	1.0	9.5	56.7	1058
Ratoon	9.0	11.4	51.7	7.0	52.5	583.5	666.9	51.1	64.8	1.2	8.7	50.5	1040
Total/Weighted Average	9.5	22.1	100.0	7.5	56.1	590.0	1305.1	100.0	62.2	1.1	9.1	53.5	1049