Price Policy *for* Sugarcane

THE SUGAR SEASON 2013-14

सत्यमेव जयते

COMMISSION FOR AGRICULTURAL COSTS AND PRICES
Department of Agriculture & Cooperation
Ministry of Agriculture
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List of Acronyms

A2+FL	Actual paid out cost plus imputed value of family labour
AAS	Advanced Authorization Scheme
ALS	Advance Licence Scheme
APEDA	Agricultural and Processed Food Products Export Development Authority
BPL	Below Poverty Line
C2	Comprehensive cost including imputed rent and interest on owned land and capital respectively.
CACP	Commission for Agricultural Costs and Prices
CAGR/CARG	Compound Annual Growth Rate/Compound Annual Rate of Growth
CF	Correction factor
CIF	Cost, Insurance & Freight
CIF	Cost Incurred by Farmers
CIM	Cost Incurred by Millers
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
DCP	Decentralized Procurement
DES	Directorate of Economics & Statistics
DFPD	Department of Food & Public Distribution
DGCIS	Directorate General of Commercial Intelligence and Statistics

DGFT	Directorate General of Foreign Trade
EC Act	Essential Commodities Act
FAO	Food and Agriculture Organization
FOB	Free on Board
FRP	Fair and Remunerative Price
FRP,RS	Fair and Remunerative Price based on Revenue Sharing
GDP	Gross Domestic Product
GVO	Gross Value of Output
HA	Hectare
ICE	Intercontinental Exchange
ISEC	Indian Sugar Exim Corporation
ISGIEIC	Indian Sugar & General Industry Export Import Corporation Ltd.
ISMA	Indian Sugar Mills Association
ISO	International Sugar Organisation
LDO	Light Diesel Oil
LIFFE	London International Financial Futures and Options Exchange
MECAS	Market Evaluation Consumption and Statistics
MFRP	Minimum Fair and Remunerative Price
MMTC	Minerals and Metals Trading Corporation
Mn	Million
MT	Metric Tonnes
NAFED	National Agricultural Cooperative Marketing Federation of India Limited
NCDEX	National Commodity and Derivatives Exchange
NFCSF	National Federation of Cooperative Sugar Factories
NSSO	National Sample Survey Organisation
OECD	Organization for Economic Co-operation and Development
OGL	Open General License
PDS	Public Distribution System
Qtl	Quintal
RCAC	Registration-cum-Allocation Certificate
SAP	State Advised Price
SMP	Statutory Minimum Price
STC	State Trading Corporation
TC	Total Cost
TE	Triennium Ending
TRP	Total Revenue Pot
USDA	United States Department of Agriculture
UT	Union Territory
WPI	Wholesale Price Index
WTO	World Trade Organization

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Summary
of Recommendations

Price Policy Recommendations:

S.1 The Commission recommends a fair and remunerative price (FRP) for sugarcane for the sugar season 2013-14 to be Rs 210/qtl at 9.5 percent recovery level. With every increase in recovery by 0.1 percentage points, the FRP will increase by Rs. 2.21/qtl. This FRP is recommended after due considerations given to the various factors enumerated in the Sugarcane Control Order of 1966, as amended from time to time. These considerations range from cost of production of sugarcane to the price of sugar and by-products. The Commission projects that for the 2013-14 sugar season the cost of production of sugarcane (including transportation and premium on insurance) would be Rs 197/qtl and the sugar prices are likely to prevail within a range of Rs 3000-3700/qtl. This FRP will not have any impact on food inflation as farmers in most states are already getting a much higher price (SAP in UP being Rs 240/qtl, for instance) for their sugarcane for the 2012-13 season.

S.2 The Commission also recommends that the Government should switch over to a 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 incurred in producing sugarcane and converting that sugarcane into sugar and by-products. These relative costs (average of three years, 2007-09) suggest a ratio of 69:31 percent at 10.31 percent recovery level. If one loads the value of by-products on to the value of sugar, then the farmer will get 75% of the value of sugar (at 10.31% recovery level). To illustrate, if the ex-mill price of sugar in sugar season 2013-14 works out to Rs 3350/qtl (middle of the range of Rs 3000-3700/qtl expected to prevail in 2013-14), the price of sugarcane would be Rs {3350x(10.31/100)*(75/100)} = 259/qtl at all India recovery level of say 10.31. For states with higher recovery, say Maharashtra at 11.30% recovery, it would work out to {3350x(11.30/100)*(75/100)} = Rs 284/qtl. Given the uncertainty about future sugar prices, this revenue sharing principle needs to be combined with MFRP, which can be set at half a standard deviation from the trend of sugar price. The trend line of sugar prices suggests that the ex-factory price would be Rs 2904/qtl in 2013-14 sugar season and half a standard deviation below this comes to Rs.2582/qtl, and 75% of this turns out to be Rs. 197/qtl of sugarcane price, which incidentally is equal to the cost of production of sugarcane (Rs 197/qtl). What this implies is that the farmer will get a MFRP as the assured price, no matter what the sugar price is, but in reality he/she is likely to get a much higher price (Rs 259/qtl) in sugar season 2013-14. Adoption of this Hybrid Formula as the basis of pricing of sugarcane will bring greater stability, and more rationality in the sugar sector, taking it to higher levels of efficiency and growth.

Non-Price Recommendations

S.3 Reforms in sugar sector should be taken up to its logical conclusion, from delicensing to decontrol, so that it can be developed as an energy hub producing sugar, ethanol from molasses, and power from bagasse, creating jobs and enhance income of millions of farmers in rural areas.

S.4 As a part of decontrol, the system of levy and regulated release mechanism need to be dispensed with. Policy of levy on sugar cross subsidizes the PDS sugar consumers through sugar mills/cane farmers/non-levy sugar consumers and tantamounts to an 'implicit tax'. Employing price policy instrument to accomplish equity objectives compromises on efficiency front. The Commission recommends that levy obligation on sugar mills be done away with, and the government should invite tenders from sugar mills to supply for PDS. A still better solution would be to use income transfers to the poor (for PDS consumers) by giving them a direct cash subsidy and take sugar out of PDS system all together which will be more efficient.

S.5 As far as release of non-levy sugar is concerned, it needs to be replaced by buffer stock policy of 2 million tonnes to stabilize open market prices. This buffer stock policy can be dovetailed with liberal trade policy.

S.6 The imposition of 10 percent import duty on sugar on 13 July, 2012 is likely to reduce imports and therefore hit the overall supplies adversely. This will put pressure

on domestic prices and thereby will make exports less competitive. If import is restored at zero percent duty as was the case prior to 13th July, 2012, the overall supply of sugar will further improve which in turn would have a 'cooling' effect on prices and would also make Indian sugar export competitive. However, if export of sugar is banned, it would amount to an 'implicit tax' and farmers ought to be compensated for this by increasing FRP by 10 percent.

S.7 Sugarcane is a water intensive crop and therefore cane productivity needs to be optimised per unit of water and its cost. In this backdrop, drip irrigation needs to be promoted which can save almost 40 to 50 percent water. Water thus saved, like any other scarce resource, can be utilised to meet other competing demands.

S.8 Also, there is need to accord 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 on long term basis.


Chapter-1

Chapter-1
An Overview

1.1 The overall mandate of CACP is to advise the Government on the price policy of specified commodities to help fix the minimum support prices of those commodities with a view to evolve a balanced and integrated price structure broadly in line with the overall needs of the economy and with due regard to the interests of the producer and the consumer. While recommending the price policy and the relative price structure, the Commission is required to keep in view the following factors:

" i) The need to provide incentive to the producer for adopting improved technology and for developing a production pattern broadly in the light of national requirements;

ii) The need to ensure rational utilization of land, water and other production resources;

iii) The likely effect of the price policy on the rest of the economy, particularly on the cost of living, level of wages, industrial cost structure, etc."

1.2 In operationalizing these terms of reference for price policy purposes, the Commission is expected to look into the costs of production of various crops across regions, for which a detailed scheme called the 'Comprehensive Scheme for Studying Cost of Cultivation of Principal Crops in India'(CS) is run by the Directorate of Economics and Statistics (DES) in association with State Agricultural Universities and Agro-Economic Research Centres. Besides cost, the Commission also looks into the overall demand and supply of the commodity under question, its domestic and international prices, inter-crop price parity, terms of trade, and its likely implications for consumers.

Cost of production is only one of several factors that is taken into consideration while recommending price policy.

1.3 However, unlike other mandated commodities, the pricing of sugarcane is governed by the statutory provisions of 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. But it remained virtually unimplemented mainly on account of delays in the announcement of profits by the mills. The Sugarcane (Control) Order, 1966 was amended w.e.f. 22.10.2009 and the concept of SMP was replaced by the Fair and Remunerative Price (FRP) of sugarcane. For the

From 2009-10 sugar season, a new item 'reasonable margins for growers of sugarcane on account of risk and profits' is also considered while recommending price policy.

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) w.e.f. 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.

1.4 The amended provisions of Clause 3(1) of the Sugarcane (Control) Order, 1966 provide as follows:

"**Fair and Remunerative price of sugarcane payable by producer of sugar** -(1) 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; and

(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)

1.5 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 cost of production of sugarcane, but also recovery rates and pricing of sugar, as also its by-products namely molasses, bagasse and press mud. Thus, revenue sharing of sugar factories is expected to be reflected in sugarcane pricing. Whether this is actually done, and to what extent, will be discussed later in this report.

Revenue sharing of sugar factories is expected to be reflected in sugarcane pricing.

Pricing of Sugarcane in Practice and the issue of Mounting Cane Arrears

1.6 The Commission has been recommending the prices of sugarcane (SMP/FRP) as per its mandate and terms of reference. But those prices (SMP/FRP) are far below (see chapter-2 for details) the prices that are actually received by farmers as a result of state level intervention in the form of State Advised Prices (SAP, as in states like Uttar Pradesh), or some sort of final 'negotiated price' based

on 'surplus sharing' mechanism as in case of Maharashtra sugar cooperatives. In any case, since the actual prices being paid to farmers are much higher (statutorily) than the SMP/FRP, many a times it creates a situation where mills are not able to pay those prices, especially when sugar prices in the market are low and SAPs are high. This results in mounting arrears to farmers. In 2011-12 sugar season, these arrears amounted to 11.6 per cent of the price payable. Similar situation has earlier developed in 2006-07 and 2007-08 when these cane arrears were 16.4 and 22.9 per cent of price payable, respectively. This is not a healthy state of affairs from the point of view of famers as well as industry, as it leads to increasing litigation in courts, wherein farmers ask for immediate payment of arrears and mills plead that given the low realization from sugar and by-products, SAP is too high and they cannot pay the SAP without going in losses. And these litigations continue for years in courts. This is a clear sign that the pricing mechanism for sugarcane, as it exists today, has serious shortcomings. SMP/FRP seems to be much on the lower side than what farmers' consider fair and remunerative, while SAP, at times, becomes too high resulting in mounting arrears, and widening trust deficit between the main stakeholders, farmers and millers, in the cane-sugar value chain. There is, therefore, a dire need to devise a more appropriate pricing formula that ensures a fair sharing of the value created in the cane-sugar value chain, and where farmers and millers both feel comfortable. This is discussed in some detail in chapters 2 and 6. The other way would be to change the FRP regime in such a manner that it reflects more the demand side pricing (i.e., looking more at the price of sugar and its by-products) rather than the cost of production of cane (supply side pricing). But in a sector, which is highly regulated, getting the right market price of sugar or its by-products in not an easy task. From levy on sugar mills to controlling the releases of even non-levy sugar into market, its exports and imports, all are heavily controlled by the government. Even the allocation of molasses to different user industries is often controlled by the state governments, affecting its true market price. Perhaps there is no other agri-commodity sector which is as heavily controlled as the sugar sector today.

SMP/FRP have been far below prices actually received by farmers. Many a times this creates a situation when mills are unable to pay those prices which leads to mounting arrears

Mounting arrears leads to trust deficit between farmers and millers, making it all the more imperative to devise a scientific revenue sharing formula

From De-licensing to Decontrol of Sugar sector

1.7 Sugar sector has been heavily controlled for a long time. A major step to liberate this sector from controls was taken in 1998 when licensing requirement for new sugar mills was abolished, and over a period of time, from 1998 to 2009, levy percentage on sugar mills was reduced from 40 per cent to 10 per cent. These measures contributed significantly to a structural transformation in sugar industry, from being dominated by the sugar co-operatives to private sector led sugar mills, as is shown in charts-1.1 and 1.2.

Levy percentage on sugar mills was reduced from 40 per cent to 10 per cent during period from 1998 to 2009.

Chart 1.1: Sector-wise Installed Capacity in Sugar Industry, 1990-91 to 2011-12

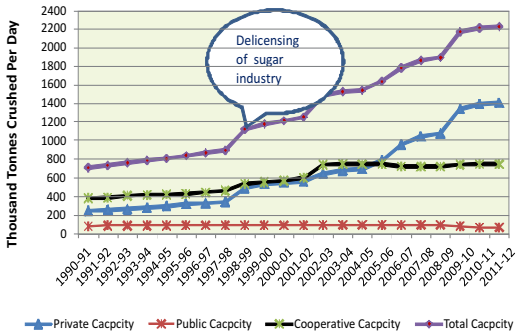
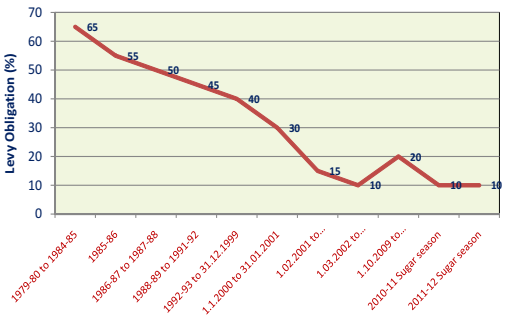


Chart-1.2 : Percent of Levy Obligation on Sugar Factories



Abolishing of licensing requirement for new sugar mills in 1998 and gradual reduction in levy obligation led to significantly higher share of installed capacity of private sector.

1.8 It may be noted from chart- 1.1 that till 1997-98, growth in sugar industry was at a much lower level, which took-off to much higher growth trajectory in terms of installed capacity in post de-licensed period. And this came increasingly from the private sector. Till 1997-98, sugar cooperatives were dominating the sugar industry with an installed capacity of 51.51 percent of total installed capacity in the country, followed by the private sector (38.21%) and public sector (10.28%). But, by 2011-12, this had changed significantly with the private sector contributing to the larger share of 63.25 percent in total installed capacity, followed by cooperatives (33.56%) and public sector (3.19%) trailing behind. There is also evidence that the private sector mills, the existing ones as well as the new ones that are coming on stream, are of much higher capacity than the cooperatives or public sector mills. Normally, the larger mills enjoy scale economies and greater efficiency in sugar production. This clearly indicates that the policy decision to liberate the sugar industry from licensing requirements and reducing levy had large beneficial impact on the growth and efficiency of this sector. This should encourage the government to go full length on liberalizing this sector from other controls, especially about remaining levy, regulated monthly/ fortnightly/weekly releases of non-levy sugar in the open market, cane area reservation, distance between mills, exports and imports policy, etc. This move from delicensing to full de-control has the potential to take this sector yet to a greater height, where integrated plants can come up producing not only sugar, but also ethanol and power from its by-products. These can become energy hubs in rural areas, and given that the demand for energy (fuel and power) will keep increasing with rising incomes and population, sugar industry can latch on to this rising demand, diversify and avoid the usual cyclicity in its production and prices, and bring greater prosperity in rural areas. Currently, sugar industry is considered worth Rs 80,000 crores with large employment in rural areas, and it has a potential to grow in double digits over a longer period, if it can exploit this energy potential. It is in keeping with the potential of this industry, the Government has set up an expert committee under the Chairmanship of Dr.

C Rangarajan to look into how best to de-regulate this sector to realize its full potential. Some of these key issues are briefly touched upon hereunder.

Levy obligation on sugar factories

1.9 The sugar factories are under obligation to give a certain percentage of their sugar production to the Government as levy sugar for the purpose of the public distribution system (PDS) at a price fixed by the Government which is lower than the open market price. The levy percentage was as high as 65% in 1979-80 sugar season, which has been gradually brought down to 10 percent in a phased manner as depicted in chart-1.2.

1.10 To move towards better targeting in PDS, the Government restructured the supply of levy sugar in the PDS, in Feb. 2001 and restricted its supply to BPL families except in the north eastern states, hilly states and Islands territories where universal coverage was allowed to continue. Accordingly, the allotment of levy sugar is made on the basis of fixed States/UTs quotas with effect from 1.2.2001. Besides, a quantity of about 1.00 lakh MT is allotted as fixed Annual Festival quota of the States/UTs as per the scheduled festival requirement of the State Governments / UT Administrations. At present the total annual requirement of levy sugar is about 2.8 million tonnes out of a total sugar production of about 26 million tonnes in 2011-12. The price paid to the mills for levy sugar by the government is worked out on the basis of SMP/FRP of sugarcane declared by the Centre, and not the actual prices (SAP or final prices) paid by the factories to farmers. This amounts to a sort of 'implicit tax' on the factory, but which gets transmitted either to the farmer as the capacity of the factory to pay a remunerative price to farmer is reduced by that amount or to the consumers of non-levy sugar as their price for sugar goes up. Currently, the levy price is about Rs 18/kg vis-à-vis an ex-factory price of more than Rs 30/kg, leading to an 'implicit tax' of more than Rs 3000 crores on sugar mills/farmers/non-levy sugar consumers. Basically, what the government policy of levy on sugar is trying to achieve is cross subsidization of the PDS sugar consumers through sugar mills/cane farmers and non-levy sugar consumers. This use of price policy instrument to achieve equity objectives, compromises on efficiency front. A better way is to either use an income policy for PDS consumers, i.e, giving them direct cash subsidy to buy from the open market or invite bids from the sugar industry for 2.8 million tonnes to feed the PDS on fortnightly/monthly basis. This will encourage the more efficient mills to bid for this large market at lower price, improve their scale and cut down costs further to capture this PDS market. This will go a long way in improving the overall efficiency of sugar mills, and also making them globally competitive. So, the Commission is of the considered view that levy obligation on sugar mills be done away with, and the government should invite tenders from sugar mills to supply for PDS. A still better solution would be to use income transfers to the poor and take sugar out of PDS system all together.

Current levy price is about Rs 18/kg vis-à-vis an ex-factory price of more than Rs 30/kg, which leads to an 'implicit tax' of more than Rs 3000 crores on sugar mills / farmers / non-levy sugar consumers

Levy sugar, essentially seeks to achieve equity objective through price policy instrument. In the process, efficiency is compromised. Therefore, it is recommended that levy obligation on sugar mills be done away with

Regulated Release Mechanism

Stated objectives of release mechanism are stability and 'reasonable' level of sugar prices in open market. However, empirics seem to indicate otherwise.

1.11 Sugar, manufactured during five to six months during the sugar season (October to September), is controlled and regulated to be sold and distributed in a staggered manner with certain stated objectives namely (a) the consumer gets adequate sugar throughout the year at a fair price, (b) cane growers who provide sugarcane to millers, receive a fair price, (c) the sugar producer gets a reasonably fair return from the sale of sugar. After adjusting the levy obligation of the sugar factories, the other 90% of sugar is allowed to be sold as non-levy (free-sale) sugar through the system of Regulated releases applicable uniformly to all the sugar mills throughout the country. The quantum of non-levy sugar to be released for a particular month for domestic consumption is decided by the Central Government having regard to the production, stock, requirement and prices of sugar in the country. On the basis of the non-levy quota decided by the Government, month-to-month release orders for sale of sugar in the open market are issued. Sometimes, these release orders are based on fortnightly or even weekly quotas, hoping that these controlled releases will keep the sugar prices in open market stable and at a 'reasonable level'. How far this policy has succeeded is debatable as sugar prices have demonstrated high degree of volatility (see chapter-6) and the trend of sugar prices has been rising. Also, it is worth noting that there is no other agri-commodity which faces such a monthly/fortnightly/weekly regulated release system as does sugar, and certainly not sugar anywhere else in the world. This is akin to the 'license/controlled raj' of 1960s when India was facing huge food shortages. That's not the case anymore. There is ample evidence that 'license-control raj' leads to more 'rent seeking' and stifles efficiency. The Commission, therefore, is of the considered opinion that there is no case for such a tight control for a commodity, which is largely (more than sixty percent) consumed by bulk buyers like beverage companies and confectionaries. The Commission recommends abolishing controlled release mechanism of non-levy sugar. There are better instruments of price stabilization than this. For example one can use a hybrid of sugar stocking (of about 2 million tonnes) policy dovetailed with an open trade (export and import) policy. In this context, it may be recalled that the Commission in its report on sugarcane pricing policy for 2012-13 sugar season also had recommended that sugar sector be decontrolled by dispensing with the monthly release system and sugar stock of about 2 million tonnes be created to stabilize markets.

Hybrid Formula for Pricing of Sugarcane: Revenue Sharing with Minimum FRP (MFRP)

1.12 Amongst the leading cane producing countries in the world, India is perhaps the only country where fixed price system as against revenue sharing formula is in vogue (see chapter-2 for details). In this backdrop, the Commission suggests changing the price mechanism to revenue sharing formula with MFRP, the

building blocks of which are discussed in chapters-2 and 6. This pricing approach has the potential to take the sugar sector to greater heights, bringing more stability and breaking the cycles of boom and bust in this sector.

1.13 In what follows in the rest of the report, we discuss the demand-supply of sugar and the efficacy of sugarcane pricing policy as in vogue in chapter-2, followed by its international dimension in terms of exports and imports, and domestic prices vis-à-vis international prices to gauge its trade competitiveness in chapter-3. Chapter-4 presents the estimates of cost of production of sugarcane in the recent past and projects for 2013-14 sugar season, and also looks at the inter-crop profitability. In chapter-5, we examine different dimensions of sugarcane productivity, adjusting its land productivity with crop duration and water intake in Maharashtra and Uttar Pradesh to see where is the real comparative advantage in growing sugarcane, given that water is going to be increasingly scarce in India. In chapter-6, we make a case for a Hybrid Formula for pricing of sugarcane, wherein we use the revenue sharing principle with some Minimum FRP (MFRP). Finally, in chapter-7, we pull all the relevant information and recommend the FRP for 2013-14 crop season.

India needs to move to revenue sharing formula to put sugar sector on higher trajectory of growth path, more stability and objectivity.


Chapter-2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Chapter-2

Demand-Supply, and Efficacy of Pricing Policy

Domestic Market Scenario

Demand & Supply situation important component of pricing policy.

2.1 Since sugarcane is cultivated in India primarily to produce sugar, it is important to know what has been the demand and supply situation of sugar in the recent past and what it is likely to be in the coming year, if we have to get our pricing of sugarcane right. Like most of the other agri-commodities, sugarcane is also produced during a particular season, and its crushing to convert it into sugar also takes place for a few months, but its demand is through-out the year. So the sugar millers/traders/bulk consumers have to keep some stocks with them to meet their year round demand. While the demand for sugar is gradually increasing with rising population and incomes (given that its expenditure elasticity is positive and high) and therefore has a robust trend, the supplies of sugar are more volatile depending upon weather, and prices of sugarcane that farmers receive in relation to other competing crops.

2.2 The NSSO data shows that the per capita consumption of sugar in 2009 for direct household consumption in rural and urban areas of the country is 660 gms and 780 gms per month respectively. Based on 68.8 percent rural population, all-India weighted average per capita per month for direct household consumption is estimated at 697 gms per month which works out to 10.04 million tonnes per year for a population of 1.2 billion. And out of this, a part is bought by households through the public distribution system (PDS) at a subsidized price. The estimates of the DFPD show that about 2.8 million tonnes of sugar is distributed through the PDS. The sugar industry estimates that the total consumption (absorption) of sugar in the country, including by households, bulk buyers, and others, is roughly 21 to 22 million tonnes. This leaves 11 to 12 million tonnes or 55 percent at the maximum for consumption by bulk buyers like beverage companies, confectionaries, etc. However, bulk buyers like beverage companies, confectionaries, etc. are reported to be consuming 65 to 70 percent of sugar in the country while only about one-third is consumed directly by households. This inconsistency needs to be investigated further by undertaking an appropriate study on this issue.

Stock-to-use ratio at end of season is an important parameter for future prices.

2.3 The production of sugar in the sugar season (October to September) of 2011-12 is likely to be around 25 to 26 million tonnes. That means the extra production either will be exported or added to carry over stocks for the next season. Thus, stock-to-use ratio at the end of each season becomes an important parameter to see what is likely to happen to sugar prices in the coming season. Table-2.1 presents the demand-supply situation as well as the stock-to-use ratios at the end of each season for the last three years.

Table-2.1: Availability of Sugar as Percentage of its Use During 2009-10 to 2011-12

(*Lakh tonnes, percent*)

S.No.	Particulars	2009-10	2010-11	2011-12
1	Opening stock	35.83	51.25	67.79
2	Less-adjusted 5% due to damages/ unsalable stocks	0.00	2.56	0.00
3	Net opening stock	35.83	48.69	67.79
4	Export allowed during the previous season but physically exported during the current sugar season	0.00	0.00	4.42
5	Net Adjusted opening stock (3 minus 4)	35.83	48.69	63.37
6	Production	188.00	243.50	260.00
7	Imports	41.80	0.00	0.00
8	Estimated total availability (5+6+7)	265.63	292.19	323.37
9	Estimated releases for internal consumption	211.98	208.00	214.12
10	Export against ALS/AAS obligation and OGL /bilateral agreement with Maldives	2.40	26.00	40.00
11	Estimated non-levy sales as per court Order	0.00	0.00	8.00
12	Total estimated releases [9+10+11]	214.38	234.00	262.12
13	Estimated closing stock on 30.09.2012 (8 minus 12)	51.25	58.19	61.25
14	Stock to Use Ratio (%) {(13)/ (12)*100}	23.91	24.87	23.37

Source: Collated from data furnished by Directorate of Sugar, Department of Food and Public Distribution

Notes: 1. Opening stock as on 01.10.11 is different from the closing stock as on 30.09.11. The closing stock is derived figure i.e. opening stock plus production minus releases during the season whereas opening stock is physically verified stock in respect of most of sugar mills. It is higher than the opening stock due to dispatch of sugar for exports/ domestic market against Release orders issued during the 2010-11 sugar season but dispatched during the 2011-12 sugar season and also non-lifting of levy sugar by the States of Bihar & Jharkhand totaling to about 3.5 lakhs tons during the 2010-11 season.

2.Figures for 2011-12 are estimates.

2.4 It may be noted that during 2011-12 sugar season, India's sugar exports are targeted to be around 4 million tonnes, which may be the highest level of exports since 2000-01, excepting 2007-08. As a result of these healthy exports, stock-to-use ratio of sugar is likely to be marginally lower at 23.4 percent at the end of 2011-12 sugar season compared to the preceding sugar season (24.9 percent). What would be the demand-supply situation during the sugar year 2012-13 and therefore the likely scenario of sugar prices depends upon several factors. What is known at this stage (as on mid-August 2012) is that rains have

Stock-to-use ratio at end of 2011-12 sugar season likely to be within comfortable margin.

not been good in many parts of the sugarcane growing areas, particularly in Maharashtra and Karnataka, and even some part of Uttar Pradesh and Tamil Nadu. This may impact yields, although ISMA holds that the overall production of sugar may not get impacted adversely compared to 2011-12, as the area sown in 2012-13 (upto 13 August, 2012) is more than that in the corresponding period of last year. The overall supply of sugar could also get impacted by trade policy. The imposition of 10 percent import duty on sugar on 13 July, 2012 will reduce imports and therefore hit the overall supplies adversely. But this import duty has been perhaps a major factor behind a sudden increase in domestic prices of sugar (by more than 10 percent in July-August 2012), making exports less competitive. While the international prices of sugar are coming down (Liffe prices are already down by more than US$50/tonne between July-August 2012), and domestic prices going up, exports of Indian sugar seem to be increasingly difficult. However, looking at likely domestic production, exports and imports scenarios, it appears that the stock-to-use ratio would remain within comfortable range, and if import duty is waived-off, this will further improve the supply situation. Given these contrary policy and price trends in recent months, it is difficult to project the sugar prices in 2012-13 and 2013-14 sugar seasons. Nevertheless, an attempt is made in this direction in chapter-3 and then again in chapter-6. It is important for the Commission to have the best possible guess about sugar prices that are likely to prevail in the coming years, especially for 2013-14, as the Commission has to recommend FRP for cane for 2013-14 sugar season, and sugar price is one of the critical parameters that goes into those considerations. Although currently (in August 2012) wholesale sugar prices at most places are hovering around Rs 3500 to Rs 3700/qtl, the Commission expects that they may soften a bit with the lowering of import duty, and somewhat restrictive export policy which the DFPD has been talking about recently. Nevertheless, the Commission believes that during 2012-13 and 2013-14, sugar prices may hover in the range of Rs 3000/quintal to 3700/quintal. As in case of any commodity price projections, this is the best guesstimate given the information about monsoon, likely production, consumption, stocks, and international price situation, as it existed in mid-August 2012. But any of these factors can undergo dramatic changes in the coming months, and as a result, these price projections will also have to be re-visited.

Sugar prices likely to hover in the range of Rs 3000-3700/ qtl in 2012-13 and 2013-14.

Efficacy of Pricing Policy

2.5 The Commission has been recommending the prices of sugarcane (SMP/FRP) after taking into account various factors that are given in its mandate and terms of reference. To appraise the efficacy of sugarcane price policy, there could be two ways to look at it:

(1) where we compare the SMP/FRP with the actual costs of production of sugarcane by the farmers, after adjusting for their recovery rates, which would be supply side pricing, and has been attempted in table-2.2.

Table-2.2: SMP/FRP vis-à-vis Actual Cost of Production

(Rs/qtl., percent)

Sugar season	Basic SMP/ FRP	All-India recovery rate (%)	SMP/FRP at all-India recovery rate	Actual Cost of production (All-India weighted average)	Percent Margin in SMP/FRP over actual cost
1	2	3	4	5	6
2008-09	81.18	10.05	90.65	97.12	-6.66
2009-10	129.84	10.20	139.41	109.42	27.41
2010-11	139.12	10.17	149.37	120.74	23.35
Average					14.70

(2) where we compare the SMP/FRP, after adjusting for their recovery rates, with the sugar prices. This would be the demand side pricing and is attempted here in table-2.3. The demand side pricing is always considered better way of distributing the value created in the cane-sugar value chain between two main stakeholders *viz.* the farmers and millers, ratio of SMP/FRP (adjusted for recovery rates) to sugar prices since 2000-01 is worked out and given in table 2.3.

Table-2.3: SMP/FRP Recommended by CACP and its Ratio to Ex-Mill Sugar Prices

Sugar season	Ex. Mill prices (Rs./qtl)	Basic SMP/ FRP (Rs./qtl)	All-India recovery rate (%)	SMP/ FRP at all-India recovery rate	SMP/FRP as percentage of ex-mill prices At basic recovery rate	SMP/FRP as percentage of ex-mill prices At All-India recovery rate
1	2	3	4	5	6	7
2000-01	1347.52	59.50	10.48	73.36	44.16	54.44
2001-02	1310.88	62.05	10.27	74.97	47.33	57.19
2002-03	1182.45	69.50	10.38	84.87	58.78	71.78
2003-04	1365.28	73.00	10.22	87.77	53.47	64.29
2004-05	1607.87	74.50	10.17	89.14	46.33	55.44
2005-06	1749.88	79.50	10.22	90.28	45.43	51.59
2006-07	1363.44	80.25	10.16	90.59	58.86	66.44
2007-08	1397.74	81.18	10.30	92.91	58.08	66.47
2008-09	2127.86	81.18	10.05	90.65	38.15	42.60
2009-10	2981.63	129.84	10.20	139.41	43.55	46.76
2010-11	2653.92	139.12	10.17	149.93	52.42	56.12
2011-12	2762.62	145.00	10.17	155.23	52.49	56.19
Average					**49.69**	**57.56**

Notes: 1. SMP/FRP is always announced with some basic recovery rates, which were 8.5% during 2000-01 to 2004-05, 9% during 2005-06 to 2008-09 and 9.5 % from 2009-10 onwards. The actual recovery rates differ from factory to factory, from region to region, and year to year, and therefore, SMP/FRP actually payable needs to be tweaked incorporating the difference between actual recovery rates and basic recovery rates.

2. The actual recovery rates for 2011-12 are assumed to be the same as in 2010-11 (10.17%) due to non-availability of data for these years.

SMP/FRP adjusted for recovery rate broadly covered all-India weighted average costs of production during 2008-09 to 2010-11.

2.6 It may be seen from table 2.2 that from the supply side pricing, SMP/FRP, after adjusting for the actual recovery rates, broadly covered the weighted average costs of production at all India level and gave a margin of about 15 percent during the three year average of 2008-09 to 2010-11 for which the latest actual cost of production data are available. The table-2.3, which reflects the demand side pricing, shows that average SMP/FRP as percentage of sugar price (12 years' period from 2000-01 to 2011-12) was about 50% of sugar prices at basic recovery rate which increases to 58 percent if it is adjusted to the actual recovery ratio at all India level.

2.7 There would obviously be state-wise variation in this SMP/FRP as a ratio to sugar prices, given that recovery rates as well as ex-mill sugar prices differ across states. For the two major sugar producing states of India, we have made an attempt to work out this for the period 2004-05 to 2011-12 in table-2.4. What follows from this is that if UP and Maharashtra had paid farmers SMP/FRP for sugarcane, duly adjusted for their respective recovery rates, then UP farmers would have got only 51 percent of sugar price on an average during the 2004-05 to 2011-12 period, while Maharashtra farmers would have got 62 percent of sugar price. It may be noted that ex-mill sugar prices are generally lower in Maharashtra compared to UP, which may result in higher ratio for farmers in sugar prices, besides their higher recovery ratio. On a year to year basis, there is a wide variation. For Maharashtra, it would have worked out to 81 percent in 2007-08 to 50 percent in 2008-09, while for UP it would have been 65 percent in 2006-07 to 38 percent in 2008-09.

Table-2.4: Actual Prices Received by Sugarcane Farmers, SMP/FRP as Percentage of Ex-mill Sugar Prices in Maharashtra and U.P.

(Rs./qtl., percent)

Sugar season	Ex-mill sugar prices		Cane prices paid to farmers		Cane prices as percent of ex-mill sugar prices		SMP/FRP at State-specific recovery rate		Recovery rate (%)		SMP/FRP as percentage of ex-mill prices At State-specific recovery rate	
	Maha-rashtra	U.P.	Maha-rashtra	U.P.	Maha-rashtra	U.P.	Maha-rashtra	U.P.	Maha-rashtra	U.P.	Maha-rashtra	U.P.
1	2	3	4	5	6	7	8	9	10	11	12	13
2004-05	1601.66	1674.70	130.07	104.50	81.21	48.49	99.83	85.81	11.39	9.79	62.33	51.24
2005-06	1820.42	1692.29	140.62	112.50	77.25	66.48	103.00	83.83	11.66	9.49	56.58	49.54
2006-07	1452.29	1296.75	93.92	125.00	64.67	96.39	101.56	84.62	11.39	9.49	69.93	65.25
2007-08	1317.08	1492.71	93.41	125.00	70.92	83.74	106.44	83.89	11.80	9.30	80.81	56.20
2008-09	2082.29	2161.08	158.05	140.00	75.90	64.78	103.91	81.18	11.52	8.91	49.90	37.56
2009-10	3121.67	2889.58	214.69	165.00	68.77	57.10	157.31	129.84	11.51	9.13	50.39	44.93
2010-11	2806.67	2592.96	205.00	205.00	73.04	79.06	165.77	139.12	11.32	9.16	59.06	53.65
2011-12	2720.00	2950.00	235.00	240.00	86.40	81.36	172.78	145.00	11.32	9.16	63.52	49.15
Average					74.77	72.18					61.57	50.94

Notes:1. In Maharashtra, the cane price paid from 2004-05 to 2008-09 has been taken from the compilation of cost analysis by VSI Pune and from 2009-10 to 2010-11 by taking the average of the minimum and maximum cane price paid.
2. For 2011-12, Cane Commissioner (Maharashtra) informed that farmers are given Rs.205/qtl., Rs. 185/qtl. and Rs. 180/qtl. in high recovery zone, medium recovery zone and low recovery zone respectively, besides Rs.45/qtl. as transportation/harvesting charges. As cane crushed in these three zones is more or less equal, average equivalent FRP works out to Rs.235/qtl.

2.8 It is observed (table-2.4) that neither state follows the Centre's FRP and each state advice in this regard and each state announces its own SAP or some sort of "negotiated price" which the states work out in consultation with farmers and millers. It is extremely important to note that the actual prices paid to sugarcane farmers in Maharashtra and UP, on an average for this period, work out to 75 percent and 72 percent of their respective sugar prices. This is way above what the Centre's SMP/FRP would have given them. We will see later in chapter-6 that this comes very close to the revenue sharing formula of 70 to 75 percent of sugar prices being paid to farmers as cane prices, which has a much deeper robust scientific foundation than the SMP/FRP pricing mechanism.

Sugar sector faces cycles in production causing uncertainty.

2.9 The problem with this "negotiated price" approach each year at the state level is that it is not linked to sugar price directly, and as a result, with sugar prices varying, this leads to sometimes abnormally high shares of farmers' cane prices *vis-a-vis* sugar prices, which the mills are not able to afford leading to large cane arrears (table 2.5), and several litigations in the courts. This happened in UP in 2006-07 when the share of cane price to sugar price was 96.4 percent and in Maharashtra in 2011-12, when its share was 86.4 percent. Both are at the cost of the industry and unsustainable in long run, leads to financial sickness and ultimately demise of industry. But as table-2.4 reveals that in the years following such peak payment years, there is a drastic fall, which corrects the system in a very crude manner, making it slide from the peak like a roller-coaster and bringing to a trough, to be again taken upswing, thus leading to cycles in production, bringing greater uncertainty, and somehow the sugar sector keeps moving and sometimes limping.

Table-2.5: Cane Price Arrears During 2006-07 to 2011-12

(Rs. Crores, %)

Sugar Season	Total price payable	Price paid	Arrears	% of arrears on price payable
2006-07	25747.26	21524.26	4223.00	16.40
2007-08	22423.63	17290.77	5132.86	22.89
2008-09	17884.47	17285.50	598.97	3.35
2009-10	36786.00	35324.74	1461.26	3.97
2010-11	41481.58	38889.79	2591.79	6.25
2011-12	49280.05	43581.45	5698.60	11.56

Source: Directorate of Sugar, Department of Food and Public Distribution

Cane price arrears grew in geometric progression in last two years.

2.10 During last two years, arrears have grown almost in geometric progression. This is not a healthy state of affairs from the point of view of famers as well as industry, as it leads to increasing litigation in courts, wherein farmers ask for immediate payment of arrears and mills plead that given the low realization from sugar and by-products, SAP is too high and they cannot pay the SAP price without going in losses. And these litigations continue for years in courts. This is a clear sign that the pricing mechanism for sugarcane, as it exists today, has serious shortcomings. SMP/FRP seems to be much on the lower side than what farmers' consider fair and remunerative, while SAP or "negotiated price" at times goes too high which millers often contest and results in mounting arrears, widening trust deficit between the main stakeholders, farmers and millers, in the cane-sugar value chain. There is, therefore, a dire need to devise a more appropriate pricing formula that ensures a fair sharing of the value created in the cane-sugar value chain, and where farmers and millers both feel comfortable. Thailand, for instance, which is close to India's sugarcane conditions, gives 70 percent plus of the value of sugar and its by-products to farmers as cane price. Table-2.6 gives a broad idea of pricing system in leading cane producing countries in the world.

Table-2.6: Sugarcane Pricing System in Selected Countries

Country	Cane payment system	Industry revenues to be shared	Grower's revenue share
Australia	Revenue share (variable)	Raw sugar (millers retain molasses)	62-67%
Brazil	Revenue share (variable)	Sugar and ethanol	56-61%
Fiji	Revenue share (fixed)	Sugar, molasses and other by-products	70%+
India	Fixed price	Varies by states	Fixed price
Mexico	Revenue share (fixed)	Standard sugar, millers retain molasses	57%
South Africa	Revenue share (fixed)	Raw/refined sugar and molasses	62-63%
Thailand	Revenue share (fixed)	Raw/white/refined sugar and by products	70% plus

Source: ISO, MECAS (06)04

2.11 It is noted that India is the only country amongst major cane producing countries, where fixed price system is prevalent. To keep pace with best international

Need to devise an appropriate pricing formula that ensures a fair sharing of the value created in the cane-sugar value chain.

practices, enhance objectivity and equity amongst various stakeholders in fixation of FRP, and also to reduce disputes, the Commission is of considered view that India needs to move from the existing system of fixed pricing towards revenue sharing formula with minimum FRP(MFRP).


Chapter-3

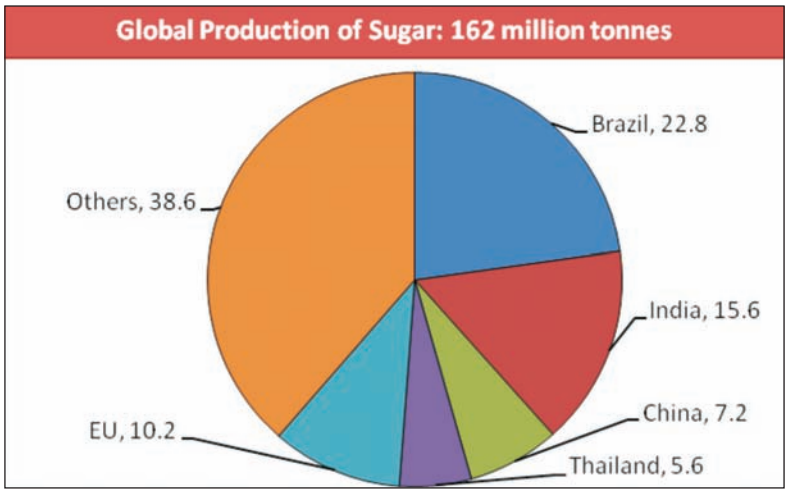
Chapter-3
Trade Competitiveness of Indian Sugar

Global Scenario: Production and Trade in Sugar

India is world's second largest producer of sugarcane and sugar

3.1 Global production of sugarcane, as per FAO, in TE 2010 was 1.7 billion tonnes of which 40 percent was accounted by Brazil followed by India at 18 percent, China (7 percent), Thailand (4.1 percent) and Pakistan (3.2 percent). A negligible amount of sugarcane is traded as most of the global trade is in the processed form i.e. sugar. Sugar is produced from both sugarcane and sugarbeet. In 2012-13, out of a total estimated production of 174 million tonnes of sugar, 79 percent is expected to be produced from cane and the remaining from beet (USDA). EU-27 is the biggest producer of beet sugar followed by Russia, USA, Ukraine and Turkey.

Chart-3.1: Major Producers of Sugar, TE 2011-12



Source: Sugar & Sweeteners Yearbook, 2012, USDA

3.2 The global output of centrifugal sugar in TE 2011-12 was 162 million tonnes out of which 34 percent was traded (Table 3.1). Brazil is the biggest producer of sugar (with a share of 22.8 percent in global output) followed by India (15.6 percent). Other major producers of sugar are EU-27 (10.2 percent), China (7.2 percent) and Thailand (5.5 percent) (Chart 3.1). Brazil, the largest producer of sugarcane in the world, uses about half of its produce for producing sugar while the other half goes to produce ethanol, which is blended with petrol for motor vehicles. Majority of new vehicles manufactured in Brazil are flexi fuel vehicles and Brazil switches its sugarcane usage between ethanol and sugar, depending upon prices of crude oil in the international market. The total production of ethanol in Brazil was about 26.0 billion litres in TE 2011-12. Brazil is the

Use of sugar cane for ethanol by Brazil has linked global markets of sugar, ethanol and crude oil

second biggest producer of ethanol after USA. The difference between the two countries in producing ethanol is that while in Brazil, the main feedstock is cane, in case of US, it is corn (roughly 125 million tonnes of corn goes for ethanol). This has made the global markets of sugar, ethanol and crude oil somewhat interlinked. Any projections on sugar prices, therefore, must take into account what is likely to happen to crude oil prices, and how it is going to trigger swings in cane consumption between ethanol and sugar, and therefore impacting the sugar prices. This is a subject matter for further study.

Table-3.1: Global Production, Exports and Imports of Sugar

(million tonnes)

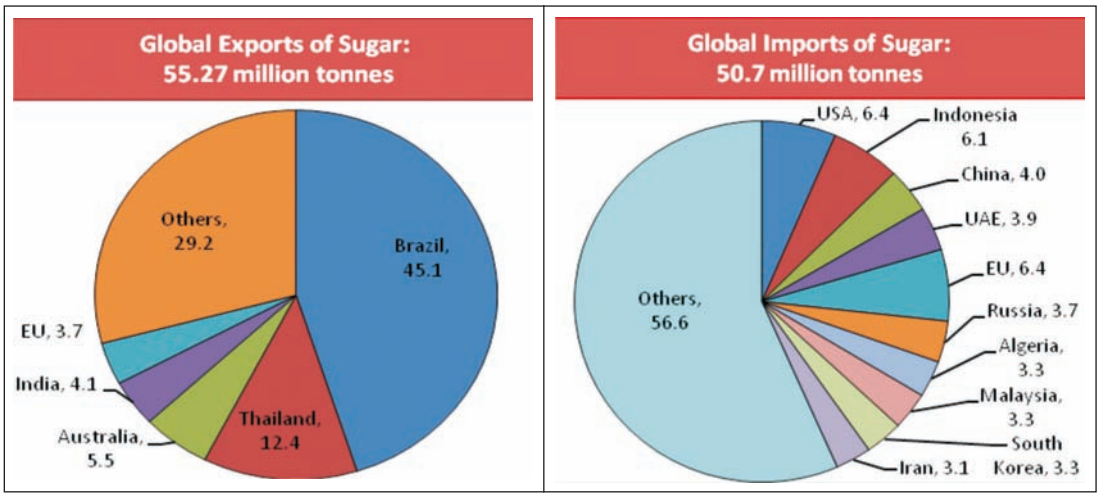
Year	Production	Export	Import
2000-01	130.6	37.7	38.7
2001-02	134.6	40.9	38.1
2002-03	148.4	47.4	41.5
2003-04	142.4	46.9	42.1
2004-05	140.7	47.7	45.2
2005-06	144.6	48.8	44.9
2006-07	164.5	50.2	45.6
2007-08	163.5	50.9	45.7
2008-09	143.9	47.9	44.9
2009-10	153.5	51.9	51.2
2010-11	161.6	56.1	51.9
2011-12	171.0	57.8	48.9

Source: USDA, Foreign Agricultural Service

Brazil corners 45.1 percent of the global exports in sugar

3.3 Total world sugar export was 55.27 million tonnes in TE 2011-12. Brazil corners slightly less than half of the global trade in sugar with 45.1 percent share in global exports. Thailand follows way behind at a share of 12.4 percent. Other major exporters of sugar were Australia (5.5 percent), India (4.1 percent) and EU-27 (3.7 percent) in TE 2011-12 (Chart 3.2). USA is the biggest importer of sugar (with a share of 6.4 percent in global imports) closely followed by EU-27 (6.3 percent share) and Indonesia (6.1 percent share) in TE 2011-12.

Chart-3.2: Major Exporters & Importers of Sugar, TE 2011-12



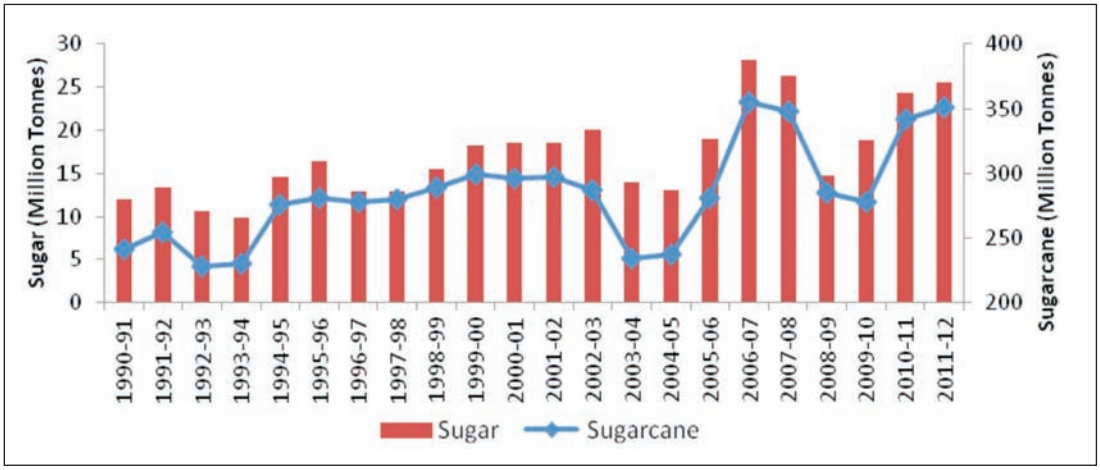
Source: Sugar & Sweeteners Yearbook, 2012, USDA

Indian Scenario: Production of Sugarcane and Sugar

3.4 In India, production of sugarcane has increased from 241 million tonnes in TE 1992-93 to 325.9 million tonnes in TE 2011-12. The production of sugar has increased from 12.0 million tonnes in TE 1992-93 to 22.9 million tonnes in TE 2011-12 (Chart 3.3). It is interesting to note that sugar and cane production have a cyclical behaviour. During the decade of 1990s, broadly, the pattern was two years upswing followed by two years downswing. During 2000s, however, it seems the production cycles have changed to three years upswing and two years downswing. This is a major problem within the sugar sector, which causes uncertainty to farmers and millers alike. This happens despite the fact that this sector is 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.

Sugar sector is heavily regulated in India. It has witnessed cyclical behaviour causing uncertainty to farmers and millers

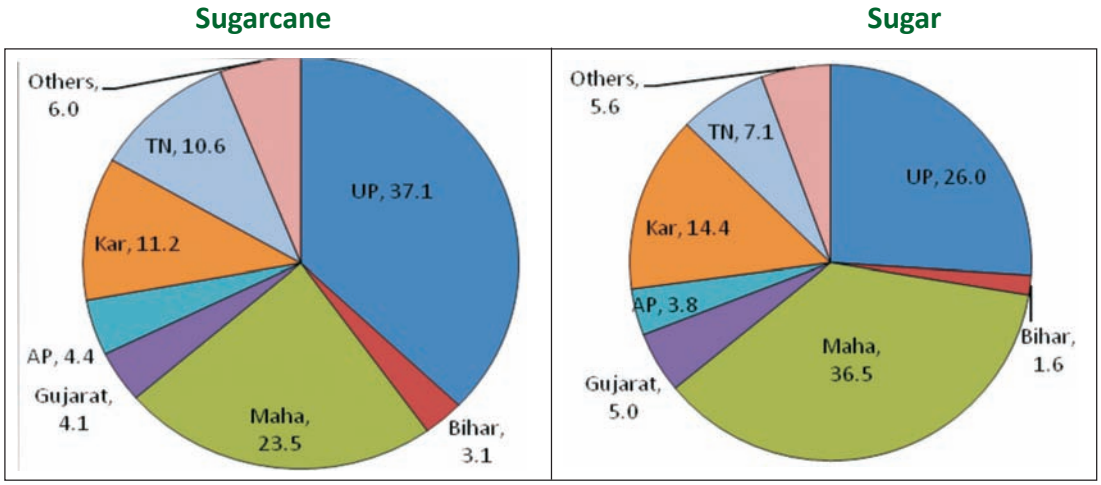
Chart-3.3: Production of Sugarcane and Sugar in India - 1990-91 to 2011-12



Source: DES, Ministry of Agriculture

3.5 The biggest producer of sugarcane in the country is Uttar Pradesh (37.2 percent share in TE 2011-12) followed by Maharashtra (23.5 percent). Other major producers of sugarcane in the country are Karnataka (11.2 percent), Tamil Nadu (10.6 percent) and Andhra Pradesh (4.4 percent). In terms of sugar production, Maharashtra is the biggest producer (36.5 percent) followed by Uttar Pradesh (26.0 percent). This is due to the high recovery rate in Maharashtra as the sugarcane crop in the state is of a longer duration than that in Uttar Pradesh. The State-wise shares in production of sugarcane and sugar in TE 2011-12 are shown in chart 3.4.

Chart-3.4: State-wise Shares in Production of Sugarcane & Sugar, TE 2011-12



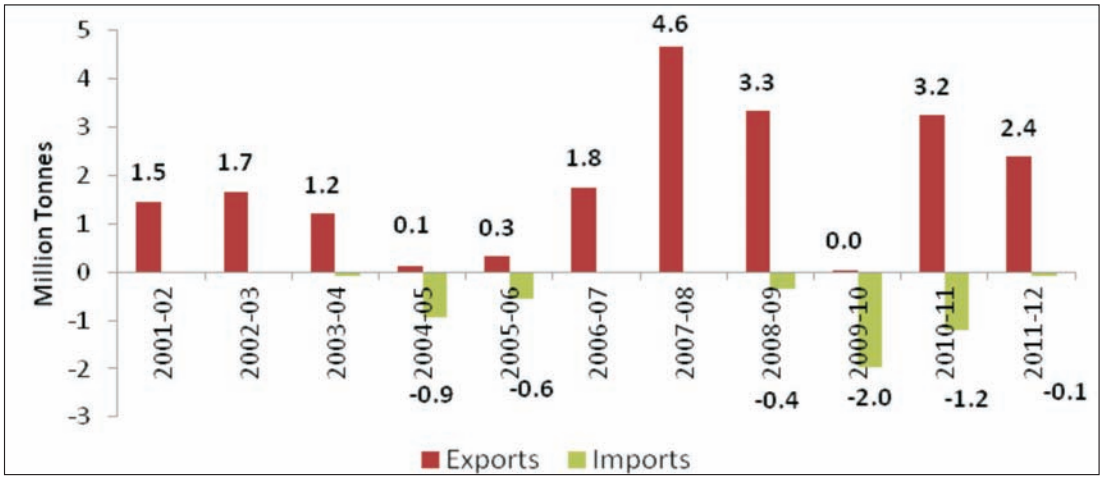
Source: DES, M/o Agriculture & Directorate of Sugar, Ministry of Consumer Affairs, Food and Public Distribution

India's Trade in Sugar

3.6 India is 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 last ten years, India has been a net exporter of sugar (Chart 3.5). This has been despite constant government interventions in external trade of sugar with intermittent ban on exports. The main consideration of the government is to curb the rise in prices of sugar in the domestic market.

India is world's fourth largest exporter of sugar and an occasional importer

Chart-3.5: Volume of Exports and Imports of Sugar by India



Source: DGCIS, Ministry of Commerce
Note: 1. Exports and Imports refer to financial year.
2. Figures for 2011-12 are for the period upto February, 2012

Export and Import Policies

Export policy:

3.7 Export policy of sugar in India, like many other agri-exports, has followed a "stop- go" approach, with occasional hiccups, depending upon the situation of domestic production and prices of sugar. Basically, exports have acted as a "residual" after taking care of domestic needs, determined by the Central Government. In trade theory, restrictive export policy indicates a "pro-consumer" and "anti-farmer" bias, with export bans reflecting an "implicit taxation" of the producers and "cross-subsidization of consumers". On the other hand, high import duties reflect "anti-consumer" and "pro-producer" bias. Indian trade policy has oscillated between complete export bans to high import duties (up to 60 percent) with an overarching objective to attain domestic price stability. A quick review of export and import policies below gives a mixed picture, albeit with a fair degree of tilt towards "pro-consumer" bias.

Trade policy of sugar in India follows a "stop- go" approach, depending upon the situation of domestic production and prices of sugar

3.8 Over the last decade and a half or so, the exports of sugar were canalised through the notified export agencies, viz. Indian Sugar & General Industry Export Import Corporation Ltd. (ISGIEIC) and State Trading Corporation of India Ltd. (STC) till 15th January, 1997. From January 15, 1997, exports of sugar were decanalised and permitted subject to obtaining Registration-cum-Allocation Certificate (RCAC) from Agricultural and Processed Food Products Export Development Authority (APEDA). Since 1st April, 2001, this requirement of RCAC was dispensed with and export of sugar could be undertaken by the various sugar mills/ merchant exporters, after obtaining the export release order from Directorate of Sugar, Department of Food and Public Distribution.

3.9 As domestic prices of sugar surged between January-June, 2006, exports of sugar were banned w.e.f. 22nd 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 (NFCSF), were permitted subject to the quantitative ceiling notified by DGFT from time to time. Due to high production in sugar season 2007-08, the ban on export of sugar against advance licenses was relaxed on 4th January, 2007 and later for exports under OGL was permitted from 23rd January, 2007. Within a span of six months, due to the cyclicality in production of sugarcane and consequently sugar, trade policy was changed from complete ban on exports to open exports through OGL.

3.10 As 2008-09 was also a good production year, the requirement of obtaining export release orders from Directorate of Sugar (except for export to EU and US) was also relaxed till 31st December, 2008 vide DGFT notification dated 31st July, 2007. This requirement was reintroduced w.e.f. 1st January, 2009 in view of the lower expected production of sugar in 2009-10. Sugar production improved in 2010-11 and due to comfortable sugar stocks in the country, exports of 1.5

million tonnes of sugar were allowed under OGL during March-August, 2011 and 2 million tonnes during December 2011-February, 2012. Recently, free exports of sugar have been allowed subject to prior registration of quantity from 14th May, 2012. Obtaining export release orders from Directorate of Sugar has also been dispensed with by notification dated 11th May, 2012.

Import Policy for Sugar

3.11 Imports of sugar were allowed under OGL with zero duty since March 1994. A basic customs duty of 5% and a countervailing duty of Rs. 850.00 per tonne was imposed on imported sugar w.e.f 27th April, 1998 which was gradually increased from 20% w.e.f. 14th January, 1999, to 60% w.e.f 9th February, 2000 along with continuance of countervailing duty of Rs. 850/- per tonne (increased to Rs 950 per tonne w.e.f. 1.03.2008 plus 3% education cess).

3.12 During January-June 2006, due to surge in sugar prices, imports of sugar were permitted without any quantitative restrictions upto 30th September, 2006. The import duty on sugar was abolished on 6th August, 2009. Government allowed import of raw sugar under Advance Authorization Scheme by sugar mills at zero duty upto 30-09-2009 and import of raw sugar at zero duty under OGL by the sugar mills/Private Trade upto 31-03-2010 which was further extended upto 31-12-2010. Levy obligation was removed in respect of all imported raw sugar and white or refined sugar. The Government also allowed duty free import of white/refined sugar by STC/MMTC/PEC and NAFED upto 1 million tons by 01-08-2009 which was extended upto 30-11-2009. Further, duty free import of white/refined sugar under OGL has also been opened to other Central/State Government agencies and to Private Trade in addition to existing designated agencies. Department of Revenue has extended the period of duty free import of raw, white and refined sugar from time to time till 30th June 2012. Recently, due to surge in domestic prices an import duty of 10 percent has been imposed w.e.f. 13th July, 2012.

3.13 Thus, the Government has been following broadly a consumer-oriented trade policy as after the lean 2009-10 sugar season, imports have been allowed at zero import duty since August 2009 while exports of sugar have been tightly controlled and were subject to release orders from the Directorate of Sugar until recently despite surplus production years of 2010-11 and 2011-12. With surplus stocks available, free exports of sugar have now been allowed but expected shortfall in production of sugarcane in the crop season 2012-13 has raised fears of export controls on sugar. It needs to be appreciated that any commodity export ban imposes an 'implicit tax' on its producers and therefore trade needs to be regulated through tariffs rather than bans, and are more transparent in their "taxation". The Commission recommends that exports of sugar should be left open, and if there is need to restrict exports, they could be regulated through use of export tariffs with a simultaneous offset policy in terms of bonus to farmers on their FRP of same percentage as the export duty.

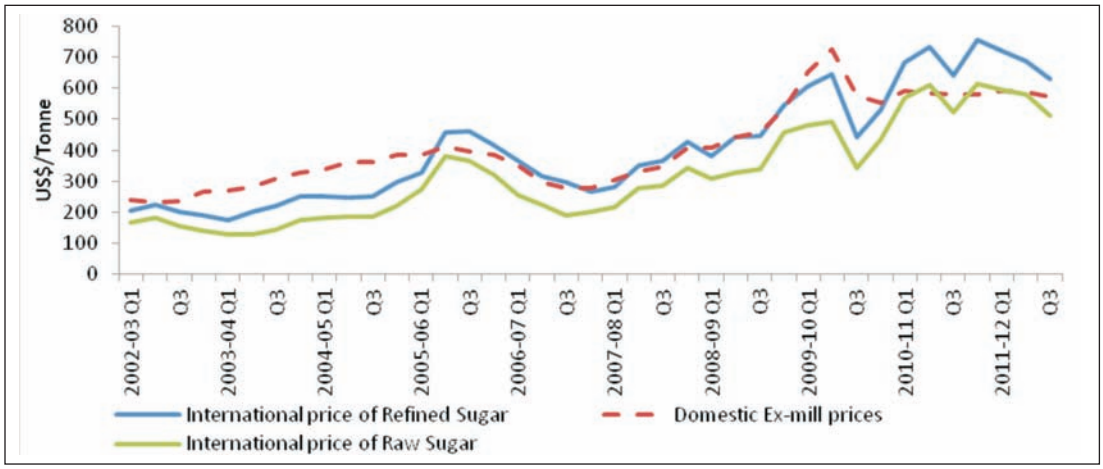
Trade Policy has been broadly consumer-oriented

India's Trade Competitiveness

3.14 Trade competitiveness is a dynamic concept and depends upon the relative movement in international and domestic prices which in turn are determined by changes in demand and supply of commodities, technology & costs of production, and market conditions. In its simplest form, trade competitiveness can be measured by comparing domestic prices which the farmers receive for that good with its export parity reference price (for exports – derived by deducting freight, port handling, exporters' margins etc from the f.o.b price of that commodity) and import parity reference price (for imports – derived by adding freight, port handling expenses and related costs, importers' margins etc. in the c.i.f price of the commodity). If the domestic price of any commodity is lower than the export (import) parity reference price, then the commodity is export (import) competitive. In the absence of reliable data, a preliminary attempt to measure India's competitiveness in sugar has been made by simply comparing the ex-mill prices at All-India level and international prices (Chart 3.6). It is seen that domestic sugar prices have broadly followed the trend in international prices. Since 2005-06, domestic prices have been lower or closely followed the international prices of refined sugar. It needs to be appreciated here that domestic prices are for crystal sugar while international prices are for refined sugar and that crystal sugar commands some premium over refined sugar in the domestic market because of our tastes and preferences. The figures in the chart indicate that Indian sugar, in most of the years, is an efficient import substitute and in many years also export competitive. Indian pricing of sugar is not very much out of line with its global prices over a period of more than a decade.

Domestic sugar prices broadly follow the trend in international prices

Chart-3.6: International Prices vs Domestic Wholesale Prices of Sugar



Note:

1. *International prices of refined white sugar as traded at the London Futures Exchange (LIFFE)*
2. *International Prices of Raw Sugar are taken from World Bank and refer to International Sugar Agreement (ISA) daily price, raw, f.o.b. and stowed at greater Caribbean ports.*
3. *Domestic Ex-mill prices have been taken from Directorate of Sugar, Department of Food & Public Distribution and refer to crystal sugar*
4. *There is on an average 30 percent premium on refined sugar over raw sugar*
5. *Crystal sugar (preferred in India) commands a premium over refined sugar (preferred world-wide)*

Global Outlook

3.15 The FAO sugar price index has increased by 12 per cent from 290 points in June, 2012 to 324 points in July, 2012. This increase in the price of sugar is mainly because of untimely rains in Brazil, the world's largest sugar exporter, which hampered sugarcane harvesting, and poor rains in India and Australia. However, as per the projections for the next three years by FAO-OECD Agricultural Outlook for 2012-21, the prices of sugar are expected to increase only marginally (Table-3.2).

Table-3.2: Forecast for International Prices of Sugar

Commodity	Price forecast (Rs/qtl)		
	2012-13	2013-14	2014-15
Refined Sugar	2956	3000	3065
Raw Sugar	2534	2552	2608

Source: OECD – FAO Agricultural Outlook for 2012-21.
Note: 1. Refined sugar price is from Euronext, Liffe, Contract No.407 London, Europe, October/September.
2. Raw sugar world price, ICE contract No.11 nearly, October / September.
3. It has been assumed that the exchange rate would be 1US$=Rs 55

3.16 Currently, there is a pressure on domestic prices as well, which may be due to imposition of import duty of 10% and poor rains in Maharashtra, UP and Tamil Nadu. But this is likely to settle down by December 2012 as indicated by NCDEX sugar futures (Table-3.3).

Table-3.3: NCDEX Futures Price of Sugar M Grade (Crystal Sugar)

Month / Year	Futures price (Rs/qtl)
August, 2012	3550
September, 2012	3478
October, 2012	3513
November, 2012	3505
December, 2012	3375

Source: NCDEX-13th August, 2012

3.17 It is always a challenge to forecast the prices of any commodity and even the best forecasts go awry. Yet, given whatever information is available, informed policy decisions have to be taken. And from that perspective alone, the Commission looks at the future prices of NCDEX and OECD-FAO, the stock-to-use ratios at home, the monsoon in India and Brazil, and comes to the following conclusion: it won't be a surprise if the prices hover between Rs 3000-3700/ quintal, although currently the prices have even crossed Rs 3700/qtl in some domestic markets. This is subject to reasonable weather conditions in Brazil as well as in India in the remaining months of the monsoon, and Indian rupee remaining stable around Rs 55 to a US dollar. This is important to keep in the background as one of the considerations while deciding about the pricing of sugarcane for the 2013-14 sugar season.

Chapter-4

Chapter-4
Costs, Returns, and Inter-crop Price Parity

4.1 Cost of production is one of the important considerations that goes into setting a fair and remunerative price for sugarcane. But this is purely a supply side consideration from the farmers view point. For pricing of sugarcane, we also need demand side considerations, and they come from the demand for sugar and its by-products, as sugarcane is grown primarily for sugar. This demand side is embodied in domestic and international prices of sugar so long as markets are relatively free. Therefore, these are as important as the cost of sugarcane and have been dealt in chapters-2 and 3. In this chapter, what follows will be a discussion on cost of production of sugarcane, and returns in cane cultivation vis-à-vis its competing crops.

FRP of sugarcane is determined by cost of production of cane and demand for sugar and its by products.

4.2 The latest estimates of cost of cultivation/production of sugarcane received from DES are for the year 2010-11. They are for the states of Andhra Pradesh, Haryana, Karnataka, Maharashtra, Tamil Nadu, Uttar Pradesh and Uttarakhand. But the Commission has to project the cost of production of cane for the year 2013-14 for its FRP exercise. And this is done by using actual costs for the latest three years, in this case 2008-09, 2009-10 and 2010-11, and adjusting them to the input price increases (such as those of labour, fertilizers, farm machinery, diesel, etc) till 2013-14. These projections are then modified by a correction factor (CF), which is the percentage difference in the actual costs and projected costs of 2008-09 to 2010-11. These estimates are generated first at state level and then aggregated at all India level by using the relevant state level production weights.

The latest estimates of cost of cultivation/ production pertain to the year 2010-11.

4.3 As the trend of movement of input prices is crucial for estimating cost of production per quintal, the updated data on prices of different inputs is taken in to account. It, then, computes for each state weighted composite input price indices, the weights being share of each input in total operational cost net of interest. The weighted composite input price index so estimated for the year 2013-14 is an average indicator of how much input price in general is expected to go up for that year compared to each of the latest available three years' actual input prices. The all-India paid out cost including family labour (A2+FL) per quintal and overall C2 cost per quintal are then arrived at by taking weighted average of respective states' specific estimated costs, weights being shares of production of each state in total production. As these projections are based on certain assumptions, they may turn out to be very

The Commission incorporates correction factor (CF) in cost projection as percentage of deviation of projected costs and actuals of latest three years on a rolling basis.

different from reality. The degree of deviation is known only when actual costs are available, usually after three years. Therefore, the Commission also incorporates a 'correction factor' (CF) in its projections to get better accuracy. This CF is derived as a percentage of the deviation of projected costs from actual costs on a three year rolling basis for which latest actual cost data are available.

At all-India level net returns as percentage of C2 stand at 66 percent during 2008-09 to 2010-11.

Cost and Profitability of Sugarcane during 2008-09 to 2010-11

4.4 Table-4.1 summarizes returns and rate of returns (over both A2+FL and C2 costs) during the period 2008-09 to 2010-11. At all-India level, gross returns over A2+FL cost is Rs 82791/ha, the highest level is for Karnataka (Rs 121674/ha) and lowest for Uttar Pradesh (Rs 70805/ha). The wide variation in gross returns is primarily due to high land productivity and higher recovery ratio in Karnataka vis-à-vis Uttar Pradesh. But the high productivity and high recovery in tropical region *vis-a-vis* sub-tropical region is also due to the fact that the duration of the crop is much longer (usually 13 months on an average) in former states vis-à-vis 9-10 months in latter states. So, while looking at returns across states, one should actually normalize it on per month basis. Once this is done, the state-wise variation in returns per month reduces substantially. At all India level, if one takes sugarcane crop to be 12 months' crop, the gross return over cost A2+FL works out to be less than Rs 7000/per month per ha. Keeping in mind that sugarcane is basically a fully irrigated crop, this return can be compared with wheat and rice in fully irrigated tracts of India.

4.5 Table-4.1 also gives net returns over C2 costs on per ha basis as well as rates of return over A2+FL costs and C2 costs. The rate of return over C2 cost, e.g., during this period stands at 66 per cent at all India level, and ranges from 30 percent in Andhra Pradesh to 96 percent in Karnataka, with Maharashtra at 47 percent and UP at 80 percent, falling in between this range. It may be noted that these returns are worked out on the basis of actual costs and prices received by the farmers (not those recommended by CACP or announced by the Central Government as SMP/FRP). The actual prices received by farmers are generally higher than those recommended by CACP. The implicit price, the price at which sugarcane has been sold by the sugarcane growers at the time of harvest ranges between Rs. 200 per quintal and Rs. 250 per quintal during the years 2009-10 and 2010-11, while the SMP/FRP was much below this price.

Table-4.1: Gross & Net Returns on Actual Estimates of Cost for the Years from 2008-09 to 2010-11

State	Cost A2+FL (Rs./ ha.)	Cost C2 (Rs./ ha.)	GVO (Rs./ ha.)	Gross returns (on A2+FL basis) (Rs./ ha.)	Gross Rate of return (Gross returns as a % of A2+FL)	Net Returns (on C2 basis) (Rs./ ha.)	Net Rate of Return (Net returns as a % of C2)
Andhra Pradesh	64866	107306	139877	75011	116	32570	30
Haryana	32361	73025	132199	99838	309	59174	81
Karnataka	51241	88407	172915	121674	237	84508	96
Maharashtra	73003	114034	167976	94972	130	53941	47
Tamil Nadu	76115	99807	161022	84906	112	61215	61
Uttar Pradesh	30421	56107	101227	70805	233	45119	80
Uttrakhand	34734	70757	129993	95260	274	59236	84
ALL-INDIA wt.ave	46853	78104	129645	82791	177	51541	66

Source: CS, DES

Projecting cost of Sugarcane production for 2013-14

4.6 The all-India weighted average cost C2, adjusted at 9.5 per cent recovery and inclusive of transportation cost and crop insurance premium, comes to Rs. 197.28/qtl. This is 22 per cent higher than the previous years' level of projected cost of Rs. 161.65/qtl (inclusive of transportation cost and crop insurance premium). Out of Rs. 197.28/qtl as the projected cost for the year 2013-14, Rs. 179.15/qtl is the cost of production, Rs. 15/qtl is transportation cost, and Rs. 3.13/qtl is the crop insurance premium. The cost of Rs. 179.15/qtl (adjusted for recovery at 9.5 percent) has been derived from the unadjusted cost of Rs. 184.82/qtl based on the actual cost estimates of 2008-09, 2009-10, and 2010-11.

4.7 The cost of production of sugarcane has accelerated mainly because of rise in labour cost, and other inputs such as fertilizers, diesel etc. The nominal costs of production of sugarcane have increased at a compound annual growth rate of 10 percent during the period 2006-07 to 2008-09. But during the period 2010-11 and 2013-14, the likely annual compound growth rate in cost of production of sugarcane would be 15.25 per cent.

Trends in Wage Rate in Farm Sector

During last three years i.e. from December, 2008-May, 2009 to December, 2011 – May, 2012 the compound annual growth rate in agricultural wage rate recorded at 20.17 per cent in nominal terms and 8.98 percent in real terms.

4.8 An assessment of average daily wage rate for agriculture labour, based on the data published by the Labour Bureau, Shimla has been made. The latest available data is up to May, 2012. During the last three years i.e. from December, 2008-May, 2009 to December, 2011 – May, 2012 the compound annual growth rate in agricultural wage rate has been 20.17 per cent in nominal terms and 8.98 per cent in real terms (real wage rate has been derived by deflating agricultural wage rate by CPIAL). As regards the agricultural wage rate during May, 2011 and May, 2012, Andhra Pradesh has recorded an increase in wage by 16 per cent, Karnataka by 18 per cent, Maharashtra by 14 per cent, Tamil Nadu by 31 per cent and Uttar Pradesh by 18 per cent, Punjab by 15 percent, Haryana by 4 per cent.

Input Price Movement

4.9 The Wholesale Price Index (WPI) with the base 2004-05=100 for farm inputs during June, 2011 to June, 2012 has witnessed increase by 14 per cent for fertilizers, 6 per cent for electricity for irrigation purposes, 5 per cent for pesticides and 10 per cent for light diesel oil (LDO) and 7 per cent for High Speed Diesel Oil and 13 per cent for fodder and 11 per cent for cattle feed.

At all India level the weighted average C2 cost of production for the year 2013-14 is projected at Rs. 184.82 per quintal and A2+FL cost at Rs. 120.44 per quintal.

4.10 C2 cost of production of sugarcane at all India level for the year 2013-14 is projected to be Rs. 185/qtl. This is a weighted average of state level costs, with Andhra Pradesh at Rs 235/qtl, Haryana at Rs 175/qtl, Karnataka at Rs 154/qtl, Maharashtra at Rs 180/qtl, Tamil Nadu at Rs 171/qtl, Uttar Pradesh at Rs 194/qtl and Uttarakhand at Rs 168/qtl. The A2+FL Cost at all India level is projected at Rs 120/qtl. Table 4.2 gives variations in projected C2 and A2+FL costs across states for the sugar season 2013-14. All the state level projected costs for the year 2013-14 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 179/qtl and A2+FL cost comes to Rs 117/qtl. The coefficient of variation, showing the spread of costs across states around the average cost at all India level, comes to 18 per cent in case of cost C2, and 24 percent in case of cost A2+FL.

The variation in cost across states in terms of co-efficient of variation is 18 percent for C2 and 24 percent for A2+FL.

Table-4.2: State-wise Projected Costs of Production for Sugarcane for 2013-14 Sugar Season (Adjusted for Recovery)

(Rs/qtl)

States	C2 adjusted at 9.5% recovery	A2+FL adjusted at 9.5% recovery
Andhra Pradesh	229.95	142.19
Haryana	183.34	105.71
Karnataka	130.24	79.77
Maharashtra	150.95	93.71
Tamil Nadu	176.94	151.06
Uttar Pradesh	201.68	128.65
Uttarakhand	175.11	87.83
All India	179.15	117.15
Coefficient of Variation (CV) (%)	18.10	23.91

Effective Margins Over Projected C2 and A2+FL Cost for the Sugar Season 2013-14

4.11 Table-4.3 and Chart-4.1 show margins over costs for sugarcane crop by states as well as at all India level if the FRP stays fixed at 2012-13 level of Rs. 170 per quintal. In most of the cases, if FRP is not revised upwards the margins over cost with reference to FRP would turn negative. At all India level, the margins over FRP would be negative at (-) 8.02 per cent, with Andhra having the highest negative (-) 28 per cent, Maharashtra, (-5) per cent, and Uttar Pradesh, (-12) per cent.

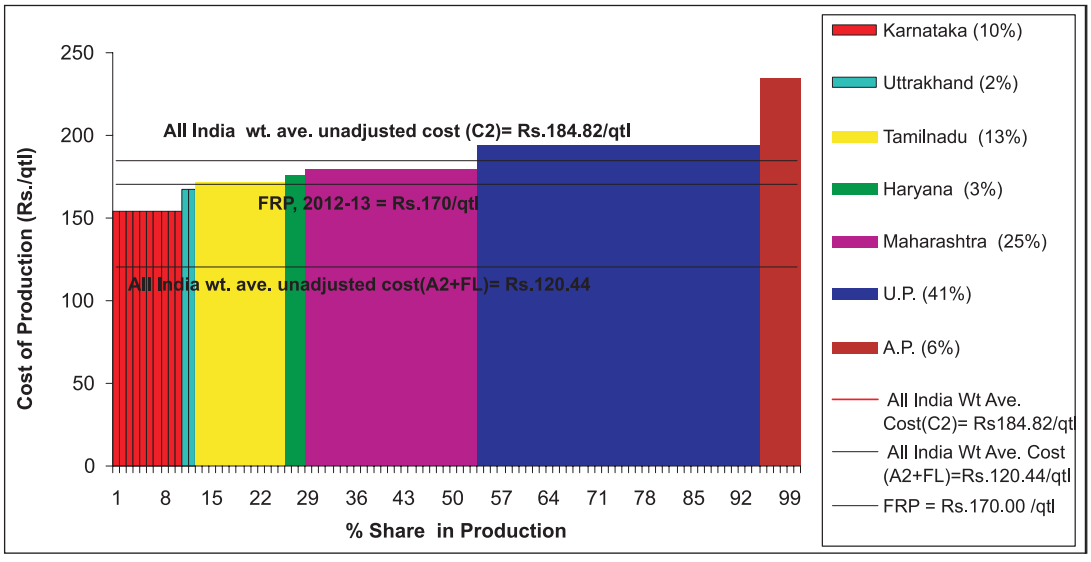
At FRP level of Rs. 170 per quintal for the year 2012-13, margins over projected cost for the year 2013-14 would be negative at 8 percent.

Table-4.3: State-wise Projected Costs of Production for Sugarcane for 2013-14 Sugar Season (Unadjusted for Recovery) (in Ascending Order of Cost)

(Rs/qtl)

States	Projected costs of production for 2013-14 (Rs./qtl)		FRP, 2012-13	Relative Shares in Production (%)	FRP margins over adjusted C2 Cost (%)	FRP margins over adjusted A2+FLCost (%)
	C2	A2+FL				
Karnataka	154.37	94.54	170.00	10	10.12	79.81
Uttarakhand	167.74	84.13	170.00	2	1.35	102.07
Tamil Nadu	170.98	145.97	170.00	13	-0.58	16.46
Haryana	175.23	101.03	170.00	3	-2.98	68.26
Maharashtra	179.55	111.47	170.00	25	-5.32	52.51
Uttar Pradesh	194.04	123.78	170.00	41	-12.39	37.34
Andhra Pradesh	234.80	145.18	170.00	6	-27.60	17.09
All India Wt. Ave.	184.82	120.44	170.00	100	-8.02	41.14

Chart-4.1: State-wise Projected costs of Sugarcane Production (in Ascending Order) for the Year, 2013-14



Inter-Crop Price Parity

The inter crop price parity in returns between sugarcane and other competing crops like paddy and wheat will substantially reduce if normalised for duration of crop cycles of these crops.

4.12 Table 4.4 gives a picture of comparative returns on crops competing with sugarcane. It appears that sugarcane is a very profitable crop vis-à-vis crops like wheat, paddy and cotton. Net rate of return (over C2) turns out to be 66 per cent in sugarcane during 2008-09 to 2010-11 at all India level, compared with paddy (19%), cotton (27%) and wheat (36%). However, this can be misleading. This is because 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 belt and about 10 months in the north. 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 normalised 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 4.4, per hectare returns over C2 for sugarcane at all-India level stands at Rs. 4295 per month as against Rs. 5368 and Rs. 5789 for paddy grown in Punjab and Haryana respectively, and Rs. 4474 for wheat grown in Haryana. Once these things are taken into account, the inter-crop parity will improve sharply, and sugarcane will be very near to irrigated cotton or irrigated wheat and paddy.

At all India level per hectare returns over C2 for sugarcane at Rs. 4295 per month as against Rs. 5368 and Rs. 5789 for paddy grown in Punjab and Haryana respectively.

Table-4.4: Inter-crop 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.)	Profit-abil-ity (Net Returns as % of C2)	Per Month Re-turns over A2+FL (Rs./ ha.)	Per Month Returns over C2 (Rs./ha.)
SUGARCANE								A2+FL	C2
All-India (Average between 2008-09 to 2010-11)	46853	78104	129645	82791	177	51541	66	6899.28	4295.09
U.P. (Average between 2008-09 to 2010-11)	30421	56107	101227	70805	233	45119	80	7080.54	4511.91
Karnataka (Average between 2008-09 to 2010-11)	51241	88407	172915	121674	237	84508	96	8690.99	6036.30
Maharashtra (Average between 2008-09 to 2010-11)	73003	114034	167976	94972	130	53941	47	6783.75	3852.96
PADDY									
All-India (Average between 2007-08 to 2009-10)	20033	29847	35525	15492	77	5677	19	3872.97	1419.34

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.)	Profit-abil-ity (Net Returns as % of C2)	Per Month Re-turns over A2+FL (Rs./ ha.)	Per Month Returns over C2 (Rs./ha.)
Punjab (Average between 2007-08 to 2009-10)	24379	43574	65046	40667	167	21472	49	10166.68	5367.98
Haryana (Average between 2007-08 to 2009-10)	24207	43449	66605	42397	175	23156	53	10599.33	5789.01
A.P. (Average between 2007-08 to 2009-10)	29352	46032	55440	26088	89	9407	20	6521.97	2351.85
U.P. (Average between 2007-08 to 2009-10)	17941	27591	34059	16118	90	6468	23	4029.50	1617.00
Karnataka (Average between 2007-08 to 2009-10)	24655	36380	50844	26189	106	14464	40	6547.25	3615.93
COTTON									
All-India (Average between 2007-08 to 2009-10)	24196	35053	44502	20306	84	9449	27	5076.43	2362.19
Gujarat (Average between 2007-08 to 2009-10)	26628	37825	53586	26958	101	15761	42	6739.45	3940.33
Maharshtra (Average between 2007-08 to 2009-10)	22932	31113	34160	11228	49	3048	10	2807.00	761.92
WHEAT									
All-India (Average between 2008-09 to 2010-11)	19092	31889	43424	24332	127	11534	36	6082.90	2883.52
Punjab (Average between 2008-09 to 2010-11)	20411	38897	52598	32188	158	13702	35	8046.96	3425.43
Haryana (Average between 2008-09 to 2010-11)	21797	40489	58385	36588	168	17896	44	9147.04	4473.99
U.P. (Average between 2008-09 to 2010-11)	20688	33821	43601	22913	111	9780	29	5728.29	2445.02
Maharashtra (Average between 2008-09 to 2010-11)	24084	33838	35407	11323	47	1569	5	2830.75	392.35

** Sugarcane as a whole is about 12- month crop, and paddy as well as wheat, 4 - month crops*

To wrap up, the projected C2 cost of sugarcane at all India level for the year 2013-14 comes to Rs 197/qtl (Rs 179 plus Rs 18), and A2+FL cost comes to Rs 135/qtl (Rs 117 plus Rs 18). Both are adjusted for 9.5 percent recovery level.


Chapter-5

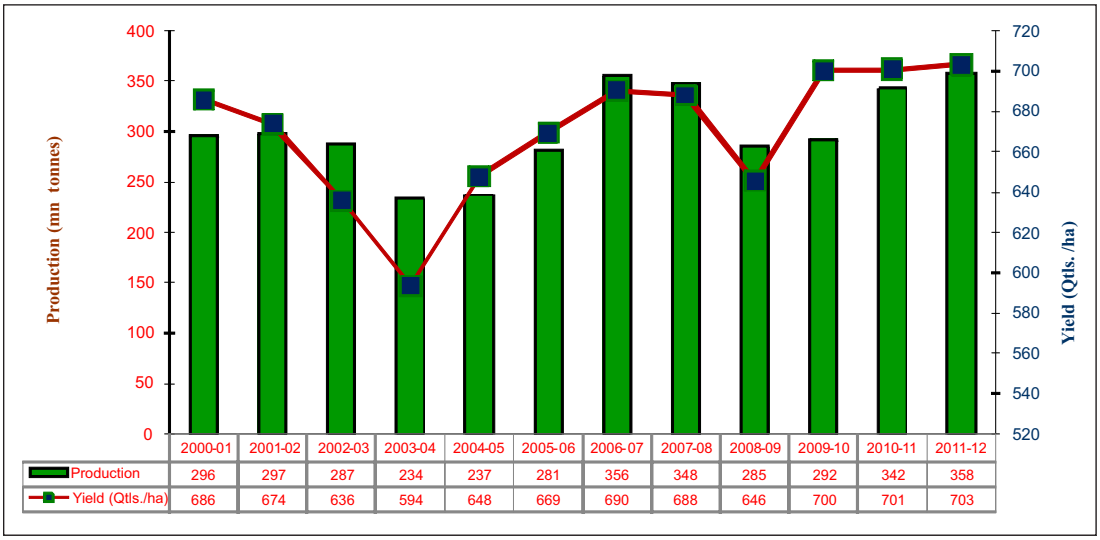
Chapter-5
Productivity: Different Dimensions

An Aerial View of Growth in Productivity Level

5.1 The long term compound annual rate of growth (CARG) of land productivity of sugarcane at all India level during the decade of 2000s (TE 2001-02 to TE 2011-12) has accelerated to 1.02 percent per annum compared to 0.54 percent per annum observed during the preceding decade of 1990s (TE 1991-92 to TE 2000-01). At the same time, CV in the productivity level has also increased to 5.14 percent during 2000s compared to 3.67 percent during 1990s, indicating more fluctuations in yield levels during recent years. The year-wise production and land productivity during 2000-01 to 2011-12 are depicted in chart-5.1.

Growth in yield of cane accelerated to 1.02% p.a. in the decade of 2000s compared to 0.54% p.a. during 1990s.

Chart-5.1 : Production and Yield of Sugarcane in India During 2000-01 to 2011-12



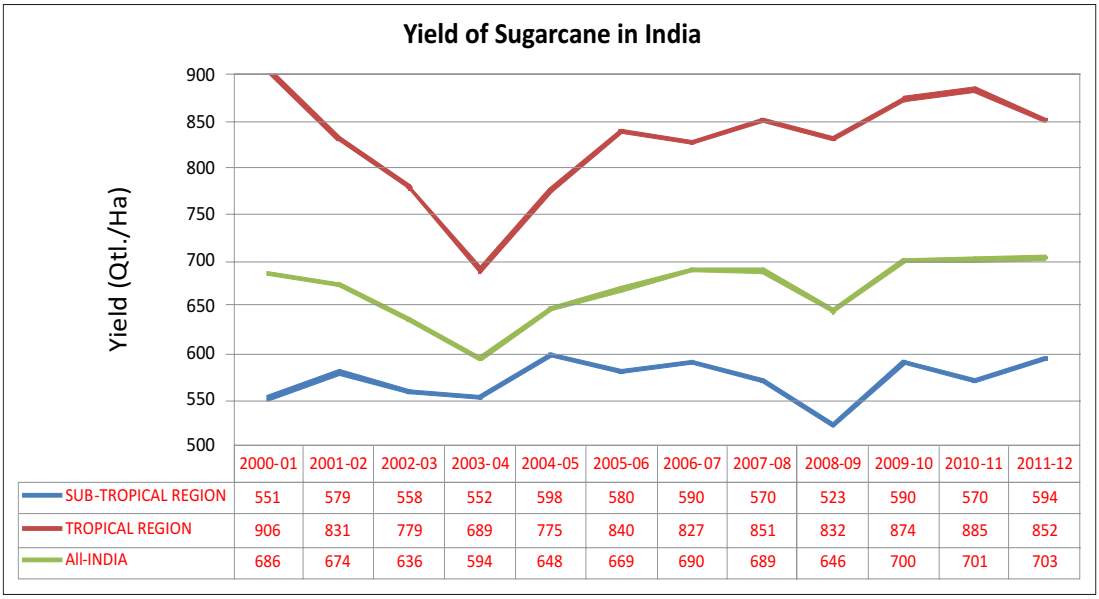
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Production	296	297	287	234	237	281	356	348	285	292	342	358
Yield (Qtls./ha)	686	674	636	594	648	669	690	688	646	700	701	703

Source: DES, Ministry of Agriculture

5.2 Disaggregated analysis shows that productivity improvement is more pronounced in tropical region compared to sub-tropical region (chart-5.2).

Tropical region has significantly higher yields compared to sub-tropical region.

Chart-5.2 : Yield of Sugarcane in Tropical and Sub-tropical Regions of India During 2000-01 to 2011-12



	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
SUB-TROPICAL REGION	551	579	558	552	598	580	590	570	523	590	570	594
TROPICAL REGION	906	831	779	689	775	840	827	851	832	874	885	852
All-INDIA	686	674	636	594	648	669	690	689	646	700	701	703

Source: DES, Ministry of Agriculture.

Whether the yield differentials in two broad regions are due to natural endowment of weather/soil conditions or due to technology or farm practices is a matter of further investigation.

Relationship Between Cost of Production and Yield Rates

5.3 As noted in chapter-1, cost of production (CoP) is one of the factors (besides other relevant factors) that is taken into consideration by the Commission while recommending FRP of sugarcane. Given the fact that CoP has been increasing year after year, 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 rates.

5.4 To empirically test the hypothesis of inverse relationship between real CoP (at 2010-11 prices) and yield levels (adjusted for recovery rates), 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:

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

where CoP = real Cost of Production,

y = yield rate,

e = elasticity; and

a = constant

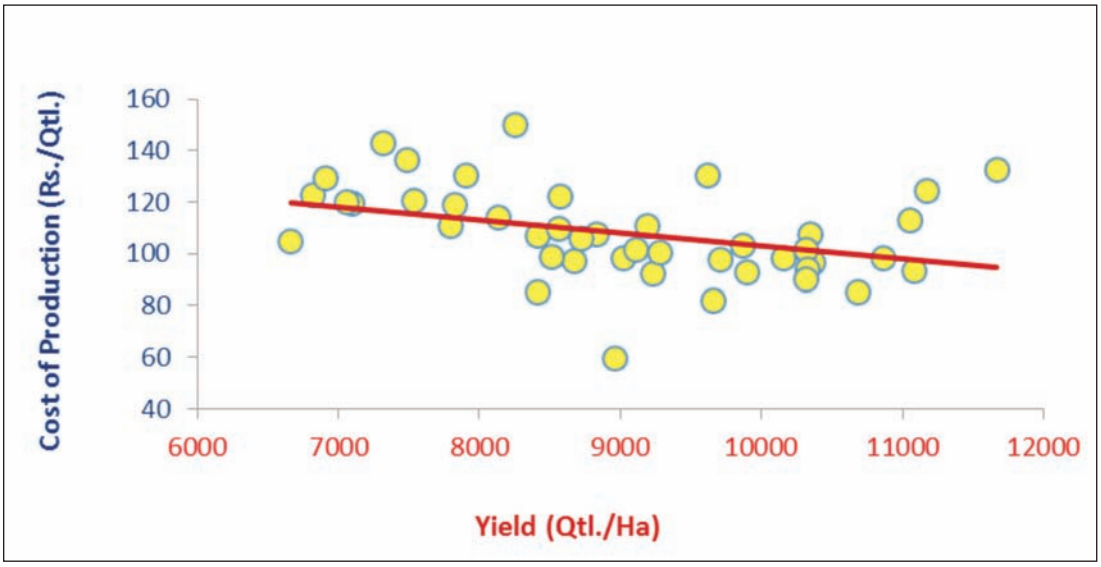
5.5 The panel data which included tropical and sub-tropical regions did not give any statistically significant results. Then panel data was partitioned into tropical and sub-tropical regions and two separate regressions were undertaken. The result of regression analysis for tropical region gave the following statistically significant (with 95% level of confidence) result :

$$\text{Log CoP} = 8.602689 - 0.432327 * \log y$$

The above regression result implies that for every 10 percent increase in yield level in tropical region, it will result in decrease in real cost (CoP) by 4.32 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-5.3).

Real cost of production of cane can be brought down by 4.32% in tropical region if yield level increases by 10%.

Chart-5.3 : Relationship Between Cost of Production and Yield Rates for Tropical Region (Constant Prices 2010-11 =100)



5.6 But the result of sub-tropical region remained statistically insignificant and therefore not reported here. It needs further study to understand the dynamics between yields and costs.

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

5.7 According to the existing practice, production per unit of area is taken into consideration to compare land productivity of a given crop across states. Based on this criterion, one may infer that Maharashtra with yield rate of 801 qtl./ha during 2011-12 is more efficient compared to U.P. which has 596 qtl./ha of yield of sugarcane. However, this approach reflects only one dimension of land productivity. But since the duration of sugarcane crop in the field varies across states, and since it requires varying quantities of water for irrigation leading to different recovery rates, especially in tropical and sub-tropical regions, there

is need to look at other dimensions of land productivity after adjusting for the duration of the crop, its water intake, and its recovery rates. This is important as land and water are increasingly becoming scarce in India with high opportunity costs. Therefore, the real resource cost of growing sugarcane in different regions cannot be correctly compared unless land productivity is normalized for the time duration of the crop, its water intake, and its recovery rate. An attempt has been made in this direction and 'adjusted yields' of sugarcane in the states of Maharashtra and Uttar Pradesh have been derived in table-5.1.

Table-5.1 : Sugarcane Yields Adjusted for Crop Duration, Recovery Rates and Water Requirements: Cases of Maharashtra and UP, 2011-12

Season / Variety	% Share	Production (lakh MT)	Land Productivity (Q/Ha)	No. of standard irrigations (of 7.5 cms. each) per ha.	Irrigation Requirement (in terms of lakh litres) per ha. {col. (5)x 7.5}	Recovery Rate (%)	Land Productivity after adjusting for recovery rate (Q/Ha)	Crop duration (months)	Sugarcane Productivity per ha per month after adjusting for recovery rate {Q/(M*Ha)} {col(8)/col(7)}	Water Productivity per lakh lit of water after adjusting for recovery rate & crop duration {Q/(Ha*Months *litres)} {col(8)/col(6)}
1	2	3	4	5	6	7	8	9	10	11
Maharashtra										
Adsali	10	122.64	1200.00	32.50	243.75	12.30	1611.35	17.00	94.79	6.61
Pre-Seasonal	30	275.94	900.00	27.50	206.25	12.00	1179.04	14.50	81.31	5.72
Suru	20	143.08	700.00	22.50	168.75	11.45	875.00	12.00	72.92	5.19
Ratoon	40	276.94	650.00	22.50	168.75	10.50	745.09	11.00	67.74	4.42
Total/ weighted Average	100	818.60	800.97	25.00	187.50	11.32	987.88	12.85	75.55	5.18
UP										
Plantation	60	892.67	655.41	8.00	60.00	9.50	679.74	10.00	67.97	11.33
Ratoon	40	395.52	536.24	7.00	52.50	8.65	506.38	9.00	56.26	9.65
Total/ weighted Average	100	1288.19	595.83	7.60	57.00	9.16	610.40	9.60	63.29	10.66
Efficiency gap in UP w.r.t. Maharashtra[1]			25.61						16.23	-105.74

Notes: 1 ha. = 100 meter length X 100 meters width =10,000 sq. meters and 1 meter = 100 cms. Since 1 cubic meter of water = 1000 litres, therefore 1 ha would require 1 lakh litres of water for 1 cm. height.
2. Maharashtra and UP together accounted for over 60 per cent of the country's production of sugarcane during 2011-12.
Source: Constructed by the Commission on the basis of discussions with officers of concerned states.

[1] *Efficiency gap is defined as (1-e)*100 where e = yield of UP/yield of Maharashtra*

5.8 It emerges from table-5.1 that UP is less efficient to the tune of 26 percent compared to Maharashtra 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 duration of the crop and recovery rate are taken into consideration, efficiency gap in UP reduces to 16 percent. Furthermore, on normalising for all three factors *viz*. crop duration, recovery rate and water consumption, efficiency gap turns negative in UP, meaning thereby that U.P. is more efficient compared to Maharashtra by 106 percent when productivity is measured on the basis of per lakh litres of water consumed, after duly adjusting for crop duration and recovery rates. This analysis has high relevance for India, as it is projected by the International Water Resources Group that India will be 50 percent short of water by 2030. Given that sugarcane is a very water intensive crop, its long term development must ensure that it is in line with availability of sufficient water and its cost. A crude, back of the envelop, calculation shows that bringing irrigation water through major and medium irrigation schemes or through borewells in states like Maharashtra costs more than two to three times than in, say eastern Uttar Pradesh or even Bihar. What this indicates is that the "real" cost (domestic resource cost) of water in Maharashtra is much higher than, say in UP. If this costing is incorporated in calculating water productivity, the difference in sugarcane yields will be so high that, Uttar Pradesh and presumably Bihar, would turn out to be the most efficient producers of sugar per unit cost of water, adjusted for time duration and recovery. Historically, it was eastern UP and Bihar as the seat of sugarcane before licensing regime shifted the sugarcane belt to western India because licenses were given on priority to cooperatives, and cooperative had their roots in western India. But western India, especially Maharashtra is not blessed with natural endowment of water, as eastern UP or Bihar. In fact in Maharashtra, sugarcane cultivation, which is on about 3 percent of the total cropped area of the state, takes away almost 60 percent of irrigation water in the state, leading to massive inequity in the use of water within the state. Future growth of cane in Maharashtra is likely to be severely hampered by scarce water supplies unless much of sugarcane is put on drip irrigation or varieties are evolved that use less water. From a long term perspective, wisdom lies in aligning India's natural comparative advantage (resource endowment) with the cropping patterns. And from that point of view, future growth has enormous potential in eastern UP and Bihar, provided we get our water pricing policies right and create an environment of investments in these two states. This is what will give India a competitive edge globally and in a sustainable manner.

UP is 106% more efficient compared to Maharashtra in terms of water productivity after adjusting for crop duration and recovery rates.

"Real" cost (domestic resource cost) of water in Maharashtra is much higher than in UP.

3% of the total cropped area of Maharashtra takes away almost 60 percent of irrigation water in the state for cane cultivation.

5.9 Given the increasing scarcity of water across states in varying magnitudes, it is all the more critical to assess water required per unit production of sugar as the main purpose of cultivation of the crop under reference is not to produce cane for the sake of it but to produce sugar. Therefore, it makes sense to work out water consumed per unit production of sugar in major cane producing states. To begin with, it is worked out for two states namely Maharashtra and UP and is presented in table-5.2:

Table-5.2 : Water Requirement for Production of One Kg of Sugar in Major Sugar Producing States

S. No.	Parameter	Maharashtra	UP
1	Land Productivity (quintal/ha)	800.97	595.83
2	Average Recovery Rate (%)	11.32	9.16
3	Average no. of irrigations per ha.	25.00	7.60
4	Average height of water (in cms.) per irrigation	7.50	7.50
5	Average water required (in lakh liters) for one irrigation of 1 cm height per ha.	1.00	1.00
6	Average Water Requirement (lakh Liters) per ha for entire sugar season {row(3)*row(4)*row(5)}	187.50	57.00
7	Production of sugar (quintal/ ha) {row(1)*row(2)/100}	90.67	54.58
8	Water requirement for production of one quintal of sugar (lakh litres) {row(6)/row(7)}	2.07	1.04
9	Water requirement for production of one kg of sugar (litres) {row(8)*100000/100}	2068	1044

Source: Deduced from table-5.1

To produce I kg of sugar, it takes just 1044 litres of water in UP compared to 2068 litres in Maharashtra.

5.10 It is evident from table-5.2 that Maharashtra consumes an additional 1000 liters (over and above what it takes UP to produce sugar) for every kilogram of sugar produced, and since real cost of water in Maharashtra is at least 2 to 3 times higher than that in UP, it raises an issue of comparative advantage. The Commission is of considered opinion that this needs to be investigated further by a special study with an eye on long term growth of this industry.

India commands 2nd position in the world in terms of cane production but is ranked 11th in terms of its yield rate.

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

5.11 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-5.3.

Table-5.3 : Gap in Yield Level of Sugarcane in India *vis-a-vis* Benchmark[2] Country

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
2nd {17.9%}	11th {66.5 tonnes/ha}	Colombia (106 tonnes/ha, 1.9%), Philippines (87 tonnes/ha, 2%), Guatemala (86 tonnes/ha, 1%), Argentina (83 tonnes/ha, 1.7%), Australia (80 tonnes/ha, 1.9%) and Brazil (79 tonnes/ha, 40%)

Source: Collated from FAO
Notes: 1. Above figures are based on TE 2010
2. Figures in parentheses indicate yield and share of production respectively in the total world production.
3. Countries with less than 1% share of production in total world production have not been considered.

Efficiency gap in India's yield level is 38% compared to that of benchmark country (Colombia) in the world.

5.12 Though India commands second position after Brazil in terms of its share in the total world production of sugarcane, its land productivity is way behind that of benchmark country (Colombia) and has efficiency gap[3] of 38 percent in its land productivity. In order to enhance the domestic productivity level, it is imperative to deepen the understanding as to how the benchmark countries have accomplished such a high level of performance. It is, therefore, recommended that a special study be undertaken to examine the best international farming practices, the factors (both natural and man-made) that have helped benchmark countries achieve high levels of productivity and also to explore the possibility of adapting those practices/factors in Indian conditions after taking its agro-climatic conditions and other relevant factors into consideration.

5.13 To recapitulate, on normalising land productivity for the time duration of the crop, its water intake, and its recovery rate, it emerges that UP, a major cane producing state in sub-tropical region, is far more efficient compared to Maharashtra in tropical region, especially from the point of view of cost of water per unit of sugar. Taking cognisance of projection made by the International Water Resources Group that India will be 50 percent short of water by 2030 coupled with the fact that sugarcane is a very water intensive crop, its long term development must ensure that it is in line with availability of sufficient water

[2]*The country that has the highest yield in the world is taken as 'benchmark' country.*
[3]*Efficiency gap = (1-e)*100, where e = yield of India/yield of benchmark country.*

and its cost. It is, therefore, recommended that in a state like Maharashtra, sugarcane productivity needs to be maximized per unit of water and its cost. From that point of view, drip irrigation needs to be promoted which can save almost 40 to 50 percent water, which can be used for other 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 on long term basis.


Chapter-6

Chapter-6

Towards a Hybrid Formula for Pricing of Sugarcane: Revenue Sharing with Minimum FRP

Pricing of Sugarcane: Mandate and the Current System in Vogue:

6.1 The Commission has been recommending the prices of sugarcane (SMP/FRP) after taking into account various considerations that are given in its mandate and terms of reference. These considerations have been listed in detail in chapter-1. Suffice it to say here that these considerations range from the cost of production of cane to the price of sugar and its by-products. In Chapter-2, we also appraised the efficacy of sugarcane pricing policy by looking at the SMP/FRP as a percentage of sugar prices to see how far these prices have been really 'fair and remunerative'. To recapitulate, it was found that the average SMP/FRP (adjusted for actual recovery ratio) as percentage of sugar price (12 years' period from 2000-01 to 2011-12) was about 58% of sugar prices. But the state level pricing of cane through SAP or through 'negotiated price' gave the cane farmers, on an average, between 72 percent (in UP) and 75 percent (in Maharashtra) of ex-mill sugar prices prevailing in those states during the period 2004-05 to 2011-12. Obviously, SAP or 'negotiated price' at state level, whichever the way it was reached at, was much more remunerative to farmers than the SMP/FRP announced by the Centre. This made SMP/FRP mechanism almost irrelevant to sugar sector, except for calculating the levy sugar price. The levy on sugar is an 'implicit tax' imposed on the producers of cane and sugar to subsidize the low income consumers through PDS. However, the problem with SAP or 'negotiated price' at the state level is that it is highly uncertain and volatile in terms of percentage of sugar prices. Sometimes, this SAP goes as high as 96 percent of sugar price in one year leading to large cane arrears and then drops to below 50 percent of sugar price in some other years (see Table 2.4 for details on UP). So the real challenge in pricing of cane is bringing about some stability and certainty in the system, but also ensuring that farmers do get at least what they have been getting on an average, say between 70 to 75 percent of the sugar price. The other challenge is to find out a rational and more scientific basis of this 70-75 percent of sharing of sugar prices than the current system of SAP or 'negotiated pricing' at the state level leads to. In this

SAP or negotiated price at state level is more remunerative than SMP/FRP but is highly uncertain and volatile.

chapter, we make an attempt in this direction and propose a Hybrid Formula, which combines the 'revenue sharing principle' with some rock bottom Minimum FRP (MFRP).

Revenue Sharing Principle for Pricing of Sugarcane:

Total Revenue Pot generated from cane-sugar value chain needs to be shared equitably between farmers and millers.

6.2 It is well known that sugarcane in India is produced primarily for sugar. But in that process of converting sugarcane into sugar, there are some by-products, such as molasses, bagasse and press mud, that are also produced in the first stage of processing. And these by-products too have a value, along with the main product, sugar. The Total Revenue Pot (TRP), therefore, generated from the cane-sugar value chain is the value of sugar and its first stage by-products from a given quantity of cane. This TRP, in principle, needs to be shared between the two major stakeholders, namely the farmers who produce sugarcane and the millers who crush and convert sugarcane into sugar and its by-products. A scientifically sound, and economically fair principle to share the TRP between farmers and millers would be to distribute it in the ratio of their relative costs in producing cane and converting that cane into sugar and its by-products. This is because both the stakeholders in the cane-sugar value chain incur certain costs and take the risk to create value in this chain. And it is only fair that they share the rewards too in the same ratio as their costs and risks.

6.3 To empirically map this revenue sharing principle, one needs to get (1) the cost of producing cane by farmers, and (2) cost of converting cane into sugar and its by-products by millers. Both these costs need to be for comparable years, preferably for three years to avoid any aberration of a single year problem. The cost of production of cane is compiled by the DES under its CS scheme, while the cost of conversion of cane into sugar and by products is compiled by the Tariff Commission. The comparable years, for which both sets of cost data are available, are 2007-09. The cost ratio of two stakeholders, farmers and millers, in growing and processing one quintal of cane comes to 68.76: 31.24, to be exact, at an all India recovery ratio of 10.31 during those years (see Appendix 6.1 for details). These ratios will change with varying recovery ratios and prices of sugar. In any case, what is important is that there is a ratio in which the TRP (value of sugar and its by-products) needs to be shared between farmers and millers. As an illustration, if value of sugar from a quintal of cane is say Rs 'X', and from its by-products say 9 percent of the value of sugar (Rs 0.09X), then the share of farmer would be Rs {0.6876 (X+0.09X)} = 0.75X, say 75 percent of the value of sugar. But since the total revenue pot (X+0.09X) can change depending upon sugar recovery ratio, price of

sugar, recovery of by-products and their prices, the price that farmer gets for sugarcane as a percent of sugar prices will therefore also vary (see table-A.2 in Appendix 6.1).

6.4 But since the sugar prices can be very volatile, revenue sharing principle can bring in much uncertainty about sugarcane pricing for farmers. Given their limited capacity to absorb the risks of high volatility of sugar (and therefore sugarcane) prices, one may have to think of a hybrid approach wherein we combine the revenue sharing principle with some sort of a minimum price fixed for sugarcane, call it Minimum FRP (MFRP). One way to proceed in this direction is to fix the MFRP of sugarcane on the basis of trend in sugar prices minus one or half of a standard deviation, say one or half sigma, which sets a floor for farmers as far as cane prices are concerned. But in reality they are likely to get much higher prices than this MFRP, depending upon the price of sugar. This pricing mechanism (dovetailing revenue sharing with MFRP) is explained in detail below.

Hybrid approach combining revenue sharing principle with a minimum FRP needs to be evolved.

Towards a Hybrid Formula: Revenue Sharing with MFRP

6.5 Under the existing policy for sugarcane pricing, farmers receive FRP/SMP based on the recovery rate. As per the best international practices, it is proposed to switch to revenue–sharing arrangement, based on sugar prices, between the farmers and sugar industry. Our analysis based on relative costs of farmers and millers in the cane-sugar value chain, suggested that the share of farmers in the TRP should be about 69 percent, which amounts to roughly 75 percent of ex-mill value of sugar. We also saw that over a period of 2004-05 to 2011-12, farmers in UP got, on an average, around 72 percent of ex-mill sugar prices and in Maharashtra it was 75 percent of ex-mill sugar prices (see table-2.4). We have, therefore, worked out permutation combinations with two alternative possibilities: 70 and 75 percent of sugar prices. Table 6.1 shows what the farmers would have got had they followed the revenue sharing formula vis-à-vis what is recommended by the Central Government as SMP/FRP. It is clear that on an average for 12 years (2000-01 to 2011-12), FRP pricing of cane has been 27 to 36 percent below what it would have been under the revenue sharing formula with 70 to 75 percent sharing of sugar price, respectively.

Table-6.1: Comparison of FRP and Corresponding Sugarcane Price Under Revenue-sharing

(Rs/qtl)

Year	Ex-mill prices for sugar	FRP/SMP (adjusted for All-India recovery rate)	Recovery rate (%)	Revenue sharing @ 70%			Revenue sharing @ 75%		
				Farmers' share in terms of sugar	Converted in terms of price of sugarcane (Rs/qtl)	Diff between price of cane through Revenue sharing & FRP as a % of FRP	Farmers' share in terms of sugar	Converted in terms of price of sugarcane (Rs/qtl)	Diff between price of cane through Revenue sharing & FRP as a % of FRP
2000-01	1347.52	73.40	10.48	943.26	98.85	34.68	1010.64	105.92	44.30
2001-02	1310.88	75.00	10.27	917.62	94.24	25.65	983.16	100.97	34.63
2002-03	1182.45	84.90	10.38	827.72	85.92	1.20	886.84	92.05	8.43
2003-04	1365.28	87.80	10.22	955.70	97.67	11.24	1023.96	104.65	19.19
2004-05	1607.87	89.10	10.17	1125.51	114.46	28.47	1205.90	122.64	37.64
2005-06	1749.88	90.30	10.22	1224.92	125.19	38.63	1312.41	134.13	48.54
2006-07	1363.44	90.60	10.16	954.41	96.97	7.03	1022.58	103.89	14.67
2007-08	1397.74	92.90	10.30	978.42	100.78	8.48	1048.31	107.98	16.23
2008-09	2127.86	90.70	10.05	1489.50	149.69	65.04	1595.90	160.39	76.83
2009-10	2981.63	139.40	10.20	2087.14	212.89	52.72	2236.22	228.09	63.63
2010-11	2653.92	148.9	10.17	1857.7	188.9	26.9	1990.4	202.4	35.9
2011-12	2762.62	155.2	10.17	1933.8	196.7	26.7	2072.0	210.7	35.8
Average						27.2			36.3

Source: Directorate of Sugar, Ministry of Consumer Affairs, Food and Public Distribution.
Note: 1. The year refers to Oct-Sept marketing year
2. The recovery rate is available till the year 2010-11 and it is assumed to remain the same for 2011-12
3. FRP/SMP is linked to a basic recovery rate. For 2000-01 to 2004-05 sugar sesaon, it was 8.5%. SMPs for sugar seasons 2005-06 to 2008-09 has been linked to basic recovery of 9%. From 2009-10 onwards, it is linked to 9.5 recovery rate.
4. FRP/SMP has been adjusted by the actual recovery rate at All-India level
5. Two scenarios have been envisaged: one at 70% share in total revenue for the farmers and the other at 75% share in total revenue.
6. The corresponding sugarcane price has been derived from the farmers share in the sugar price by linking it with the recovery rate which is the percentage of Sugar Production to the Sugarcane crushed.

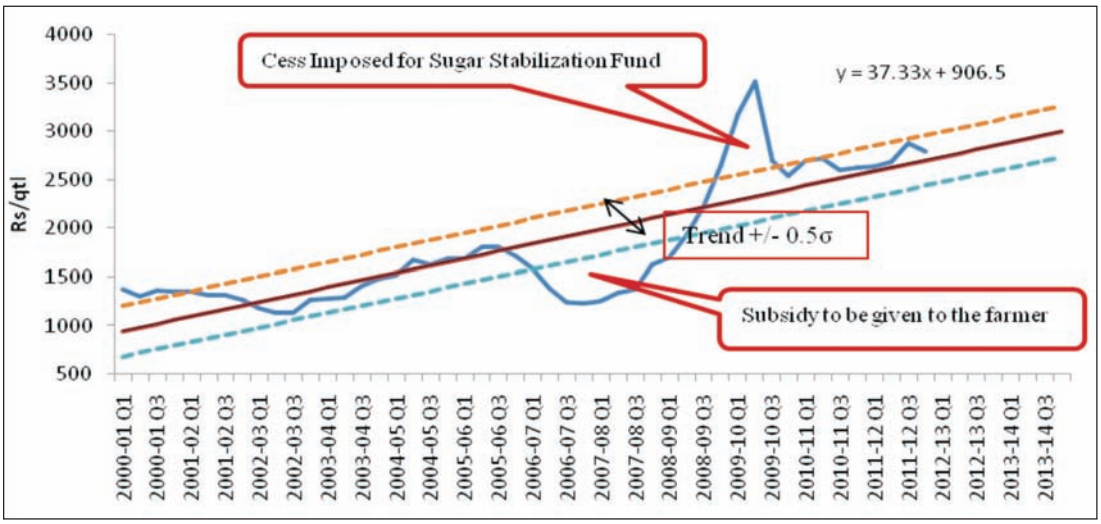
Sugar Stabilisation Fund created would be source of subsidy for farmers during downward sugar cycle.

6.6 Thus, there is no doubt that revenue sharing principle would be much better than the SMP/FRP pricing mechanism. But as pointed out earlier, since the sugar prices are quite volatile, there is need to put a rock-bottom protective price for the farmers, namely the MFRP. To understand where this MFRP can be fixed, we have studied and analyzed the behavior of actual quarterly domestic prices (ex-mill prices) of sugar over the period 2000-01 to 2011-12. A trend line has been fitted against the domestic prices during this period. This trend line can be projected to get the future price of sugar as a guiding price for revenue sharing between the farmers and sugar industry. We have also looked at the standard deviation in these prices, and drawn two more lines around the trend line, which are at

trend +/- half a standard deviation from the trend. If prices go below the lower line (trend minus half the standard deviation), then farmers would be given a subsidy equivalent to the difference. During the upward cycle, if prices rise higher than the upper line (trend plus half the standard deviation), then a cess needs to be imposed on the realized revenue to fund a Sugar Stabilization Fund. This Fund could be the primary source of the subsidy to the farmers during the downward swings of sugar prices faced by the sugar industry.

Sugar Stabilisation Fund could be the main source of the subsidy to the farmers during the downward swings of sugar prices

Chart-6.1: Trend in Domestic Prices of Sugar and Half a Standard Deviation Around the Trend



Source: Directorate of Sugar
Note: 1. σ, refers to the standard deviation, works out to be 644.30.
2. Values for 2012-13 and 2013-14 have been extrapolated using the trend line fitted.

6.7 For the 2013-14 sugar season, if one extrapolates sugar prices using the trend fitted in Chart 6.1, the price of sugar comes to Rs 2904/qtl. And if one adopts the revenue sharing concept, the corresponding price to be received by the farmer would come to Rs 207 (@ 70% share) and Rs 222 (@75% share) at all India recovery level of 10.17. But as discussed earlier in detail in Chapters-2 and 3, the likely scenario for sugar prices is going to be between Rs 3000-3700/qtl during 2013-14. This means farmers are likely to get a sugarcane price between Rs. 214 to Rs. 263/qtl under the 70% sharing formula, and between Rs. 229 to Rs. 282/qtl under 75% sharing principle.

6.8 But since we do not know for sure what the price of sugar would be in 2013-14, and farmers do want to know some minimum price they can be assured, this necessitates dovetailing the revenue sharing arrangement with MFRP to limit the losses of farmers during any downward movement in prices. This MFRP may be derived from the trend minus half the standard deviation below the trend line fitted as shown in Chart 6.1 and Table 6.2. The table 6.2 presents two scenarios wherein the farmers receive 70 percent and 75 percent of the revenue expected when the sugar prices are 0.5 σ below the trend line. The corresponding price for sugarcane (derived through the recovery rate) would

serve as the floor price i.e MFRP which the farmers would receive even when sugar prices fall below this level. The difference between the actual (lower) sugar price and MFRP would be financed by the Sugar Stabilization Fund (as explained above). According to table-6.2, the MFRP for 2013-14 comes out to be Rs 183.8(@ 70%) and Rs 196.9 (@ 75%). It is interesting to note that this MFRP (Rs 196.9 at 75%) almost covers the comprehensive cost of production and transportation of sugarcane farmers (the projected C2 cost of sugarcane plus the transportation of cane to mills and premium on insurance) at all India level for the year 2013-14 comes to Rs 197.28/qtl as explained in chapter 4). Thus, the farmers and industry would share the falling revenues during the downward swing of the sugar cycle in such a manner that farmers still get the rock bottom MFRP, which in the case cited above comes to almost equal to their projected costs of production and transportation for the year 2013-14.

Table-6.2: Minimum FRP to be paid to the Farmers in the Hybrid Formula (Revenue Sharing Arrangement with MFRP)

(Rs/qtl)

Year	Sugar prices, extrapolated based on Trend -σ /2	Recovery rate (%)	Value of sugar produced from 1 qtl of cane crushed {col. (2)*col.(3)/100	Corresponding MFRP based on revenue sharing formula @	
				70% Sharing {Col(4)*0.70}	75% sharing {Col(4)*0.75}
1	2	3	4	5	6
2000-01	640.34	10.48	67.11	46.98	50.33
2001-02	789.66	10.27	81.10	56.77	60.82
2002-03	938.98	10.38	97.47	68.23	73.10
2003-04	1088.30	10.22	111.22	77.86	83.42
2004-05	1237.62	10.17	125.87	88.11	94.40
2005-06	1386.94	10.22	141.75	99.22	106.31
2006-07	1536.26	10.16	156.08	109.26	117.06
2007-08	1685.58	10.30	173.62	121.53	130.21
2008-09	1834.90	10.05	184.41	129.09	138.31
2009-10	1984.22	10.20	202.39	141.67	151.79
2010-11	2133.54	10.17	216.98	151.89	162.74
2011-12	2282.86	10.17	232.17	162.52	174.13
2012-13	2432.18	10.17	247.35	173.15	185.51
2013-14	2581.50	10.17	262.54	183.78	196.90

Notes 1.: σ refers to the standard deviation of the actual ex-mill sugar prices over the period (2000-01 to 2011-12).
2. Prices for 2012-13 and 2013-14 are extrapolated.

6.9 Thus, to recap, it would be good for the farmers and the millers to adopt a Hybrid Formula based on revenue sharing principle and some MFRP for pricing of sugarcane. This will bring about greater certainty, stability and rationality into the system and will go a long way in putting sugar sector on a higher trajectory of growth. Pending the adoption of this formula, Commission recommends FRP in Chapter-7 based on various considerations, as has been done in previous years.


Chapter-7

Chapter-7

Recommendations for Fair and Remunerative Price for Sugarcane (FRP)

Comfortable demand-supply balance expected in 2013-14 sugar season.

7.1 While working out an appropriate FRP for sugarcane for the sugar season 2013-14 the Commission has duly considered the factors as enumerated in Chapter-1. On demand side, likely consumption of sugar on account of domestic demand of households and bulk buyers would be around 21 to 22 million tonnes in sugar season (October-September) 2011-12. And this level may touch at the most 22 million tonnes in 2013-14, going by the past trends. Stocks-to-use ratio during 2013-14 sugar season is likely to be around 23 per cent, thus indicating a comfortable demand-supply balance in the country.

7.2 Since it is arduously difficult to forecast the price of sugar, the Commission has carefully examined the projections of domestic and international agencies in this regard, and speculates that the prices of sugar for the sugar season 2013-14 may be within a broad range of Rs 30 to Rs 37 per kg in the domestic market. Despite best efforts of the Commission on the likely price of sugar for the year 2013-14, the price range arrived at by the Commission may deviate depending upon the behaviour of monsoon in India and Brazil during 2012-13, and other unpredictable factors like the price of crude oil, which can affect pricing of ethanol thereby having ramifications for demand-supply balance of sugar. As per NCDEX data on futures price of sugar (crystal sugar), it swings around at the minimal level of Rs. 33.75 per kg. On the international price front, the price of refined sugar as given in OECD-FAO Agricultural Outlook for 2012-2021, the sugar price in equivalent rupee terms is forecast at Rs. 30 per kg for 2013-14 season.

7.3 Given the fact that the mandate of CACP clearly states (under the Sugarcane Control Order, 1966) that while working out FRP for sugarcane, it should take into account not only the price of sugar and its by-products into account but also its cost of production, the Commission has discussed and recommended switching to a Hybrid Formula for pricing of cane in Chapter-6. This Hybrid Formula combines the revenue sharing principle with Minimum FRP (MFRP). The revenue sharing principle states that the revenue generated in the cane-sugar value chain be distributed between farmers and millers in the ratio of their relative costs in producing and processing of cane into sugar and its by-products. Looking at the costs of production of sugarcane as generated by the DES under

the CS for the years 2007-09, and those of conversion of cane to sugar and its first stage by-products such as molasses, bagasse and press mud, for the same years (2007-09), as generated by the Tariff Commission, the Commission finds the relative costs of farmers and millers to be in the ratio of 69:31 at an overall all India recovery level of 10.31 percent during 2007-09. Obviously, this ratio will vary with varying recovery ratios across different sugar zones of India. In any case, at all India level, if one takes value of by-products to be around 9 percent of the value of sugar produced from a quintal of sugarcane, then the price of sugarcane will work out to roughly 75 percent of the value of sugar (i.e., 69 percent of value of sugar produced plus 69 percent of the value of by-products, from a quintal of sugarcane. But, since the price of sugar can be very volatile, and farmers may not be in a position to bear wide swings in prices of sugar and thereby prices of cane, it is proposed that this revenue sharing principle be combined with some MFRP, which is worked out as half a standard deviation from the projected trend prices of sugar. The details of this Hybrid Formula are explained in in Chapter-6 and Appendix 6.1. India is perhaps the only country which still follows a fixed price formula for cane pricing while all other major sugarcane growing countries around the world follow a revenue sharing model. This is the best international practice and the Commission recommends the switch towards this Hybrid Formula, which will be good for farmers and millers, and bring about greater certainty and stability in sugar sector, besides providing a rational and scientific basis for pricing of sugarcane. Pending the adoption of this Hybrid Formula for sugarcane pricing, the Commission has considered the projected cost of production (C2) of sugarcane at all India level (weighted average), adjusted at 9.5 per cent recovery and inclusive of transportation cost and crop insurance premium. This comes to Rs. 197.28 per quintal. It records 22 per cent increase over the previous year's projected cost of Rs. 161.65 per quintal (inclusive of transportation cost and crop insurance premium). It is pertinent to mention here that during the period 2010-11 to 2013-14 the likely annual compound growth in cost of production of sugarcane works out to be 15.2 per cent. In contrast, the annual compound growth rate during 2006-07 to 2008-09 was 10 per cent. The increase in the rate of cost of production growing is due to acceleration in cost of labour and that of other inputs such as fertilizers, diesel, etc. U.P., a major producing state constituting about 41 per cent of share in production, is a high cost state with a projected cost of Rs. 194.04 per quintal.

Returns on paddy and wheat are close to that of sugarcane.

7.4 As regards inter crop price parity it is evident that at all-India level net return as percentage of C2 during the period 2008-09 to 2010-11 comes to 66 percent, and net returns in absolute terms, Rs. 51541 per hectare. Compared to other crops like paddy, and wheat, sugarcane may look much more lucrative. But it is usually lost sight of the fact that sugarcane is long duration crop i.e. about 12- month crop, with variations between Maharashtra with crop duration of 13

months and Uttar Pradesh with crop duration of 10 months. Sugarcane being fully irrigated, it is compared to paddy and wheat in the fully irrigated tracts of Punjab and Haryana: it is found that returns on paddy and wheat are close to that of sugarcane.

7.5 After having analysed the factors in all their aspects, the Commission recommends that FRP of sugarcane for the year 2013-14 be fixed at Rs. 210 per quintal linked to basic recovery of 9.5 per cent. For each 0.1 per cent increase in recovery over and above 9.5 per cent, the FRP would be increased by Rs 2.21. All India average recovery rate being 10.17 per cent achieved in 2011-12 the FRP recommended comes to Rs. 224.81.

FRP for 2013-14 sugar season is recommended at rupees 210/ qtl. linked to basic recovery of 9.5%.

7.6 It may be noted that this increase in FRP, though quite substantial (23.5%), will not have any impact on wholesale price of sugar as farmers are already getting much higher prices for cane even for 2012-13 season. For example, in UP, the SAP is already declared to be Rs 240/qtl, and discussion with millers in Maharashtra also indicates a price not below this for 2012-13 season. If at all, this price will help the mills to have a better realization from the levy sugar, which will improve their financial viability, enabling them to give a higher price to farmers, leading to higher production of cane and sugar in the country.

(**Ashok Gulati**)
CHAIRMAN

(**Ashok Vishandass**)
MEMBER

(**Anandi Subramanian**)
MEMBER SECRETARY

August 27, 2012


Appendix-6.1

Appendix-6.1

An Analytical Framework on Revenue Sharing Formula for Sugarcane Pricing

A.1 The Total Revenue Pot (TRP) generated from the cane-sugar value chain is the value of sugar and its first stage by-products from a given quantity of cane which needs to be shared between the two major stakeholders namely the farmers who produce sugarcane and the millers who crush and convert sugarcane into sugar and its by-products. A scientifically sound, and economically fair formula to share the TRP between farmers and millers would be to distribute it in the ratio of their relative costs in producing cane at farm level and converting that cane into sugar and its by-products at factory level. This is because both the stakeholders in the cane-sugar value chain incur certain costs and take the risk to create value in this chain. It will, therefore, be fair if they share the rewards too in the same ratio as their costs and risks. The methodology for revenue sharing in the ratio of relative costs incurred by farmers (CIF) for producing cane at farm level and costs incurred by millers (CIM) for converting cane into sugar and its by-products at mill level in this process of cane-sugar value creation, on a comparable basis, is detailed in the following paragraphs.

A.2 State-wise C_2 cost of production (CoP) of sugarcane per quintal has been taken from C.S. Scheme (Comprehensive Scheme for Studying Cost of Cultivation of Principal Crops in India) being run by the DES in the Ministry of Agriculture. This data is taken for 6 states namely Andhra Pradesh, Haryana, Karnataka, Maharashtra, Uttar Pradesh and Tamil Nadu for triennium ending (TE) 2009-10. The choice of reference period and also these 6 states is determined by intersection of two sets of data *viz*. state-wise CoP available under C.S. Scheme and conversion costs (conversion of sugarcane into sugar and its by-products at factory level) reported by Tariff Commission in their 'Report on Cost Study for Levy Sugar Pricing' (June, 2009). These 6 states are fairly representative as they accounted for 88% of sugarcane produced at all-India level during 2009-10.

i. While looking for costs incurred by the farmers and those incurred by the millers, it is important to note that in the states of Karnataka and Maharashtra, harvesting cost is borne by millers. Therefore, this component has been deducted from CIF and added to CIM.

ii. While working out averages of various parameters of 6 states under reference, cane crushed in each state is taken as the relevant weights.

iii. Conversion costs from sugarcane to sugar and transportation costs are presented zone-wise in the aforesaid report of Tariff Commission for the TE 2009-10.

Based on these Zone-wise costs, state-wise weighted average costs are worked out, weights being quantities of cane crushed in each zone.[4]

iv. Both conversion costs and transportation costs compiled by Tariff Commission pertain to 'cost per quintal of sugar' whereas CoP at farm level relates to cost per quintal of sugarcane. To make these data comparable, costs per quintal of sugar have been converted into cost per quintal of sugarcane by appropriately using relevant recovery rates.

v. CIF is sum of cost of production of cane (C_2, after deducting harvesting cost if paid by millers) and transportation cost borne by farmers.

vi. CIM is sum of gross conversion cost, harvesting cost if paid by millers and transportation cost incurred by millers.

vii. Thus Total Cost from farm to factory level is

$$TC = CIF + CIM$$

viii. Total Revenue Pot is

$$TRP = VS + VB,$$

where VS and VB denote value of sugar and value of by-products (molasses, bagasse and press mud) respectively.

ix. Now let us assume that 1 qtl. of cane is crushed. Let recovery rate be denoted by 'R' percent and ex-mill price of sugar per qtl be p_s.

x. Value of sugar produced from crushing 1 qtl. of cane is

$$VS = (p_s * R)/100$$

xi. Value of first stage by-products (from 1 qtl. of cane crushed) will be given by

$$VB = \sum p_{bi} * q_{bi},$$

where p_{bi} denotes price of i^{th} by-product and q_{bi} denotes quantity of i^{th} by-product; and i =1,2,3 (1 for molasses, 2 for bagasse and 3 for press mud)

xii. Value of by-products as percent of value of sugar,

$$VBP = (VB /VS)*100,$$

[4] *It may be pertinent to add here that Tariff Commission reports two estimates of various costs. One is based on replies received from millers in response to their questionnaires and the other based on inclusion of those who had not responded (all units) by suitably estimating their costs based on certain objective criteria. We are of the considered opinion that latter is a better methodology and is more representative in statistical sense of the term, else some kind of contamination in the estimates of costs thus generated may creep in due to lack of representative character of the sample.*

xiii. Share in TC

Farmers' share in TC (FSTC) would be

FSTC= CIF/ TC*100 ,

and the millers' share in TC (MSTC) would be

MSTC = CIM/TC*100.

Since FSTC+ MSTC =100; it follows that MSTC= 100-FSTC

xiv. Farmers' Share in value of sugar (FSVS)

will be given by

FSVS = FSTC + FSTC *VBP/100 = FSTC*(1+VBP/100)

xv. Finally, the resultant 'Fair and Remunerative Price, based on revenue sharing formula' (FRP-RS) of cane that farmers ought to get

(FRP-RS) = FSVS * VS/100 (Rs./qtl.)

A.3 It is noted that FS and FRP-RS are functions of VBP, VBP in turns depends upon VB and VS which are functions of p_s , R and q_{bi}, it follows that farmers' share in value of sugar (FSVS) and thus resultant price of cane (FRP-RS) impinge on prices, recovery rate and quantities of by-products. It may be noted that quantity of by-products and their value vary from state to state. The impact of these changes on farmers' share could be broadly put in the following four categories:

i. Recovery rates change but prices of sugar and value of by-products remain unaltered. Impact of such changes may be noticed when col.(3) to col.(5) are pair-wise compared (table-A.1);

ii. Prices of sugar change but recovery rates and value of by-products remain unaltered. Impact of such changes may be noticed when col.(5) is compared with col.(6) (table-A.1);

iii. Value of by-products alone may change but prices of sugar and recovery rates remain unaltered. The impact of this change on the overall share of farmers or the TRP is likely to be very small, and therefore, it is not illustrated separately in the table as we have done for changes in R and prices of sugar.

iv. All three parameters viz. recovery rates, prices and value of by-products change and impact of these changes may be noticed when either col.(3) or col. (4) is compared with col. (7) or col. (8) (table-A.1).

Simulating the Impact of Recovery Rate on Costs

A.4 As farmers sell their produce in terms of its weight, recovery rate will not have any direct bearing on their CoP. However, it impinges on CIM and consequently

on TC. As stated under para A2 (iv), costs per quintal of sugar have been converted into cost per quintal of sugarcane and it implies that higher the recovery rate, *ceteris paribus*, lower the conversion costs (and also harvesting cost and transportation cost) per quintal of cane crushed. In other words, all three components of costs (in CIM) per qtl. of cane crushed would decrease on improvement in recovery rate and vice versa.

Impact of Recovery Rate and Prices on Value of Sugar produced

A.5 As recovery improves, quantity of sugar produced from a given quantity of cane would increase and consequently value of sugar produced would increase. If prices of sugar also increase, again its value would increase for a given level of recovery rate.

Impact of Recovery Rate and Prices on by-products as percent of value of sugar

A.6 Though absolute value of by-products does not depend directly on recovery rate nor on prices of sugar, value of by-products as percentage of value of sugar decreases as recovery rate or prices of sugar or both increase. An illustration of impact of variations in recovery rates and/or sugar prices on farmers' share in TRP and also resultant changes in price for cane based on revenue sharing of TRP is given in table-A.1.

Table-A.1 : Impact of Recovery Rate & Prices of Sugar on Farmers' Share in Sugar Value Chain

S.N.	Parameter	All-India based on actual data	All-India when recovery is assumed to be 12%	All-India when recovery is assumed to be 9.5%	All-India when recovery remains at 9.5% but prices decrease	Maharashtra based on actual data	U.P. based on actual data
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Recovery rate (%) (**R**)	10.31	12.00	9.50	9.50	11.48	9.69
2	Ex-mill price of sugar (Rs./qtl.) ($\mathbf{p_s}$)	2825	2825	2825	2720	2720	2950
3	Gross Conversion Cost (Rs./qtl of cane)	43.50	37.36	47.19	47.19	34.84	48.68
4	Harvesting Cost if borne by millers (Rs./ qtl of cane)	3.05	2.62	3.31	3.31	10.82	0.00
5	Transportation Cost (Rs./qtl of cane)	0.66	0.57	0.72	0.72	2.41	0.02

S.N.	Parameter	All-India based on actual data	All-India when recovery is assumed to be 12%	All-India when recovery is assumed to be 9.5%	All-India when recovery remains at 9.5% but prices decrease	Maharashtra based on actual data	U.P. based on actual data
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
6	Cost Incurred by Millers (**CIM**) (Rs./qtl of cane){sum of rows (3) to (5)}	47.21	40.54	51.21	51.21	48.08	48.70
7	Cost Incurred by Farmers **CIF** (Rs./qtl of cane)	103.91	103.91	103.91	103.91	102.37	103.12
8	Total Cost (**TC**) of Sugar produced from crushing of 1 qtl of cane (Rs.){row(6) + row (7)}	151.12	144.45	155.12	155.12	150.45	151.82
9	CIF as % of TC {row (7)/row(8)*100} (**FSTC**)	68.76	71.93	66.98	66.98	68.05	67.92
10	Value of Sugar produced by crushing of 1 qtl of cane (Rs.) {row(2)* row(1)/100} (**VS**)	291.18	339.00	268.38	258.40	312.18	285.91
11	Value of by-products (Molasses, bagasse & Press mud) generated from crushing of 1 qtl of cane (Rs.) (**VB**)	25.70	25.70	25.70	25.70	23.51	27.17
12	By-products as percent of value of sugar (%) {row(11)/ row(10)*100}(**VBP**)	8.83	7.58	9.58	9.95	7.53	9.50
13	Farmers share (%) in value of sugar [row(9)*{1+ row(12)/100] (**FSVS**)	74.83	77.39	73.40	73.65	73.17	74.38
14	Resultant price for cane based on revenue sharing formula (Rs./qtl.) {row(13)*row (10)/100}(**FRP-RS**)	217.88	262.34	196.99	190.30	228.42	212.65

Note: In respect of col. (5) & col. (6), the costs have been adjusted for corresponding recovery rates

A.7 As may be seen from row (9) and row (12) of table-A.1, farmers' share in T.C. at all-India level works out to be 68.76%, besides 8.83% on account of by products. This holds good when recovery rate is 10.31% and average price is Rs. 2825/qtl. (row-2). If any one or both of these parameters increase/decrease, so will be the farmers' share (FSVS) in value of sugar. While the recovery rate does not change dramatically from year to year, prices of sugar can. For example, the price of sugar has already gone up and is hovering between Rs 35 to Rs 40/kg, ex-Kolhapur market. Whether this level will sustain during the sugar season of 2013-14 is an open question.

A.8 It may be pertinent to note that value of by-products in absolute terms also varies from state to state. For instance, value of by-products works out to be Rs.23.51 /qtl. of cane crushed in Maharashtra as against Rs. 27.17 /qtl. of cane crushed in U.P. Their respective shares of by-products as percentage of value of sugar produced per qtl. of cane crushed work out to 7.53% and 9.50% respectively. This is worked out on the assumption that only 25 percent of bagasse is sold by millers and other 75 percent is internally used for which no cost is accounted for. Furthermore, the variation in absolute value of by-products emanates from varying quantities of three by-products generated in different states on crushing of equal quantity of cane while prices of these by-products are assumed to be equal in all states. Given that the market of molasses in most states is heavily regulated, the Commission recognizes that there is a fair chance of some underpricing in the value of by-products. With deregulation of the sugar sector (including molasses), it is probable that the overall value of by-products may go up a little bit.

A.9 It is noted that farmers' share in TRP in Maharashtra (68.05%) is comparable to that of U.P. (67.92%), though recovery rate in former is significantly higher than that of latter. The higher recovery rate in Maharashtra is, to an extent, counter balanced by subdued sugar prices in the state. Notwithstanding lower ex-mill price of sugar in Maharashtra, resultant prices of cane would still be higher in Maharashtra compared to that of U.P. because of significantly higher recovery rate. In the ultimate analysis, it is both prices and recovery rates that impact not only farmers' share in TRP but also value of sugar produced, by-products as percent of value of sugar and most importantly resultant price for cane based on revenue sharing formula. Based on revenue sharing pricing formula, the prices of cane would be Rs.228.42/qtl. in Maharashtra and Rs.212.65/qtl. in U.P. (for the 2012-13 sugar season, given their respective ex-mill sugar prices at Rs 2720/qtl and Rs 2950/qtl).

A.10 As noted earlier, the revenue sharing pricing formula depends mainly on recovery rates and sugar prices, and therefore it is imperative to construct a simulation table to exhibit farmers' share in TRP under various permutations and combinations of these two parameters. This presumes that the value of by-

products is rather small in relation to the value of sugar, and/or has some fixed relation with the value of sugar. By putting different values of prices and recovery rates in equations given in para-A.2, a simulation table-A.2 is constructed.

A.11 The table-A.2 can act as a ready-reckoner to know what could be the price of sugarcane if the price of sugar was either Rs 2650/qtl or Rs 2825/qtl corresponding to varying recovery ratios from 9.5 percent to 13 percent. This is an illustration and by no means an exhaustive list of all permutation and combinations of two parameters viz. Recovery (%) & Ex-Mill prices of sugar.

Table-A.2: Simulation of Revenue Sharing Formula and Resultant Price of Cane for Farmers When Recovery Ratio and Prices of Sugar and by Products Change

S.N.	Recovery (%)	CIF as % of TC	Farmers share (FS) (%) in value of sugar when ex-mill price of sugar (Rs./ qtl.) is		Resultant FRPRS (Fair and Remunerative Price based on revenue sharing formula) for cane when ex-mill price of sugar (Rs./qtl.) is		Value of Sugar produced by crushing of 1 qtl of cane when ex-mill price of sugar (Rs./qtl.) is		By-products as percent of value of sugar when ex-mill price of sugar (Rs./qtl.) is	
			2650	2825	2650	2825	2650	2825	2650	2825
1	9.50	66.98	73.82	73.40	185.85	197.02	251.75	268.42	10.21	9.58
2	9.60	67.22	74.01	73.58	188.27	199.59	254.40	271.24	10.10	9.48
3	9.70	67.44	74.19	73.77	190.70	202.18	257.05	274.07	10.00	9.38
4	9.80	67.67	74.37	73.95	193.13	204.76	259.70	276.90	9.90	9.28
5	9.90	67.89	74.54	74.13	195.56	207.35	262.35	279.72	9.80	9.19
6	10.00	68.11	74.71	74.30	197.99	209.94	265.00	282.55	9.70	9.10
7	10.10	68.32	74.89	74.48	200.43	212.54	267.65	285.37	9.60	9.01
8	10.20	68.54	75.05	74.65	202.87	215.14	270.30	288.20	9.51	8.92
9	10.30	68.75	75.22	74.82	205.31	217.74	272.95	291.02	9.42	8.83
10	**10.31**	**68.76**	**75.23**	**74.83**	**205.45**	**217.88**	**273.09**	**291.18**	**9.41**	**8.83**
11	10.40	68.95	75.39	74.99	207.76	220.34	275.60	293.85	9.33	8.75
12	10.50	69.16	75.55	75.15	210.21	222.95	278.25	296.67	9.24	8.66
13	10.60	69.36	75.71	75.31	212.66	225.56	280.90	299.50	9.15	8.58
14	10.70	69.56	75.87	75.47	215.12	228.18	283.55	302.33	9.06	8.50
15	10.80	68.76	74.93	74.55	214.46	227.49	286.20	305.15	8.98	8.42

S.N.	Recovery (%)	CIF as % of TC	Farmers share (FS) (%) in value of sugar when ex-mill price of sugar (Rs./ qtl.) is		Resultant FRPRS (Fair and Remunerative Price based on revenue sharing formula) for cane when ex-mill price of sugar (Rs./qtl.) is		Value of Sugar produced by crushing of 1 qtl of cane when ex-mill price of sugar (Rs./qtl.) is		By-products as percent of value of sugar when ex-mill price of sugar (Rs./qtl.) is	
			2650	2825	2650	2825	2650	2825	2650	2825
16	10.90	69.95	76.17	75.79	220.03	233.41	288.85	307.98	8.90	8.35
17	11.00	70.14	76.33	75.94	222.49	236.03	291.50	310.80	8.82	8.27
18	11.10	70.33	76.48	76.10	224.96	238.65	294.15	313.63	8.74	8.20
19	11.20	70.52	76.62	76.25	227.42	241.28	296.80	316.45	8.66	8.12
20	11.30	70.70	76.77	76.39	229.89	243.91	299.45	319.28	8.58	8.05
21	11.40	70.88	76.92	76.54	232.36	246.54	302.10	322.10	8.51	7.98
22	11.50	71.06	77.06	76.69	234.83	249.17	304.75	324.93	8.43	7.91
23	11.60	71.24	77.20	76.83	237.31	251.81	307.40	327.75	8.36	7.84
24	11.70	71.42	77.34	76.97	239.79	254.45	310.05	330.58	8.29	7.77
25	11.80	71.59	77.48	77.11	242.27	257.09	312.70	333.41	8.22	7.71
26	11.90	71.76	77.61	77.25	244.75	259.73	315.35	336.23	8.15	7.64
27	12.00	71.93	77.75	77.38	247.23	262.38	318.00	339.06	8.08	7.58
28	12.10	72.10	77.88	77.52	249.72	265.03	320.65	341.88	8.02	7.52
29	12.20	72.26	78.01	77.65	252.20	267.67	323.30	344.71	7.95	7.46
30	12.30	72.43	78.14	77.78	254.69	270.33	325.95	347.53	7.89	7.40
31	12.40	72.59	78.27	77.91	257.19	272.98	328.60	350.36	7.82	7.34
32	12.50	72.75	78.39	78.04	259.68	275.63	331.25	353.18	7.76	7.28
33	12.60	72.91	78.52	78.17	262.17	278.29	333.90	356.01	7.70	7.22
34	12.70	73.06	78.64	78.30	264.67	280.95	336.55	358.83	7.64	7.16
35	12.80	73.22	78.76	78.42	267.17	283.61	339.20	361.66	7.58	7.11
36	12.90	73.37	78.88	78.54	269.67	286.28	341.85	364.49	7.52	7.05
37	13.00	73.52	79.00	78.66	272.17	288.94	344.50	367.31	7.46	7.00

A.12 It follows from table-A.2, for instance, that a good factory in Maharashtra with a recovery ratio of 12 percent and ex-mill price of sugar at Rs 2650/qtl (which prevailed in much of 2011-12 sugar season), the farmers should get a price of cane to be Rs 247/quintal, based on revenue sharing formula. Similarly in UP, a good factory with a recovery rate of 10 percent and a sugar price of Rs 2825/qtl should be able to pay the farmers a cane price of Rs 210/qtl in 2011-12 sugar season. As sugar prices are likely to be comfortably higher than Rs 2650/qtl in Maharashtra belt and also higher than Rs 2825/qtl in UP belt during the sugar season 2013-14, so one can expect the FRP-RS of cane to be higher too if hybrid of the existing fixed pricing system and revenue sharing formula is adopted.

Annex Tables

Annex Table-1

Sugarcane : Area, Production and Yield During 2000-01 to 2011-12

(Area: '000 Ha, Production: '000 Tonnes. Yield: Kg/Ha)

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 (E)
1	2	3	4	5	6	7	8	9	10	11	12	13
SUB-TROPICAL REGION												
Area	2418	2577	2734	2544	2382	2569	2736	2662	2474	2329	2641	2686
Production	133344	149268	152740	140591	142499	148982	161605	151756	129398	137497	150476	159573
Yield	55137	57917	55873	55262	59823	57990	59064	57017	52305	59027	56970	59405
Uttar Pradesh												
Area	1938	2035	2149	2030	1955	2156	2247	2179	2084	1977	2125	2162
Production	106068	117982	120948	112754	118716	125470	133949	124665	109048	117140	120545	128819
Yield	54719	57976	56281	55541	60724	58201	59626	57212	52326	59251	56727	59583
Uttarakhand												
Area	123	126	134	128	107	101	121	124	107	96	107	108
Production	7349	7555	7332	7651	6441	6134	6100	7686	5590	5842	6498	6596
Yield	59993	60010	54551	59773	60196	60733	50413	61984	52243	60854	60896	61074
Bihar												
Area	94	113	107	103	104	101	130	109	112	116	248	235
Production	3988	5211	4521	4286	4112	4338	5956	3855	4960	5033	12764	12072

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 (E)
1	2	3	4	5	6	7	8	9	10	11	12	13
Yield	42648	45953	42130	41612	39538	42822	45953	35496	44324	43422	51466	51457
Punjab												
Area	121	142	154	123	86	84	99	110	81	60	70	80
Production	7770	9250	9290	6620	5170	4860	6020	6690	4670	3700	4170	4670
Yield	64215	65141	60325	53821	60116	57857	60808	60818	57654	61667	59571	58375
Haryana												
Area	143	161	189	160	130	127	140	140	90	74	85	95
Production	8170	9270	10650	9280	8060	8180	9580	8860	5130	5335	6042	6959
Yield	57133	57578	56349	58000	62000	64409	68429	63286	57000	72095	71082	73253
TROPICAL REGION												
Area	1723	1700	1653	1263	1141	1482	2244	2211	1775	1698	2086	2240
Production	156085	141323	128726	87078	88456	124463	185684	188234	147670	148456	184529	190856
Yield	90616	83141	77898	68924	77525	83960	82739	85128	83199	87419	88460	85196
Maharashtra												
Area	595	578	573	443	324	501	1049	1093	768	756	965	1022
Production	49589	45140	42617	25668	20475	38853	78568	88437	60648	64159	81896	81859
Yield	83343	78097	74375	57941	63194	77551	74898	80912	78969	84866	84866	80097
Gujarat												
Area	178	176	203	176	197	197	214	211	221	154	190	202

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 (E)
1	2	3	4	5	6	7	8	9	10	11	12	13
Production	12695	12465	14071	12669	14570	14580	15630	15190	15510	12400	13760	14177
Yield	71439	70902	69351	71820	73959	74010	73037	71991	70181	80519	72421	70183
Andhra Pradesh												
Area	217	218	233	209	210	230	264	247	196	158	192	204
Production	17690	18082	15387	15070	15739	17656	21692	20296	15380	11708	14964	16728
Yield	81371	82945	66182	72105	74948	76765	82167	82170	78469	74101	77938	82000
Karnataka												
Area	417	407	383	243	178	219	326	306	281	337	423	430
Production	42924	33017	32485	16015	14276	18267	28670	26240	23328	30443	39657	38808
Yield	102909	81122	84885	65905	80202	83411	87944	85752	83018	90335	93752	90251
Tamil Nadu												
Area	315	321	261	192	232	335	391	354	309	293	316	382
Production	33188	32620	24165	17656	23396	35107	41124	38071	32804	29746	34252	39284
Yield	105258	101620	92446	91958	100845	104671	105123	107484	106197	101452	108392	102784
All-India												
Area	4316	4412	4520	3938	3662	4201	5151	5055	4415	4175	4885	5087
Production	295956	297208	287383	233862	237088	281172	355520	348188	285029	292302	342382	357667
Yield	68576.6	67369.6	63576.1	59386.0	64743.0	66928.1	69022.2	68877.2	64553.4	70019.2	70091.2	70310.0

E: Fourth Advance Estimate

Source: Directorate of Economics & Statistics, Ministry of Agriculture

Annex Table-2

Sugarcane : All India Trends in Area, Production and Yield

(Area: '000 Ha, Production: '000 Tonnes. Yield: Kg/Ha)

	Area	Production	Yield
T.E.1991-92	3656	240203	65694
T.E.2001-02	4316	297496	68960
T.E.2011-12	4715	330783	70142
Compound Growth Rate			
1991-92 to 2001-02	1.67	2.16	0.49
2001-02 to 2011-12	0.89	1.07	0.17
1991-92 to 2011-12	1.28	1.61	0.33
Fitted Growth Rate			
1991-92 to 2001-02	1.94	2.50	0.54
2001-02 to 2011-12	1.61	2.65	1.02
1991-92 to 2011-12	1.34	1.40	0.06
Coefficient of Variation			
1991-92 to 2001-02	7.66	9.29	3.67
2001-02 to 2011-12	11.01	14.69	5.14
1991-92 to 2011-12	11.50	13.58	4.60

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

Annex Table-3

State-wise Production of Sugar During 2000-01 to 2011-12

(Lakh Tonnes)

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 (E)
1	2	3	4	5	6	7	8	9	10	11	12	13
Sub-tropical Region	61.25	72.59	78.64	62.52	61.80	70.38	105.90	91.90	50.70	61.47	71.46	86.19
Uttar Pradesh	47.55	52.59	58.74	46.08	49.03	54.60	83.52	73.20	41.53	51.67	57.58	69.58
Uttarakhand	-	4.44	4.59	3.93	3.20	4.06	5.28	4.01	2.23	2.91	3.05	3.31
Bihar	2.88	3.39	4.21	2.77	2.57	4.11	4.83	3.36	2.22	2.60	3.87	4.51
Punjab	4.96	5.93	5.11	3.88	3.21	3.81	5.50	5.34	2.43	1.81	3.03	3.88
Haryana	5.86	6.24	5.99	5.86	3.79	3.80	6.77	5.99	2.29	2.48	3.93	4.91
Tropical Region	121.85	110.81	120.92	75.04	66.10	117.11	172.90	167.56	94.84	125.18	168.26	166.79
Maharashtra	67.05	55.88	61.64	31.99	21.92	51.67	90.13	90.75	46.00	70.36	90.65	89.96
Gujarat	10.73	10.56	12.38	10.77	7.92	12.21	13.90	13.66	10.22	11.91	12.70	10.02
Andhra Pradesh	10.22	10.48	11.88	8.81	11.45	12.53	19.24	13.35	5.92	5.10	10.05	11.30
Karnataka	16.04	15.50	17.98	11.57	10.77	19.71	25.42	28.39	16.75	25.12	36.44	37.57
Tamil Nadu	17.81	18.39	17.04	11.90	14.04	20.99	24.21	21.41	15.95	12.69	18.42	17.94
Others	-	-	1.76	2.02	2.10	2.10	3.19	3.52	1.23	1.37	3.77	2.78
All India	185.10	184.98	201.32	139.58	130.00	189.59	281.99	262.98	146.77	188.02	243.49	255.76

E: Estimates of Sugar production as per Cane Commissioner as on 31.05.2012.

Source: Directorate of Sugar, Ministry of Consumer Affairs

Annex Table-4

Cane Price Arrears

(in Rs. Crores)

Season	Position as on	Total Price Payable	Total Price Paid	Arrears	% of Arrears on Price Payable
1	2	3	4	5	6
2006-2007	15.05.2007	25747.26	43581.45	4222.99	16.40
2007-2008	15.05.2008	22423.63	38887.79	5132.87	22.89
2008-2009	15.05.2009	17884.47	35324.74	598.98	3.35
2009-2010	15.05.2010	36786.00	17285.50	1461.26	3.97
2010-2011	15.05.2011	41481.58	17290.77	2591.79	6.25
2011-2012	15.05.2012	49280.05	21524.26	5698.60	11.56

Source: Directorate of Sugar, Ministry of Consumer Affairs

Annex Table-5

Balance Sheet of Sugar and System of Regulation (Sugar Year - Oct. to Sept.)

(in Lakh tonnes)

Season (Oct. to Sept.)	Opening Stock	Production	Import	Total Availability	Consumption	Export	Closing Stocks at the end of Season
1	2	3	4	5	6	7	8
1997-98	66.01	128.44	6.87	194.45	139.78	0.97	-
1998-99	53.70	154.52	8.32	208.22	141.35	0.09	-
1999-00	66.78	181.93	4.69	248.71	159.77	0.23	-
2000-01	93.40	185.10	0.45	278.50	162.45	9.87	-
2001-02	106.63	184.98	0.40	291.61	167.48	10.94	-
2002-03	113.19	201.32	0.41	314.92	183.76	15.00	-
2003-04	116.16	139.58	5.53	261.27	175.00	2.94	-
2004-05	85.00	130	20.74	235.74	171.44	0.98	63.32
2005-06	40.00	189.59	3.52	233.21	183.21	13.68	36.32
2006-07	44.00	282	-	326.00	191.00	25.00	110.00
2007-08	105.00	263	-	368.00	215.00	58.00	105.00
2008-09	100.00	147	24.47	271.47	230.80	2.10	38.57
2009-10	35.83	188	41.80	265.63	211.98	2.40	51.25
2010-11	51.25	243.5	0	292.19	208.00	26.00	58.19
2011-12 (E)	67.79	260.00	0	323.37	214.12	40.00	61.25

Source : Directorate of Sugar, Department of Food and Public Distribution.

Annex Table - 6

Export of Sugar

Financial Year	Quantity ('000 tonnes)	Value(Rs. Crores)	Unit Value (Rs.)
1	2	3	4
1999-00	13.0	18.14	13.95
2000-01	339.0	430.98	12.71
2001-02	1456.0	1728.29	11.87
2002-03	1662.0	1769.49	10.65
2003-04	1201.0	1216.59	10.13
2004-05	109.0	149.52	13.72
2005-06	317.0	557.09	17.57
2006-07	1752.0	3268.65	18.66
2007-08	4641.0	5404.18	11.64
2008-09	3334.0	4426.03	13.28
2009-10	41.8	108.84	26.04
2010-11	3241.0	10339.01	31.90
2011-12 (P)	2367.0	7642.63	32.29

Source : DGCI&S, Kolkata
(P) Provisional upto February, 2012

Annex Table-7

Index Numbers of Wholesale Prices

(Base : 2004-05 = 100)

Months	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
Sugar								
October	-	108.8	110.3	92.9	108.7	168.8	161.4	173.2
November	-	109.5	109.8	93.0	108.6	184.1	166.7	177.0
December	-	109.1	107.2	92.3	109.9	185.7	172.8	180.9
January	-	111.3	103.0	93.5	120.0	202.1	173.0	177.4
February	-	116.1	100.4	95.0	127.4	200.3	169.4	176.3
March	-	115.0	98.6	95.8	127.2	183.6	170.5	175.4
April	107.6	115.8	95.8	97.0	132.8	165.4	171.1	176.5
May	106.8	116.3	92.8	96.8	136.4	161.0	169.9	178.8
June	106.2	115.7	92.5	96.4	140.0	155.3	167.0	178.8
July	107.8	114.0	92.6	98.1	142.8	164.1	170.6	184.1
August	109.1	113.0	92.1	104.5	157.5	160.8	170.9	-
September	108.7	110.7	92.5	107.9	167.4	159.8	171.6	-
Average	**107.7**	**112.9**	**99.0**	**96.9**	**131.6**	**174.3**	**169.6**	**177.8**
Gur								
October	-	132.2	118.6	97.1	130.3	205.7	209.4	210.2
November	-	119.0	113.3	91.8	136.5	203.8	203.9	194.2
December	-	108.3	106.6	90.2	133.3	210.6	189.5	184.1
January	-	107.1	100.9	92.3	141.5	212.1	190.3	189.9
February	-	106.9	97.5	96.9	148.5	210.1	177.8	188.6
March	-	106.4	96.2	97.4	151.9	202.7	174.3	189.8
April	104.1	108.3	93.8	102.3	165.6	193.7	176.3	198.3
May	111.4	112.6	96.0	109.7	183.7	203.1	194.6	203.3
June	118.3	111.3	96.0	111.0	182.8	206.5	207.0	221.5
July	118.7	111.4	98.2	116.5	181.3	203.6	206.9	227.5
August	124.6	113.7	99.7	120.3	190.3	206.1	207.8	-
September	130.1	120.1	99.1	125.0	195.8	208.2	216.4	-
Average	**117.9**	**113.1**	**101.3**	**104.2**	**161.8**	**205.5**	**196.2**	**200.7**

Months	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
Khandsari								
October	-	111.5	106.6	87.7	103.8	155.5	154.9	172.0
November	-	111.3	105.8	86.2	104.2	159.7	155.8	171.6
December	-	111.5	106.4	90.2	108.1	163.5	156.6	174.0
January	-	111.4	104.2	90.1	120.2	177.7	169.6	175.3
February	-	116.0	100.0	89.6	127.1	181.8	168.7	172.2
March	-	115.5	98.2	94.6	127.7	177.0	169.1	172.2
April	108.3	114.7	96.7	95.8	133.7	164.3	169.2	175.0
May	108.2	115.1	90.8	97.0	138.9	158.8	168.9	178.0
June	108.7	112.7	89.4	96.8	140.6	156.8	168.1	179.5
July	111.3	112.2	89.2	97.6	134.9	155.4	169.2	183.7
August	113.3	112.4	89.5	100.8	150.0	154.7	169.1	-
September	112.5	109.5	88.4	101.9	157.1	153.7	169.0	-
Average	**110.4**	**112.8**	**97.1**	**94.0**	**128.9**	**163.2**	**165.7**	**175.4**

Source: Office of Economic Adviser

Annex Table-8

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

(Percent)

State	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11(P)
1	4	5	6	7	8	9	10	11	12	13	14	15
Uttar Pradesh	9.34	9.71	9.53	9.54	9.82	9.79	9.49	9.49	9.30	8.91	9.13	9.16
Uttarakhand	-	-	9.42	9.47	9.75	9.63	9.42	9.54	9.80	9.20	9.19	9.34
Bihar	9.20	9.11	8.82	9.05	9.33	9.58	9.48	8.67	9.20	9.30	9.49	9.30
Punjab	9.10	9.70	9.45	9.72	9.72	9.79	9.19	9.54	9.30	9.33	8.59	8.70
Haryana	9.27	9.80	9.95	10.13	10.47	10.16	9.78	9.74	9.90	9.05	9.37	9.08
Maharashtra	11.39	11.63	11.60	11.68	10.93	11.39	11.66	11.39	11.80	11.52	11.51	11.32
Gujarat	10.61	10.42	10.79	10.58	10.93	10.76	10.82	10.68	10.90	9.50	10.52	9.99
Andhra Pradesh	10.09	10.36	10.01	10.15	10.32	10.65	10.05	9.69	10.10	9.88	9.28	9.77
Karnataka	10.65	10.75	10.72	10.80	10.21	10.11	10.83	10.69	10.10	10.30	10.67	10.93
Tamil Nadu	9.20	9.64	9.61	9.87	9.92	9.64	9.24	9.31	9.30	9.56	8.94	9.11
All India	10.20	10.48	10.27	10.38	10.22	10.17	10.22	10.16	10.30	10.05	10.20	10.17

P: Provisional

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

Annex Table-9

Farm Inputs: Index Numbers of Wholesale Prices

Base 2004-05=100

Month/Year	Fertiliser	Electricity (Irrigation)	Pesticide	Non-electrical Machinery	Tractors	Lubricants	Diesel Oil (HSDO)	Diesel Oil (LDO)	Fodder	Cattle Feed
1	2	3	4	5	6	7	8	9	10	11
Annual Average (July-June)										
2005-06	102.6	110.8	103.8	105.9	104.1	106.6	124.3	131.2	111.1	103.6
2006-07	105.1	116.3	107.8	107.7	108.0	138.2	129.6	145.1	117.4	116.0
2007-08	106.6	116.0	107.5	110.0	111.1	148.1	127.7	178.5	123.0	128.2
2008-09	106.9	114.6	110.8	111.9	117.6	176.0	133.8	159.3	111.1	148.8
2009-10	110.0	118.1	111.4	116.5	123.3	177.8	138.1	172.5	156.9	170.8
2010-11	119.2	127.2	113.6	120.5	127.9	200.3	153.9	208.6	189.1	179.7
2011-12	137.0	134.3	115.8	126.8	138.0	235.4	167.8	245.7	196.5	190.0
2009										
January	107.9	117.5	112.7	110.8	122.0	174.5	132.4	100.0	108.7	148.2
February	107.2	117.5	112.7	110.7	122.0	174.5	125.4	116.8	109.8	149.7
March	107.7	108.7	112.6	110.3	122.1	174.5	125.7	119.6	112.2	150.0

Month/Year	Fertiliser	Electricity (Irrigation)	Pesticide	Non-electrical Machinery	Tractors	Lubricants	Diesel Oil (HSDO)	Diesel Oil (LDO)	Fodder	Cattle Feed
1	2	3	4	5	6	7	8	9	10	11
April	107.6	108.7	111.6	112.7	122.6	174.5	125.7	131.3	114.3	152.4
May	107.5	108.7	110.4	112.6	122.7	174.5	125.7	140.6	114.0	157.2
June	107.6	108.7	110.1	112.8	122.7	174.5	125.7	145.6	116.0	158.2
July	107.5	108.7	110.2	112.8	122.7	174.5	133.9	165.8	119.5	159.9
August	107.2	117.4	110.6	112.8	122.7	174.5	133.9	159.8	123.3	165.3
September	107.1	117.4	110.4	112.8	122.6	174.5	133.9	162.0	139.8	166.3
October	108.1	117.4	110.5	114.7	123.2	174.5	133.9	157.4	136.4	166.5
November	108.5	117.4	110.7	118.0	123.2	174.5	133.9	160.2	144.6	166.9
December,2009	109.0	117.4	110.6	117.8	123.2	174.5	133.9	165.2	143.0	168.8
2010										
January	108.9	117.4	110.2	117.7	123.5	174.5	133.9	184.3	182.3	173.1
February	109.0	117.4	110.2	118.0	123.5	174.5	136.6	185.3	176.5	175.6
March	109.8	117.4	111.8	118.6	123.7	174.5	144.6	180.1	199.1	175.8
April	114.6	117.4	114.6	118.8	123.5	174.5	145.6	187.1	182.2	177.0
May	115.2	126.2	113.6	117.6	123.9	194.2	145.6	187.3	165.2	177.0

Month/Year	Fertiliser	Electricity (Irrigation)	Pesticide	Non-electrical Machinery	Tractors	Lubricants	Diesel Oil (HSDO)	Diesel Oil (LDO)	Fodder	Cattle Feed
1	2	3	4	5	6	7	8	9	10	11
June	115.3	126.2	113.6	117.8	124.0	194.2	147.4	174.9	171.3	177.0
July	115.3	126.2	113.4	117.9	124.0	194.2	153.5	174.7	173.4	177.6
August	116.5	126.2	113.3	117.9	124.0	194.2	153.5	170.6	180.7	177.8
September	116.5	126.2	113.4	118.0	124.2	194.2	153.5	174.3	186.5	178.0
October	116.3	126.2	113.7	118.0	125.0	194.2	153.5	182.3	192.7	178.2
November	116.6	126.2	114.0	118.2	125.6	194.2	153.6	190.9	190.7	178.6
December,2010	116.3	126.2	113.9	118.1	125.6	194.2	153.6	203.0	190.1	178.5
2011										
January	117.8	128.1	112.9	121.0	128.0	194.2	153.6	217.1	193.9	181.3
February	120.3	128.1	113.1	122.9	128.3	194.2	153.6	218.6	198.5	181.4
March	120.7	128.1	113.9	123.2	128.9	194.2	153.6	228.3	205.8	180.5
April	122.9	128.1	114.1	123.6	131.4	214.0	153.6	246.3	200.6	183.8
May	125.2	128.1	113.9	123.1	134.8	220.8	153.6	256.8	176.8	181.2
June	125.7	128.1	113.8	123.5	134.8	220.8	157.1	240.2	179.5	180.0
July	127.0	128.1	114.5	123.5	136.0	221.8	167.8	232.6	182.7	184.9

Month/Year	Fertiliser	Electricity (Irrigation)	Pesticide	Non-electrical Machinery	Tractors	Lubricants	Diesel Oil (HSDO)	Diesel Oil (LDO)	Fodder	Cattle Feed
1	2	3	4	5	6	7	8	9	10	11
August	127.9	128.1	114.6	123.5	136.4	231.2	167.8	240.4	188.2	186.3
September	130.4	133.8	114.8	123.8	137.2	236.6	167.8	241.4	189.8	186.4
October	134.9	135.7	114.6	124.2	137.5	236.6	167.8	245.8	191.2	186.4
November	137.6	135.7	114.6	125.9	137.8	236.6	167.8	243.1	196.9	186.2
December,2011	138.7	135.7	115.3	125.8	137.8	236.6	167.8	253.0	198.9	186.2
2012										
January	139.5	135.7	115.9	128.9	137.9	236.6	167.8	267.9	198.5	187.3
February	140.1	135.7	115.9	128.9	138.0	236.6	167.8	267.5	197.4	191.8
March	141.1	135.7	116.2	129.0	138.4	236.6	167.8	289.3	202.2	197.3
April	141.4	135.7	116.4	129.0	140.1	236.6	167.8	296.1	206.0	192.0
May	142.4	135.7	118.3	129.0	140.1	237.8	167.8	284.4	203.3	195.6
June	143.3	135.7	118.9	129.7	138.3	241.4	167.8	263.7	202.6	199.7

Source : Office of the Economic Adviser, Ministry of Commerce and Industry

Annex Table-10

Month-wise Average Daily Wage Rates for Agricultural Labour (Man)

(Rupees)

	A. P.	Assam	Bihar	Gujarat	Haryana	H. P.	Karnataka	Kerala	M. P.	Maharashtra	Orissa	Punjab	Rajasthan	T. N.	U. P.	W. B.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Labour Bureau(Daily Wage Rates)																
January, 2008	85.35	77.70	64.35	73.62	111.63	170.00	67.15	202.66	54.04	73.34	76.05	95.58	102.64	100.30	71.76	80.16
February	77.48	77.82	65.28	73.43	115.52	170.00	67.92	203.76	55.02	73.55	74.52	95.17	98.67	100.91	72.44	79.92
March	78.16	78.12	65.45	73.43	114.51	178.33	69.05	218.94	64.57	73.59	61.39	96.56	93.85	98.63	74.15	80.57
April	86.94	78.23	65.60	74.23	115.83	155.67	69.80	218.94	56.67	76.07	62.65	102.86	97.27	99.24	74.29	80.64
May	92.67	79.12	65.30	73.99	115.50	151.18	69.67	218.73	56.49	73.65	61.20	106.92	92.57	99.73	75.29	80.43
June	89.10	79.99	65.16	73.51	116.06	147.07	70.91	217.49	56.73	77.21	63.78	107.86	120.65	98.41	78.16	81.43
July	91.48	80.34	68.91	76.26	121.28	151.57	71.46	219.70	60.92	76.66	67.33	112.98	121.44	102.05	83.41	85.53
August	88.90	84.33	69.76	78.47	121.96	160.46	72.86	219.70	61.88	76.83	66.35	112.13	111.00	103.65	79.70	86.29
September	90.88	83.30	69.83	77.34	128.05	162.22	72.48	197.70	61.41	79.89	67.29	114.08	102.20	104.60	79.13	85.86
October	97.57	83.03	70.14	78.67	130.30	161.54	72.54	224.49	62.97	79.40	67.36	120.80	103.89	106.01	81.39	85.91
November	99.03	82.97	71.30	78.67	132.54	163.95	73.29	224.49	62.40	81.39	67.85	119.71	106.44	110.86	81.82	83.55
December, 2008	98.31	81.19	71.42	78.72	132.64	164.72	72.90	220.27	61.33	82.61	68.05	130.63	109.84	113.28	81.14	87.40

	A. P.	Assam	Bihar	Gujarat	Haryana	H. P.	Karnataka	Kerala	M. P.	Maharashtra	Orissa	Punjab	Rajasthan	T. N.	U. P.	W. B.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
January, 2009	106.13	82.51	68.30	80.07	133.79	171.83	73.90	221.38	61.80	83.83	68.97	126.46	109.79	113.75	81.32	86.10
February	100.08	82.32	68.30	80.07	133.79	171.83	73.90	221.38	61.80	83.83	68.97	126.46	109.79	113.75	81.32	86.10
March	109.21	82.79	73.32	78.76	134.25	171.83	76.78	226.71	63.52	84.47	78.12	133.00	138.29	117.07	82.46	87.74
April	112.55	84.61	75.70	78.56	140.89	171.83	77.16	238.53	65.11	84.67	86.14	144.80	113.61	117.73	85.19	88.85
May	113.75	86.09	75.64	78.72	140.79	169.04	82.41	255.19	64.73	84.98	90.19	127.49	124.47	115.91	86.35	88.86
June	111.55	88.33	75.40	78.98	142.75	167.44	83.34	304.16	66.07	87.83	92.22	137.02	137.68	121.12	86.92	89.68
July	115.21	87.32	83.46	80.72	160.23	161.99	83.55	308.91	71.13	90.19	89.16	143.30	126.25	124.81	90.58	92.73
August	117.03	90.86	86.71	81.21	162.87	166.40	84.76	309.95	70.51	90.52	87.56	138.19	117.76	125.36	92.47	94.14
September	118.40	92.77	88.57	82.57	165.94	170.17	85.98	249.21	69.26	94.03	86.83	138.19	116.55	127.62	92.21	95.28
October	116.48	96.08	85.47	82.76	163.95	167.60	86.37	252.04	68.17	94.74	85.03	140.54	130.16	136.50	92.63	96.57
November	125.38	96.27	86.40	82.76	168.01	165.20	86.40	252.04	71.32	95.52	84.37	134.00	132.33	138.37	94.30	98.74
December	137.95	96.40	86.55	82.76	168.22	180.42	87.54	250.79	69.79	95.10	86.70	133.49	113.65	137.98	94.89	99.94
January, 2010	136.03	96.74	88.76	83.98	171.21	178.17	88.12	258.96	69.49	96.37	86.55	143.26	129.15	136.00	96.42	101.16
February	140.28	94.92	89.72	84.06	176.23	178.83	89.58	257.71	70.92	97.29	92.38	141.35	129.05	148.01	97.54	105.12
March	131.78	98.19	89.99	85.22	177.27	178.56	90.15	297.77	72.65	97.58	92.79	141.35	119.58	145.03	98.33	105.41

	A. P.	Assam	Bihar	Gujarat	Haryana	H. P.	Karnataka	Kerala	M. P.	Maharashtra	Orissa	Punjab	Rajasthan	T. N.	U. P.	W. B.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
April	143.43	97.36	90.30	85.77	177.62	180.78	92.76	297.77	74.25	97.38	95.32	146.99	127.59	145.38	104.03	106.50
May	135.41	99.77	92.17	85.96	179.09	177.54	92.68	297.77	74.94	99.09	95.33	147.44	145.71	145.38	101.82	106.44
June	125.90	102.23	92.10	85.96	176.35	178.87	92.80	299.16	76.40	106.26	115.39	163.59	126.25	148.01	103.21	106.12
July	141.17	104.73	96.71	88.07	181.29	185.78	95.17	307.27	79.33	109.78	105.29	182.24	136.37	158.33	109.05	109.56
August	137.66	111.56	97.90	88.37	187.85	189.67	99.21	307.27	80.45	109.18	105.74	176.86	132.17	153.03	110.93	110.64
September	136.33	112.60	98.06	87.05	185.35	193.33	103.11	317.77	80.32	110.00	109.21	172.42	192.37	163.06	112.23	114.89
October	139.76	112.39	98.69	89.14	187.65	185.71	105.67	329.87	81.27	114.63	117.52	178.37	144.36	166.73	114.63	114.81
November	153.21	112.89	99.26	90.23	188.07	184.83	108.99	329.87	83.62	116.61	120.96	176.86	144.79	178.20	115.26	115.28
December	176.29	114.10	101.85	91.36	195.02	195.22	111.76	319.13	84.43	119.36	123.96	176.21	145.69	174.08	116.53	118.47
January, 2011	171.15	117.46	101.07	92.19	196.93	195.22	116.44	334.76	85.68	124.18	125.88	172.49	139.58	175.37	115.37	122.45
February	171.26	118.36	99.78	93.67	201.61	206.78	118.42	334.76	86.89	127.40	132.63	165.15	141.13	180.82	118.11	125.85
March	174.29	123.28	101.36	93.40	201.94	206.78	119.09	341.13	89.25	131.12	127.52	168.57	148.92	183.94	115.67	126.06
April	173.70	122.48	100.95	94.33	203.06	217.44	120.22	341.13	89.08	131.32	133.01	170.24	163.06	185.84	116.08	125.53
May	170.79	122.44	101.89	95.06	202.98	211.39	124.99	341.13	89.59	134.93	134.85	211.35	179.20	177.58	116.98	128.77
June	174.12	122.63	103.22	96.20	202.95	218.33	126.57	350.22	89.90	139.62	132.64	188.77	171.87	199.02	119.25	129.93
July	173.87	127.21	107.86	111.84	205.36	219.22	127.62	359.95	94.20	155.95	132.98	215.13	207.55	199.57	123.03	133.11

	A. P.	Assam	Bihar	Gujarat	Haryana	H. P.	Karnataka	Kerala	M. P.	Maharashtra	Orissa	Punjab	Rajasthan	T. N.	U. P.	W. B.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
August	171.33	127.90	110.16	111.87	205.50	231.67	132.62	372.33	97.84	155.04	134.07	211.42	190.91	207.55	121.88	139.39
September	176.03	115.45	112.83	113.48	205.75	232.22	136.36	375.84	97.88	151.86	137.24	188.57	154.33	205.94	122.51	140.94
October	176.55	127.45	112.82	113.30	205.46	230.40	136.67	391.65	98.96	153.35	135.05	219.14	162.22	208.53	125.97	141.60
November	190.57	131.04	119.19	113.30	214.29	232.22	137.72	453.74	98.61	154.71	138.34	222.81	203.06	212.64	129.79	143.33
December	176.03	127.04	112.83	113.48	205.75	232.22	135.76	375.84	97.88	151.86	137.08	188.57	154.33	205.94	122.51	140.94
January, 2012	176.55	127.45	112.82	113.30	205.46	236.74	136.66	391.65	98.96	153.35	135.05	219.14	162.22	208.73	125.97	141.60
February	202.74	131.27	123.76	114.99	211.76	240.56	145.43	419.56	100.29	153.34	139.90	235.42	171.87	231.27	136.24	151.41
March	194.67	132.19	126.25	115.86	213.01	240.56	146.57	412.89	105.61	155.66	140.46	233.24	197.96	226.33	135.02	151.75
April	206.72	132.23	126.85	117.12	209.97	240.56	146.32	417.33	109.85	156.01	144.75	256.36	194.16	230.87	136.06	159.38
May	197.71	134.12	128.69	118.44	210.38	241.43	147.73	417.33	108.45	154.18	148.45	243.35	201.89	232.34	138.23	161.18

Annex Table-11

Sugarcane : Estimates of Cost of Cultivation/Production and Related Data

Cost Items	Andhra Pradesh		Haryana		Karnataka		Maharashtra		Tamil Nadu		Uttar Pradesh		Uttarakhand	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2011-12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cost of Cultivation per hectare(Rs)														
A1	66378.86	51561.15	31993.47	29765.88	36165.32	38833.10	75585.59	64371.46	75408.77	60807.85	28417.65	19465.30	38344.27	26219.04
A2	69077.68	54436.92	31993.47	29765.88	36165.32	38843.49	75585.59	64371.46	76157.47	60885.42	28479.00	19465.30	38344.27	26219.04
A2+FL	76696.87	61278.53	39677.67	36366.67	49183.90	48884.17	87114.96	74221.59	89583.62	72426.99	38327.10	28398.06	45270.28	32045.33
B1	68757.91	53916.54	37732.69	31039.92	37402.79	40176.43	86298.29	80753.23	80606.35	66924.94	32606.29	23186.00	41804.36	29692.89
B2	119699.80	96315.88	79036.73	80997.02	73257.57	82138.51	117467.20	117454.40	99632.47	85794.30	56951.05	47350.99	79040.21	65221.44
C1	76377.09	60758.14	45416.89	37640.71	50421.37	50217.11	97827.66	90603.38	94032.49	78466.49	42454.39	32118.75	48730.36	35519.18
C2	127319.00	103157.50	86720.95	87597.81	86276.15	92179.18	128996.60	127304.60	113058.60	97335.86	66799.17	56283.73	85966.23	71047.73
C2*	127319.00	103157.50	86772.74	88414.25	86466.06	92736.99	129419.93	128182.25	116204.66	98354.96	66799.17	57698.80	87461.36	71082.34
Yield per hectare (Quintals)	845.21	788.80	577.71	644.49	906.00	1017.96	986.81	1013.81	1008.79	958.01	509.35	512.54	633.22	634.87
Value of the main-product per hectare (Rs)	166633.30	146006.10	124248.70	174454.60	172350.70	205732.30	177938.60	212442.60	190948.00	163439.60	100727.40	128161.70	134629.00	153142.50

Cost Items	Andhra Pradesh		Haryana		Karnataka		Maharashtra		Tamil Nadu		Uttar Pradesh		Uttarakhand	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2011-12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value of the by-product per hectare (Rs)	1020.07	549.35	13419.83	3459.18	3924.67	2438.34	9037.63	7720.53	2690.19	2596.47	5631.39	5246.78	8580.90	8047.94
Implicit price (Rs./qtl.)	197.15	185.10	215.07	270.69	190.23	202.10	180.32	209.55	189.28	170.60	197.76	250.05	212.57	241.22
Cost of production per quintal (Rs)														
A1	78.38	65.13	49.60	44.89	39.06	38.01	73.16	61.46	73.63	61.68	52.38	35.17	57.39	38.38
A2	81.72	68.61	49.60	44.89	39.06	38.02	73.16	61.46	74.34	61.75	52.49	35.17	57.39	38.38
A2+FL	90.19	77.39	61.99	55.33	53.08	47.46	84.01	70.64	87.57	74.42	71.26	53.23	67.20	47.96
B1	81.29	68.21	58.56	47.00	40.38	39.37	83.29	76.86	78.73	67.93	60.27	47.45	62.77	44.03
B2	140.39	121.66	123.20	123.44	78.77	79.46	113.34	111.89	97.45	87.97	105.49	90.21	118.64	98.41
C1	90.65	76.81	70.33	56.81	54.63	49.41	94.36	86.20	91.84	79.95	79.08	62.79	71.89	52.00
C2	149.75	130.27	134.97	133.25	93.02	89.51	124.41	121.23	110.55	100.00	124.30	105.56	127.76	106.38
C2*	149.75	130.27	135.05	134.49	93.22	90.05	124.82	122.07	113.63	101.05	124.30	108.22	129.98	106.44
C3	164.73	143.30	148.56	147.94	102.54	99.05	137.30	134.28	124.99	111.15	136.73	119.04	142.98	117.08

Cost Items	Andhra Pradesh		Haryana		Karnataka		Maharashtra		Tamil Nadu		Uttar Pradesh		Uttarakhand	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2011-12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Material and labour inputs per hectare														
Seed (Quintals)	71.12	54.61	17.50	3.76	9.76	20.53	34.85	41.10	27.13	31.44	33.85	23.72	18.35	15.31
Fertiliser (kgs. of Nutrients)	361.30	331.55	205.47	241.86	281.54	440.81	724.82	668.43	496.18	490.74	212.07	205.06	264.85	219.22
Manure (Quintals)	30.85	20.41	0.00	0.00	1.56	8.10	15.20	37.33	22.25	41.82	12.97	9.70	35.36	53.04
Human Labour (Man Hours)	2250.41	2183.33	1041.15	1637.05	2010.37	1985.84	2039.23	2075.21	2299.61	2156.59	1223.25	1289.62	1588.74	1315.53
Animal Labour (Pair Hours)	10.96	15.28	0.00	0.00	63.61	77.52	65.17	69.17	15.71	18.79	20.43	13.52	16.05	5.25

Source: Directorate of Economics & Statistics, Ministry of Agriculture

Note : The estimates are provisional unless specified.

Cost A1 = All actual expenses in cash and kind incurred in production by owner.

Cost A2 = Cost A1 + rent paid for leased-in land.

Cost A2+FI = Cost A2 + imputed value of Family Labour.

Cost B1 = Cost A1 + interest on value of owned capital assets (excluding land).

Cost B2 = Cost B1 + rental value of owned land (net of land revenue) and rent paid for leased-in land.

Cost C1 = Cost B1 + imputed value of Family Labour.

Cost C2 = Cost B2 + imputed value of Family Labour.

Cost C2= Cost C2 estimated by taking into account statutory minimum or actual wage whichever is higher.*

Cost C3 = Cost C2 + 10% of Cost C2* on account of managerial functions performed by farmer.*

Annex Table-12

Sugarcane: Break-up of Cost of Cultivation Per Hectare

(in Rs.)

Cost Items	Andhra Pradesh		Haryana		Karnataka		Maharashtra		Tamil Nadu		Uttar Pradesh		Uttarakhand	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Operational Cost	**73797.22**	**58170.72**	**39487.47**	**36271.74**	**48856.17**	**48571.65**	**85900.95**	**72976.01**	**88194.60**	**71680.69**	**37219.88**	**27571.32**	**44522.96**	**31719.23**
Human Labour														
Casual	35699.00	27955.55	15913.42	19797.94	20845.96	19610.04	22383.25	18591.44	48819.88	36787.69	7092.65	5483.77	16859.12	8772.43
Attached	1163.92	1319.75	1692.18	3004.77	242.46	214.54	1330.18	1041.10	2738.75	2215.71	365.34	288.65	1680.66	1810.80
Family	7619.19	6841.61	7684.20	6600.79	13018.58	10040.68	11529.37	9850.13	13426.15	11541.57	9848.10	8932.76	6926.01	5826.29
Total	**44482.11**	**36116.91**	**25289.80**	**29403.50**	**34107.00**	**29865.26**	**35242.80**	**29482.67**	**64984.78**	**50544.97**	**17306.09**	**14705.18**	**25465.79**	**16409.52**
Bullock Labour														
Hired	333.28	299.22	0.00	0.00	1974.79	2228.46	3406.31	2010.55	366.65	490.30	259.05	97.65	419.14	111.05
Owned	14.79	122.08	0.00	0.00	516.15	720.32	451.64	1472.73	230.41	88.49	1939.86	935.94	274.99	109.06
Total	**348.07**	**421.30**	**0.00**	**0.00**	**2490.94**	**2948.78**	**3857.95**	**3483.28**	**597.06**	**578.79**	**2198.91**	**1033.59**	**694.13**	**220.11**
Machine Labour														
Hired	3117.07	1485.33	0.00	219.27	2344.30	1934.46	10882.06	5431.23	1015.34	1161.72	1101.43	795.36	364.10	267.57
Owned	86.25	18.51	1986.40	0.00	0.00	44.40	389.30	785.95	121.14	118.64	326.77	263.33	851.65	347.18
Total	**3203.32**	**1503.84**	**1986.40**	**219.27**	**2344.30**	**1978.86**	**11271.36**	**6217.18**	**1136.48**	**1280.36**	**1428.20**	**1058.69**	**1215.75**	**614.75**
Seed	14044.87	9007.56	4562.33	751.79	1754.54	2752.11	7530.30	5903.18	5206.33	4494.14	8426.79	3724.99	5492.72	3060.35

Cost Items	Andhra Pradesh		Haryana		Karnataka		Maharashtra		Tamil Nadu		Uttar Pradesh		Uttarakhand	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fertilisers and Manure														
Fertilisers	4603.21	4086.98	2652.85	2560.64	3614.38	6222.35	10354.80	9327.17	6412.43	6261.59	2774.50	2421.89	3373.25	2711.98
Manure	1110.31	909.43	0.00	0.00	131.23	366.54	2002.65	3283.59	973.67	1149.04	518.14	349.52	1767.79	3359.71
Total	**5713.52**	**4996.41**	**2652.85**	**2560.64**	**3745.61**	**6588.89**	**12357.45**	**12610.76**	**7386.10**	**7410.63**	**3292.64**	**2771.41**	**5141.04**	**6071.69**
Insecticides	822.23	765.22	496.36	335.76	10.10	39.28	171.60	108.47	447.95	371.65	127.54	110.59	1147.18	851.79
Irrigation charges	1245.11	2307.91	2628.95	1255.43	2295.59	2131.94	11094.69	11457.18	4037.76	3442.76	2829.61	3070.48	3154.76	2967.91
Interest on working capital	3892.83	3019.36	1870.78	1745.35	2108.09	2266.53	4374.80	3713.29	4398.14	3537.60	1610.10	1096.39	2211.59	1523.11
Miscellaneous	45.16	32.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.79	0.00	0.00	0.00	0.00
Fixed Cost	**53521.78**	**44986.78**	**47233.48**	**51326.07**	**37419.98**	**43607.53**	**43095.65**	**54328.59**	**24864.00**	**25655.17**	**29579.29**	**28712.41**	**41443.27**	**39328.50**
Rental value of owned land	48243.10	39523.60	41304.06	49957.10	35854.78	41951.68	31168.93	36701.20	18277.42	18791.79	24283.42	24164.99	37235.86	35528.55
Rent paid for leased-in land	2698.82	2875.76	0.00	0.00	0.00	10.39	0.00	0.00	748.70	77.57	61.35	0.00	0.00	0.00
Land revenue, cesses & taxes	0.28	0.25	0.00	0.00	16.52	15.76	219.03	193.08	12.30	114.73	26.90	25.94	21.14	21.96
Depreciation on implements &	200.54	231.79	190.20	94.93	311.21	286.38	994.99	1052.53	628.01	554.00	1018.97	800.78	726.18	304.14

Cost Items	Andhra Pradesh		Haryana		Karnataka		Maharashtra		Tamil Nadu		Uttar Pradesh		Uttarakhand	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Interest on fixed capital	2379.04	2355.38	5739.22	1274.04	1237.47	1343.32	10712.70	16381.78	5197.57	6117.08	4188.65	3720.70	3460.09	3473.85
Total Cost	**127319.00**	**103157.50**	**86720.95**	**87597.81**	**86276.15**	**92179.18**	**128996.60**	**127304.60**	**113058.60**	**97335.86**	**66799.17**	**56283.73**	**85966.23**	**71047.73**
Operational Cost (based on new methodology)	73797.22	58170.72	39839.26	37088.18	49046.08	49129.46	86324.28	73853.66	91340.66	72699.79	37219.88	28986.39	460118.09	31753.84
Human Labour (based on new methodology)	44482.11	36116.91	25341.59	30219.94	34296.91	30423.07	35666.13	30360.32	68130.84	51564.07	17306.09	16120.25	26960.92	16444.34
Total Cost (based on new methodology	127319.00	10315.50	86772.74	88414.25	86466.06	92736.99	129419.93	128182.25	116204.66	98354.96	66799.17	57698.80	87461.36	71082.34

Annex Table-13

Projected Cost of Production of Sugarcane

(Rs/Qtl.)

States	Latest estimates Year	Variable Inputs Price Index (Base 2004-05=100)			Projections for 2013-14 adjusted for under estimation (Rs./qtl)		
		Latest year 2010-11	2012-13	2013-14	Yield	A2+FL	C2
Andhra Pradesh	2010-11	240.37	335.95	373.33	797.31	145.18	234.80
Haryana	2010-11	199.30	264.88	311.01	557.75	101.03	175.23
Karnataka	2010-11	202.61	267.74	317.94	970.06	94.54	154.37
Maharashtra	2010-11	173.80	195.00	215.78	914.88	111.47	179.55
Tamil Nadu	2010-11	230.33	246.38	324.46	994.08	145.97	170.98
Uttar Pradesh	2010-11	206.47	248.82	284.14	490.26	123.78	194.04
Uttarakhand	2010-11	184.54	178.41	219.14	618.13	84.13	167.74
Weighted Average						**120.44**	**184.82**

Annex Table-14

Sugarcane : Variable Input Price Index

(Base 2004-05=100)

Items	Weights		Indices	
	2010-11	2011-12*	2012-13*	2013-14*
Andhra Pradesh				
Human Labour	0.64	360.20	403.43	451.84
Bullock Labour	0.00	165.29	181.82	200.00
Machine Labour	0.05	150.37	153.38	156.45
Seeds	0.20	240.14	264.15	290.57
Fertilizer	0.07	144.48	145.80	150.18
Manure	0.02	198.00	217.80	239.58
Insecticide	0.01	114.85	117.15	119.49
Irrigation Charges	0.02	118.91	122.48	126.15
Haryana				
Human Labour	0.67	238.28	285.94	343.13
Bullock Labour	0.00	164.73	181.20	199.32
Machine Labour	0.05	150.37	159.39	168.96
Seeds	0.12	263.08	299.91	341.89
Fertilizer	0.07	116.91	122.76	128.90
Manure	0.00	131.59	136.86	142.33
Insecticide	0.01	114.85	118.30	121.84
Irrigation Charges	0.07	101.37	259.10	266.87
Karnataka				
Human Labour	0.73	261.24	321.32	395.23
Bullock Labour	0.05	164.07	177.19	191.37
Machine Labour	0.05	150.37	158.57	167.21
Seeds	0.04	153.59	156.73	159.92
Fertilizer	0.08	127.42	188.67	192.44
Manure	0.00	237.66	275.68	319.79
Insecticide	0.00	114.85	116.00	117.16
Irrigation Charges	0.05	117.47	117.47	119.82
Maharashtra				
Human Labour	0.43	198.57	226.90	260.94
Bullock Labour	0.05	219.40	245.73	275.22
Machine Labour	0.14	150.37	158.57	167.21
Seeds	0.09	217.55	235.39	254.69
Fertilizer	0.13	104.10	112.29	113.42
Manure	0.02	321.39	359.96	403.15
Insecticide	0.00	114.85	116.69	118.55
Irrigation Charges	0.14	139.45	146.43	153.75

Items	Weights		Indices	
	2010-11	2011-12*	2012-13*	2013-14*
Tamil Nadu				
Human Labour	0.78	193.59	253.29	341.94
Bullock Labour	0.01	166.11	202.66	247.24
Machine Labour	0.01	150.37	172.93	207.51
Seeds	0.06	242.99	296.44	361.66
Fertilizer	0.08	122.70	119.74	143.68
Manure	0.01	153.33	176.33	202.78
Insecticide	0.01	114.85	120.59	144.71
Irrigation Charges	0.05	345.90	387.41	464.89
Uttar Pradesh				
Human Labour	0.49	207.04	244.65	288.69
Bullock Labour	0.06	393.92	453.01	520.96
Machine Labour	0.04	150.37	158.57	167.21
Seeds	0.24	294.24	323.66	356.02
Fertilizer	0.08	110.64	110.67	113.99
Manure	0.01	263.53	295.15	330.57
Insecticide	0.00	114.85	116.72	119.06
Irrigation Charges	0.08	189.81	200.56	220.62
Uttarakhand				
Human Labour	0.60	170.87	170.87	213.59
Bullock Labour	0.02	337.57	378.08	423.45
Machine Labour	0.03	150.37	158.57	171.25
Seeds	0.13	206.88	227.56	250.32
Fertilizer	0.08	125.26	128.92	130.21
Manure	0.04	281.36	315.13	352.94
Insecticide	0.03	114.85	116.72	119.06
Irrigation Charges	0.07	94.35	95.09	205.41

**Input index is projected on the basis of observed changes in the price of different inputs*

Annex Table-15

Comparative Statement of Cost Estimates of Sugarcane Provided Under Comprehensive Scheme (CS) and Those by State Governments

Crop/State	Year	Cost of Cultivation (Rs./Ha)			Yield (Qtl./Ha)		Cost of Production (Rs/Qtl)		
		C.S.	State Reply		C.S.	State	C.S.	State Reply	
		Survey	Original	Adjusted	Survey	Reply	Survey	Original	Adjusted
1	2	3	4	5	6	7	8	9	10
Andhra Pradesh	2011-12	NA	NA	NA	NA	NA	NA	NA	NA
	2010-11	127319	NA	NA	845.21	NA	149.75	NA	NA
Haryana	2011-12	NA	143125	143125	NA	710.00	NA	175.43	201.58
	2010-11	86721	118042	118042	577.71	650.00	134.97	155.12	181.60
Karnataka	2011-12	NA	NA	NA	NA	NA	NA	NA	NA
	2010-11	86276	124225	98225	906.00	940.00	93.02	132.15	104.49
Maharashtra	2011-12	NA	NA	NA	NA	NA	NA	NA	NA
	2010-11	128997	72374	72374	986.81	863.20	124.41	112.00	83.84
Tamil Nadu	2011-12	NA	121400	121400	NA	955.00	NA	127.12	127.12
	2010-11	113059	131079	131079	1008.79	960.00	110.55	96.00	136.54
Uttar Pradesh	2011-12	NA	NA	NA	NA	NA	NA	NA	NA
	2010-11	66799	83480	83480	509.35	600.01	124.30	139.13	139.13
Uttarakhand	2011-12	NA	135465	135465	NA	637.50	NA	212.49	212.49
	2010-11	85966	NA	NA	633.22	NA	127.76	NA	NA

Source: 1. Directorate of Economics and Statistics,
2. State Replies for 2013-14 Season