APCOM SERIES NO. 209

PRICE POLICY FOR SUGARCANE:

2004-05 CROP

AGRICULTURAL PRICES COMMISSION
GOVERNMENT OF PAKISTAN
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ABBREVIATIONS

AARI	:	Ayub Agricultural Research Institute
AJ&K	:	Azad Jummu & Kashmir
ALMA	:	Agricultural and Livestock Marketing Adviser
APCOM	:	Agricultural Prices Commission
BCR	:	Benefit Cost Ratio
CBR	:	Central Board of Revenue
CIF	:	Cost Insurance and Freight
COP	:	Cost of Production
CPI	:	Consumer Price Index
CPR	:	Cane Procurement Receipt
DPV	:	Duty Paid Value
ECC	:	Economic Co-ordination Committee of the Cabinet
EPB	:	Export Promotion Bureau
FBS	:	Federal Bureau of Statistics
FCA	:	Federal Committee on Agriculture
FOB	:	Free on Board
FYM	:	Farm Yard Manure
GDP	:	Gross Domestic Product
GST	:	General Sales Tax
HYV	:	High Yielding Variety
IPM	:	Integrated Pest Management
ISO	:	International Sugar Organization
LHC	:	Lahore High Court
LSD	:	Light Speed Diesel
MINFAL	:	Ministry of Food, Agriculture and Livestock
NARC	:	National Agricultural Research Center
NAs	:	Northern Areas
NWFP	:	North West Frontier Province
OLS	:	Ordinary Least Squares
PARC	:	Pakistan Agricultural Research Council
PSMA	:	Pakistan Sugar Mills Association
PSST	:	Pakistan Society of Sugar Technologists
TCP	:	Trading Corporation of Pakistan
USDA	:	United States Department of Agriculture
WPI	:	Wholesale Price Index
WAPDA	:	Water and Power Development Authority
WTO	:	World Trade Organization

PRICE POLICY FOR SUGARCANE, 2004-05 CROP

EXECUTIVE SUMMARY AND RECOMMENDATIONS

Sugarcane production has increased from 52.1 million tones in 2002-03 to 52.6 million tones in 2003-04. The sugar related sectors are in severe crisis. Marketing of sugarcane has become a nightmare for the farmers involving long waiting times at mill gates, delayed payments, short weight of the produce, low producer prices, etc.

Based on the past trend in sugar production in relation to cane, 3710 thousand tones of sugar is likely to be produced during 2003-04. The sugar industry is saddled with surplus stocks.

Total availability of sugar during 2003-04 including opening stocks of 759 thousand tones has been estimated at 4469 thousand tones while domestic requirements are estimated at 3446 thousand tones.

Based on the analysis of relevant factors discussed in main text of this Report, likely pricing options for sugarcane, 2004-05 crop are given in the following Table.

Price Policy Options

S.No	Basis	Likely prices of sugarcane at mill gate		
		Punjab	NWPF	Sindh
		Rupees per 40 Kgs		
1.	Cost of production of sugarcane (Table – 5)	41	37	40
2.	Market price realized by growers (2003-04)	34	42	35
3.	Domestic parity prices worked back from :			
	i) Average wholesale price of "gur" during November – December, 2003 (Annex- X)	39	44	-
	ii) Average wholesale prices of sugar during 2003-04 crushing season (Annex- XI)	33	33	34
4.	If real value of cane price for 2003-04 crop were to be equated with the level of 1990-91	39	39	41
5.	Import parity prices (economic) as worked back form the average fob (London) price of white sugar (Annex-XIII):			
	i) During 1998-99 to 2002-03	39	39	40
	ii) During October – November, 2003	34	34	35
6.	Export parity price (economic) as worked back from the average fob (London) price of white sugar (Annex- XV)			
	i) During 1998-99 to 2002-03	27	27	28
	ii) During October – November, 2003	22	22	23
		Rupees per US $		
7.	Cost of domestic resources (Table – 15) involved in:			
	i) Producing cane for sugar import substitution			
	- Based on 2003-04 prices of sugar	53	-	48
	- Based on average prices of sugar 1999-2004	37	-	35
	ii) Producing cane for exports of sugar			
	- Based on 2003-04 prices of sugar	91	-	82
	- Based on average prices of sugar 1999-2004	59	-	54

Note: Figures have been rounded off.

RECOMMENDATIONS

Prices of Sugarcane, 2004-05 Crop

As per results of the analysis of relevant factors, summarized in paras – 78 to 86 of this Report, APCom recommends to maintain existing purchase prices of sugarcane, announced by the provincial governments, for the 2004-05 Crop as well. However, purchase prices for sugarcane, as in other crops, should be determined by the Federal Government.

Sugar Prices

Ex-mill average price of sugar may be worked out by Ministry of Industries, keeping in view the cost of cane, processing cost of sugar, recoveries of by-products and other related costs involved. In case of depressed sugar prices in domestic market, Government should make necessary arrangements to purchase sugar at the pre-determined prices.

Linking Prices of Sugarcane to its Quality

A high powered committee be set up under the Secretary, MINFAL with representatives of the Ministry of Industries, sugar mills, cane growers and other relevant agencies, which should devise the modus operandi of linking prices of sugarcane to its quality.

Improving Marketing of Sugarcane

- The prices of sugarcane as announced by the Government must be ensured to farmers.
- The role of middleman in sugarcane buying needs to be discouraged.

- The Provincial/District Governments should install their own weighbridges and properly check those installed at mill gates and the purchase centers. The weigh bridges/scales installed by the middlemen at various places should be banned.

- Improper cane preparation results in lower sucrose recovery and loss to the mills. A campaign may be started to educate the farmers about proper preparation and stripping the trash from cane before supply to mills.

- In order to minimize excessive deductions and ensure quick payments for cane to growers, the provisions of Sugar Factories Control Act, 1950, need to be strictly enforced by the Provincial Governments.

- The Sugar Factories Control Act, 1950 may be amended in accordance with the current needs.

Value-addition in Sugar Industry

In the wake of increasing globalization and WTO requirements, sugar industry, which in Pakistan primarily relies on manufacturing sugar and has not given much attention to the production of other value added products, would also have to go into the business of value adding. The likely products which can be manufactured form the molasses include alcohol, citric acid, lysine, monosodium glutama, liquid sugar, yeasts, etc. The bagasse can be used in the production of chipboard, paper compressed fiber and even electricity. The Ministry of Industries/Experts Advisory Cell may work out a strategy in this context.

Improving Productivity

Varietal development

ECC decision on the allocation of cess fund for research should be fully implemented by the provincial governments so as to strengthen the research programme for varietal development which should also be monitored and subjected to peer reviews.

Promoting improved cultural practices

The Provincial Agriculture Extension Departments should launch educational campaign to apprise the farmers about the :

- proper methods of land preparation for sugarcane cultivation;

- optimum plant population and the methods to achieve this;

- sowing the recommended and improved varieties and discourage the cultivation of unapproved varieties;

- methods and importance of weed control and plant protection;

- importance of the use of balanced doses of various fertilizers based on proper plant/soils analysis and the timings and methods of use of various fertilizers;

- cultural practices and biological control of the pests. The government should stress upon the PSMA to ensure establishment of IPM labs for rearing of predators at each mill's premises; and

- value of press mud as a source of organic matter and promote its use in crop production. The sugar mills be advised to supply mud to the cane growers free of cost instead of selling for non-farm uses.

Role of Sugar industry in cane development

To improve the productivity of sugarcane, the sugar industry may be persuaded to take the responsibility of :

- production, multiplication and distribution of certified seed of improved and recommended varieties of sugarcane. For this purpose sugar mills should establish their Cane Development Centres either individually or collectively. These centres in collaboration with the progressive growers and sugarcane researchers should undertake the multiplication and distribution of certified cane seed and also provide technical advisory services to the growers;

- providing facilities of hot water treatment of cane setts to the growers alongwith technical guidance for using the technique; and

- providing incentive in the form of quality premium to the growers growing high sucrose varieties.

Dr. Abdul Salam
Chairman, APCom

January 31, 2004

PRICE POLICY FOR SUGARCANE, 2004-05 CROP

1. INTRODUCTION

Sugarcane annually cultivated over one million hectares of land has played a vital role in the development of country's economy. Its share in value added by major crops has ranged between 15-17 per cent. It also provides fodder for the livestock. The sugar industry - the 2nd largest agro based industry of the country comprising more than 75 sugar mills, depends on sugarcane farming for raw material. The industry has made valuable contribution in the development of infrastructure and provided off-farm employment opportunities in the rural areas. Sugarcane farming and sugar manufacturing contribute significantly to the national exchequer in the form of various levies and taxes.

2. For the last few years the sugarcane and sugar sub-sectors are in turmoil, suffering the problems associated with over supply. Industry is saddled with surplus stocks of sugar, liquidity problems, and accumulated arrears of growers. The prices of sugar have crashed both in the domestic and international markets, adversely affecting the economics of sugarcane dependent sectors.

3. In the wake of successive good crops, marketing of sugarcane has become a nightmare for the farmers, involving long waiting at the mills, short weight of the produce at purchase centers, excessive deductions on account of trash etc., delayed payments forcing the growers to sell off the produce to the middlemen at throw away prices or selling CPRs at discounted prices. End result is that price of cane realized by the growers do not cover even their cost of production.

4. In view of the importance of sugarcane crop and sugar industry in the economy the problems confronting the farmers and industry need to be resolved through policy measures aimed at addressing the core issues of over supply of sugarcane, malpractices in its marketing, and surplus stocks of sugar. The Commission has put forward a number of proposals in this context for the consideration of Government in this Report.

2. SUGARCANE PLANTING AND HARVESTING SEASONS

5. Sugarcane, a tropical crop requires temperature of more than 20 C^0 for proper germination and growth and two months of dry and cool weather towards maturity. The climatic conditions in Pakistan generally provide a growing season of 8 to 10 months for sugarcane in a year. Recommended times of planting spring and autumn crops of sugarcane by province are given in Table-1.

Table-1: Planting Times of Sugarcane by Province

Province	Planting Time	
	Spring Crop	Autumn Crop
Punjab	15th February to 3rd week of March	September
Sindh	1st February to 15th March	September to October
NWFP	15th February to 3rd week of March	September

Source: Official correspondence with Sugarcane Coordinator, NARC, Islamabad.

6. The planting time for the Autumn crop depending on the monsoon rains can be advanced to August and may last upto November in some areas. The planting of Spring crop continues upto April.

7. Harvesting of sugarcane generally commences in October and lasts upto April – May depending upon the crop size. In Sindh the crop matures a couple of weeks earlier than in the Punjab and the NWFP.

3. PROVINCIAL SHARES IN AREA AND PRODUCTION

8. Based on three years period of 2001-02 to 2003-04, the annual production of sugarcane has averaged at 51 million tonnes, and area at 1.05 million hectares. The shares of Punjab, Sindh and NWFP in sugarcane area are estimated at 66, 24 and 10 per cent.

3.1 Provincial Shares in Sugar Production

9. The sugar production, in the last three years has ranged between 2467 and 3664 thousand tonnes. Punjab Contributes about 64 per cent of the total sugar made from sugarcane while the shares of Sindh and NWFP are estimated at 33 and 3 per cent.

4. IMPORTANT SUGARCANE PRODUCING DISTRICTS

10. Districts of Faisalabad, Jhang, Sargodha, Kasur, Rahim Yar Khan, T.T.Singh, Hyderabad and Badin, each produce more than two million tonnes of sugarcane per year, together account for over 50 percent of the sugarcane produced in the country. Thus, sugarcane crop plays an important role in the economy of these districts. There are 33 sugar mills processing sugarcane in these districts.

5. AREA, YIELD AND PRODUCTION

11. During the decade ending 2003-04, sugarcane area in the country has ranged between 961 and 1155 thousand hectares (2350 to 2854 thousand acres), and production varied from 42 to 55 million tonnes per year. The yield of sugarcane in this period has fluctuated between 44 to 50 tonnes per hectare.

12. Long and short term changes in area, yield and production of sugarcane are described below:

5.1. Long-term Changes: 1993-94 to 2003-04

13. The sugarcane production at national level during the last decade ending 2003-04, is estimated to have increased @ 1.24 per cent per year. This was on account of 0.77 per cent annual expansion in area and 0.47 per cent improvement in yield.

14. The provincial growth rates in this context are given in Table- 2.

Table- 2 : Average Annual Growth Rates of Area, Yield and Production of Sugarcane: 1993-94 to 2003-04

Country/Province	Area	Yield	Production
	------------------ Per cent per annum	------------------	
Pakistan	**(+) 0.77**	**(+) 0.47**	**(+) 1.24**
Punjab	(+) 1.30	(+) 1.19	(+) 2.50
Sindh	(-) 0.33	(-) 0.93	(-) 1.25
NWFP	(+) 0.18	(+) 0.83	(+) 1.02
Balochistan	(+) 0.96	(-) 0.16	(+) 0.80

Note: The growth rates have been worked out by estimating the equation, $Y=a(1+r)^x$, through Ordinary Least Squares (OLS) method from the data given in Annex-I.

15. During the period of 1993-94 to 2003-04, sugarcane production in the Punjab is estimated to have increased @ 2.5 per cent per year, attributable to 1.3 per cent expansion in area and 1.2 per cent improvement in yield. Sugarcane production in Sindh has declined @ 1.25 per cent due to declines of 0.33 and 0.93 per cent in area and yield. Area, yield and production of sugarcane in NWFP have experienced positive growth rates i.e. 0.18, 0.83 and 1.02 respectively. In Balochistan, sugarcane production is estimated to have increased @ 0.8 per cent per year entirely due to 0.96 per cent expansion in area while yield decreased by 0.16 per cent.

5.2 Short-term Changes: 2003-04 Vs 2002-03

16. According to second estimates sugarcane production from 2003-04 crop is reported at 52.6 million tonnes, one per cent higher than the last year's crop of 52.1 million. The gains in production are entirely due to 5.7 per cent higher yield as the area has contracted by 4.4 per cent (Table-3).

Table-3: Area, Yield and Production of Sugarcane: 2002-03 and 2003-04 Crops

Country/ Province	Area 2002-03	Area 2003-04	Changes in 2003-04 over 2002-03	Yield 2002-03	Yield 2003-04	Changes in 2003-04 over 2002-03	Production 2002-03	Production 2003-04	Changes in 2003-04 over 2002-03
	-- 000 hectares --		Per cent	--Tonnes/hectare --		Per cent	-- 000 tonnes --		Per cent
Pakistan	**1099.6**	**1050.8**	**(-) 4.4**	**47.3**	**50.0**	**(+)5.7**	**52055.8**	**52584.6**	**(+) 1.0**
Punjab	735.3	686.3	(-) 6.7	45.1	48.5	(+)7.6	33168.6	33297.2	(+) 0.4
Sindh	258.6	259.9	(+) 0.5	53.4	54.7	(+)2.5	13797.6	14218.3	(+) 3.0
N.W.F.P.	104.9	104.2	(-) 0.7	48.1	48.5	(+)0.8	5049.0	5050.1	(+) 0.0
Balochistan	0.8	0.4	(-)50.0	50.8	50.8	0.0	40.6	19.0	(-)53.2

Note: Figures in parentheses are in thousand acres.
Source: Annex-I.

6. TARGETS VS ACHIEVEMENTS OF AREA, YIELD AND PRODUCTION OF SUGARCANE: 2003-04 CROP

17. The Federal Committee on Agriculture (FCA) in its meeting held on 29-10-2003 had fixed the sugarcane production target, for 2003-04 crop, at 47.74 million tonnes. As per second estimates, production reported at 52.59 million tonnes will exceed the target by 10.2 per cent (Table-4).

Table-4: Targets and Estimated Achievements of Area, Yield and Production of Sugarcane:2003-04 Crop

Country/ Province	Area Target	Area Achievement	Deviation from target	Yield Target	Yield Achievement	Deviation from target	Production Target	Production Achievement	Deviation from target
	000 hectares		Per cent	Tonne per hectare		Per cent	000 tonnes		Per cent
Pakistan	**1000.0**	**1050.8**	**(+) 5.1**	**47.7**	**50.0**	**(+) 4.8**	**47739.0**	**52584.6**	**(+)10.2**
Punjab	650.0	686.3	(+) 5.6	48.2	48.5	(+) 0.7	31313.0	33297.2	(+) 6.3
Sindh	250.0	259.9	(+) 4.0	46.5	54.7	(+)17.7	11616.0	14218.3	(+)22.4
N.W.F.P.	100.0	104.2	(+) 4.2	48.1	48.5	(+) 0.8	4810.0	5050.1	(+) 5.0
Balochistan	0.0	0.4	-	-	50.8	-	0.0	19.0	-

Source: 1. For targets: Minutes of the79th Meeting of FCA held on 29-10-2003 at Islamabad.
2. For achievements: Annex-I.

7. FACTORS CONSIDERED FOR PRICE POLICY OPTIONS

18. In formulating the price policy proposals for sugarcane, 2004-05 crop, following factors have been considered and analysed.

- 7.1 Cost of production of sugarcane
- 7.2 Market prices of sugarcane, 2003-04 crop
- 7.3 Nominal and real prices of sugarcane
- 7.4 Economics of fertilizer use on sugarcane
- 7.5 Domestic demand, supply, stocks and prices of sugar
- 7.6 Comparative economics of sugarcane and competing crops
- 7.7 Prices of sugarcane on the basis of 'gur' prices
- 7.8 Prices of sugarcane worked back from average wholesale market price of sugar
- 7.9 World supply, demand, stocks, trade and price situation of sugar
- 7.10 Import and export parity prices
- 7.11 Economic efficiency in sugarcane production

7.1 Cost of Production

19. The cost of production of sugarcane, 2004-05 crop has been synthesized by adopting the input-output parameters as used in the Support Price Policy for Sugarcane, 2003-04 crop along-with the latest inputs prices and custom hire rates of field operations. The costs of production estimates for Punjab, Sindh and the NWFP are summarized in Table-5.

Table-5: Average Farmers' Cost of Production of Sugarcane: 2003-04 and 2004-05 Crops

Item	Unit	Cost estimates		Increase in 2004-05 over 2003-04
		2003-04 crop	2004-05 crop	
		Punjab		
1. Cost of cultivation	Rs/acre	19679	20335	656
2. Yield	40 kgs/acre	565.15	565.15	-
3. Cost of production at farm level	Rs/40 kgs	34.82	35.98	1.16
4. Marketing cost including development cess	"	4.75	5.25	0.50
5. Cost of production at mill-gate	"	39.57	41.23	1.66
		Sindh		
1. Cost of cultivation	Rs/acre	22799	23386	587
2. Yield	40 kgs/acre	676.02	676.02	-
3. Cost of production at farm level	Rs/40 kgs	33.73	34.59	0.86
4. Marketing cost including development cess	"	4.82	5.32	0.50
5. Cost of production at mill-gate	"	38.55	39.91	1.36
		NWFP		
1. Cost of cultivation	Rs/acre	18660	18915	255
2. Yield	40 kgs/acre	585.46	585.46	-
3. Cost of production at farm level	Rs/40 kgs	31.87	32.31	0.44
4. Marketing cost including development cess	"	3.97	4.77	0.80
5. Cost of production at mill-gate	"	35.84	37.08	1.24

Source: Annex-II to IV

Punjab

20. The cost of growing one acre of sugarcane in the Punjab, during 2004-05 crop year, works out to Rs 20335, inclusive of land rent. Distributing the cost of cultivation over the average yield of 565 maunds (40 kgs) per acre, farm level cost of producing 40 kgs of sugarcane comes to Rs 35.98. Adding charges for transportation and development cess @ Rs 5.25 per 40 kgs, the cost of production at the mill-gate would be Rs 41.23, reflecting an increase of Rs 1.66 (4.20 per cent) over the corresponding cost estimates of 2003-04 crop.

Sindh

21. The cost of cultivating one acre of sugarcane in Sindh, during 2004-05 crop year is expected at Rs 23,386, including land rent. With the average yield of 676 maunds per acre, farm level cost of production of sugarcane comes to Rs 34.59 per 40 kgs. Accounting for transportation, marketing charges and development cess, of Rs 5.32, the cost of sugarcane at mill-gate would come to Rs 39.91 per 40 kgs, representing an increase of Rs 1.36 (3.53 per cent) over the corresponding cost of the previous year.

NWFP

22. The cost of sugarcane cultivation in the NWFP in 2004-05 crop year is expected at Rs 18915 per acre, inclusive of land rent. With the average yield of 585 maunds (40 kgs) per acre, farm level cost of production of sugarcane works out to Rs 32.31 per 40 kgs. Adding Rs 4.77 on account of transportation, marketing costs, and development cess, the mill-gate cost of sugarcane would be Rs 37.08 per 40 kgs, higher by Rs 1.24 (3.46 per cent) than the corresponding cost of the 2003-04 crop.

23. The increases in cost of production of sugarcane for the 2004-05 crop year are attributable to increases in the custom rates of field operations, prices of fertilizers, supplementary irrigation and wage rates. The downward adjustments in the mark up on institutional credit, (11 per cent) used in the calculations to estimate the opportunity cost of the working capital, has partially offset the impact of rising prices of inputs and custom rates of field operations on cost of cultivation of sugarcane.

7.2 Market Prices of Sugarcane

24. The provincial governments have fixed the following purchase prices of sugarcane at the mill gate:

	2003-04 crop	2002-03 crop
	..... Rs per 40 kgs	
Punjab	40	40
Sindh	41	43
NWFP	42	42

25. The APCom conducted field visits in the important sugarcane growing areas of the Punjab, Sindh and the NWFP in December and January. During the course of the field survey, the growers informed the survey teams about the difficulties and the problems encountered by them in selling their sugarcane.

26. The crushing campaign in 2003-04 as in last year started quite late. In view of the good crop and delay in the start of crushing by the mills, there is a great rush of farmers for the supply of sugarcane to the mills. It is a typical buyers market with middlemen having a field day. The middlemen are exploiting the farmers' needs; i) to vacate their lands for next crop, and ii) of cash to meet their production and consumption requirements. The survey teams observed long queues of trucks / trolleys and other vehicles loaded with sugarcane on the road sides waiting for the delivery of their produce. The waiting time at mill gate hovered around 3 to 4 days resulting in weight

loss, extra expenditure and a lot of inconvenience. To avoid such a situation, farmers often preferred to sell their produce to the middlemen / private parties who offered prompt payments but at a discount of Rs. 5 to 9 per 40 kgs besides transport charges. There were serious complaints about underweighment of the produce as well. The farmers who sold their produce to the sugarmills were in many cases compelled to sell their CPRs to the middlemen but at a discount of Rs. 4 to 5 per 40 kgs. The prices paid by private parties purchasing sugarcane in Punjab were reported at Rs. 25 - 30 per 40 kgs. and Rs. 32 - 35 in Sindh. The growers alleged that most of the middlemen were working at behest of the sugar mills.

27. The mills in the NWFP were purchasing sugarcane at Rs. 42 per 40 kgs and the payments were reportedly made within fortnight or so.

7.3 Nominal and Real Prices of Sugarcane, 1990-91 to 2003-04 Crops

28. To ascertain overtime changes in the purchasing power of sugarcane, its nominal support and market prices at the mill gate (from 1990-91 to 2003-04) were deflated by the Consumer Price Index (CPI), the most widely used measure of inflation in the economy. The results are given in Tables-6 and 7 and also shown in figures 1 to 4. As discussed in the section on market prices, farmers in the current year are not getting the prices of sugarcane announced by the Provincial Governments nor there are any institutional arrangements on the ground for ensuring the same. The situation has been the same for many years. Therefore, following discussion focuses on the changes in the purchasing power of sugarcane as indicated in terms of its market prices.

29. The market prices of sugarcane have declined from Rs 45 per 40 kgs in 2000-01 to Rs 34 in the Punjab and from Rs 50 to Rs 35 in Sindh. During the same period, the CPI (1990-91 = 100) has increased from 233.24 to 258.14. Accordingly, the real value of sugarcane prices has continuously plummeted during the last 4 years. The real values of sugarcane prices in the current season estimated at Rs 13.17 per 40 kgs (in terms of 1990-91 prices) in the Punjab and Rs 13.56 in Sindh are the lowest since 1990-91. The erosion experienced in the real value of market prices of sugarcane during the last 4 years is 32 per cent in Punjab and 37 per cent in case of Sindh.

Table-6: Nominal and Real Prices of Sugarcane in the Punjab: 1990-91 to 2003-04

Crop year	Nominal prices		Consumer Price Index (CPI)	Real Prices	
	Support	Market		Support	Market
1	2	3	4	5=(2/4)x100	6=(3/4)x100
	---- Rs per 40 kgs ----		1990-91=100	------ Rs per 40 kgs -------	
1990-91	15.25	15.25	100.00	15.25	15.25
1991-92	16.75	16.75	110.58	15.15	15.15
1992-93	17.50	18.50	121.45	14.41	15.23
1993-94	18.00	19.00	135.14	13.32	14.06
1994-95	20.50	20.50	152.73	13.42	13.42
1995-96	21.50	25.00	169.21	12.71	14.77
1996-97	24.00	38.00	189.18	12.69	20.09
1997-98	35.00	35.00	203.96	17.16	17.16
1998-99	35.00	32.00	215.66	16.23	14.84
1999-00	35.00	35.00	223.39	15.67	15.67
2000-01	35.00	45.00	233.24	15.01	19.29
2001-02	40.00*	37.00	241.50	16.56	15.32
2002-03	40.00*	35.00	248.98	16.07	14.96
2003-04	40.00*	34.00**	258.14	15.50	13.17

Source: Economic Survey of Pakistan (Statistical Supplement), 2002-03.

Notes: i) CPI for 2003-04 has been projected in view of the average rise in CPI during the last 3 years.

ii) *Minimum purchase price of sugarcane at mill-gate fixed by the government of Punjab.

iii) **Prices of sugarcane actually realized by the growers as obtained through the field survey conducted by the APCom in December 2003.

Table-7: Nominal and Real Prices of Sugarcane in Sindh: 1990-91 to 2003-04

Crop year	Nominal prices		Consumer Price Index (CPI)	Real Prices	
	Support	Market		Support	Market
1	2	3	4	5=(2/4)x100	6=(3/4)x100
	---- Rs per 40 kgs ----		1990-91=100	------ Rs per 40 kgs ------	
1990-91	15.75	15.75	100.00	15.75	15.75
1991-92	17.00	17.00	110.58	15.37	15.37
1992-93	17.75	18.75	121.45	14.62	15.44
1993-94	18.25	20.40	135.14	13.50	15.10
1994-95	20.75	21.90	152.73	13.59	14.34
1995-96	21.75	25.00	169.21	12.85	14.77
1996-97	24.50	40.00	189.18	12.95	21.14
1997-98	36.00	39.00	203.96	17.65	19.12
1998-99	36.00	36.00	215.66	16.69	16.69
1999-00	36.00	42.00	223.39	16.12	18.80
2000-01	36.00	50.00	233.24	15.43	21.44
2001-02	43.00	47.00	241.50	17.81	19.46
2002-03	43.00	36.00	248.98	17.27	14.46
2003-04	41.00*	35.00**	258.14	15.88	13.56

Sources: i) Economic Survey of Pakistan (Statistical Supplement), 2002-03.

ii) Various issues of Support Price Policy for Sugarcane Crop.

Notes: i) CPI for 2003-04 has been projected in view of the average rise in CPI during the last three years.

ii) * Minimum purchase prices of sugarcane at mill-gate fixed by the Government of Sindh

iii) **Price of sugarcane actually realized by the growers as obtained through field survey conducted by the APCom during December 2003..

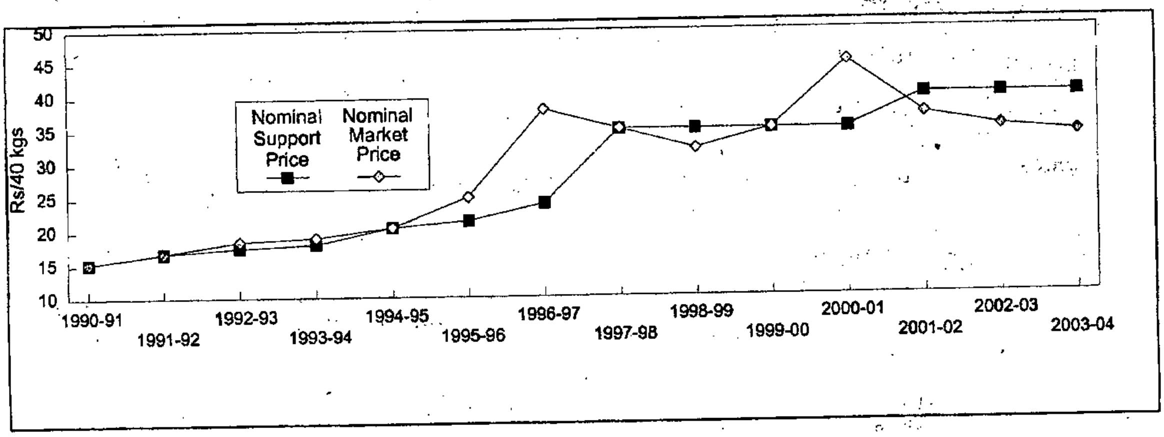

Fig-1: NOMINAL SUPPORT AND MARKET PRICES OF SUGARCANE IN THE PUNJAB: 1990-91 TO 2003-04

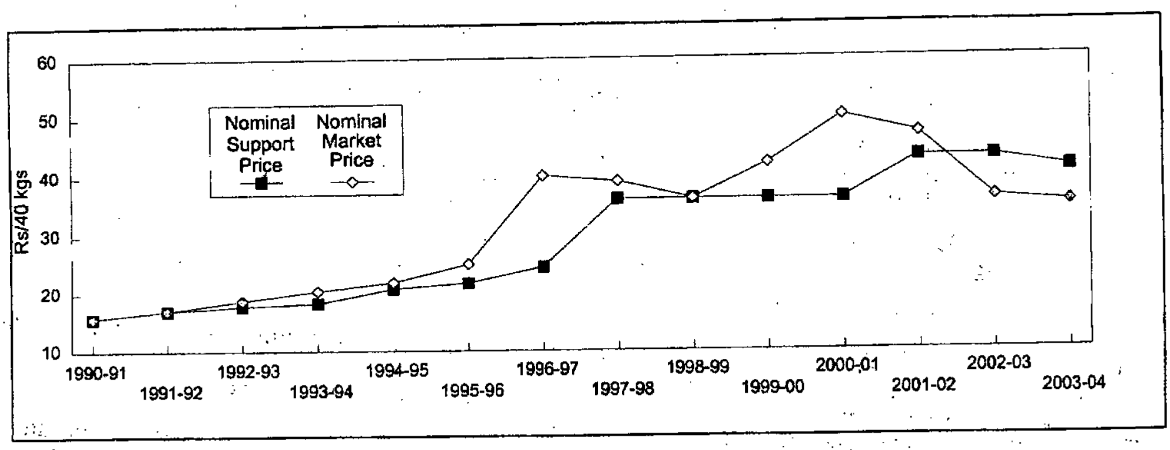

Fig-2: NOMINAL SUPPORT AND MARKET PRICES OF SUGARCANE IN SINDH: 1990-91 TO 2003-04

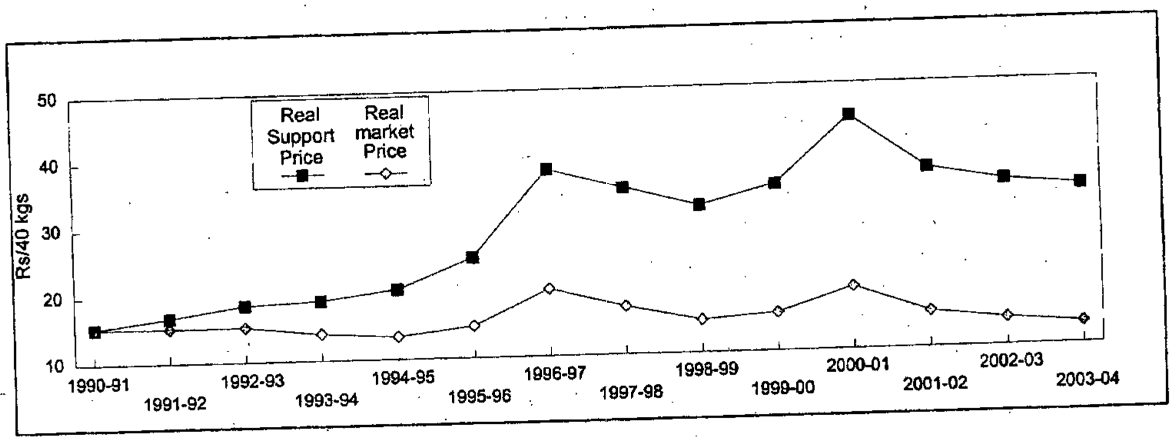

Fig-3:REAL SUPPORT AND MARKET PRICES OF SUGARCANE IN THE PUNJAB: 1990-91 TO 2003-04

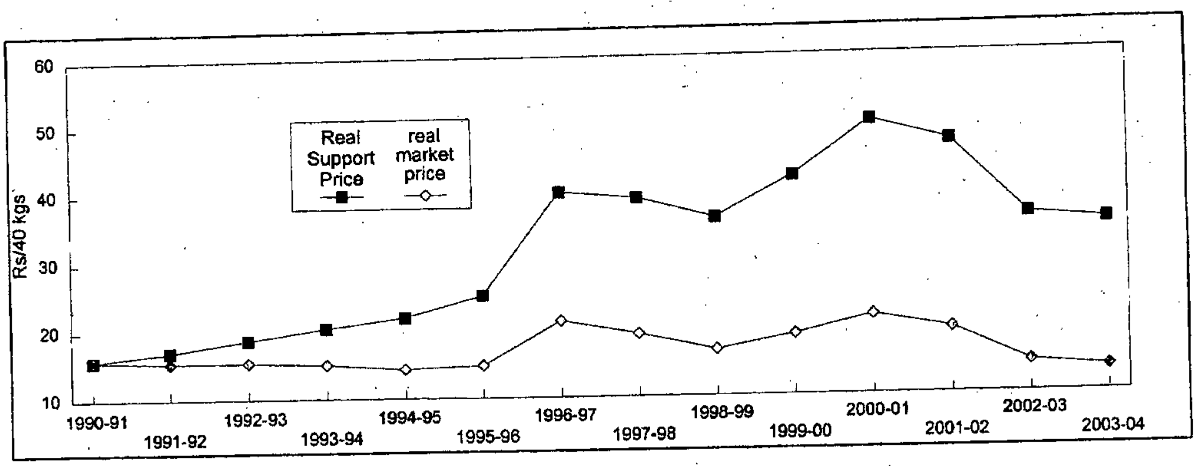

Fig-4: REAL SUPPORT AND MARKET PRICES OF SUGARCANE IN SINDH: 1990-91 TO 2003-04

7.4 Economics of Fertilizer Use

30. The economics of fertilizer use in sugarcane farming has been analysed through estimating (i) Benefit Cost Ratio (BCR) of fertilizer use and (ii) parity ratio between the prices of fertilizers and sugarcane. The results are discussed below:

7.4.1 Benefit Cost Ratio (BCR)

31. BCR refers to the ratio between value of additional produce resulting from using a certain dose of fertilizers and the costs thereof, both direct and indirect. A BCR of greater than one means that benefits are higher than the costs entailed in the process and vice a versa. To encourage fertilizer use under low risk farming conditions (irrigated) a BCR of 2:1 or higher is recommended by agronomists. Because of large variations in soil and climatic conditions across various agro-climatic regions the crop's response to the use of fertilizer nutrients exhibits considerable variation. Moreover, BCRs are also subject to change due to overtime changing prices of inputs and output. Thus the analysis of fertilizer use on sugarcane has been carried out at different response ratios for the period of 1995-96 to 2003-04. As the support prices of sugarcane are not being enforced in the field for the last many years BCRs have been estimated at the prices realized by the farmers.

32. The data presented in Table-8 reveal that BCRs at various response ratios have all along been greater than one implying fertilizer use on sugarcane has remained profitable throughout the period under analysis. However, acceptable profitability level of BCR ≥ 2, as proposed by the experts, has been generally observed at response ratios of 90:1 and 110:1. The highest profitability level, at all response ratios was observed during 1996-97 and 2000-01 crop years when market price of sugarcane rose by 56 and 23 per cent over the previous years respectively. After 2000-01 BCRs at all response ratios have declined sharply. The BCRs in the current crop year are at their lowest level and resulted from low market prices of sugarcane. The BCR data further show that profitability of fertilizer use on sugarcane in Sindh has been higher as compared to Punjab because of higher prices of sugarcane. The data on BCRs point to the need for improving the profitability of fertilizer use through all possible measures.

Table-8:- Benefit Cost Ratios (BCRs) of Fertilizer Use on Sugarcane at Market Prices:1995-96 to 2003-04

Crop year	BCR at Response ratios (Sugarcane: Nutrient) of							
	50:1		70:1		90:1		110:1	
	Punjab	Sindh	Punjab	Sindh	Punjab	Sindh	Punjab	Sindh
1995-96	1.52	1.50	1.86	1.84	2.13	2.10	2.35	2.31
1996-97	1.93	2.00	2.41	2.49	2.79	2.87	3.10	3.19
1997-98	1.46	1.63	1.83	2.03	2.12	2.36	2.36	2.63
1998-99	1.34	1.50	1.67	1.88	1.94	2.18	2.16	2.43
1999-00	1.37	1.65	1.73	2.07	2.02	2.42	2.26	2.71
2000-01	1.80	2.00	2.26	2.51	2.63	2.92	2.93	3.26
2001-02	1.26	1.60	1.58	2.00	1.83	2.32	2.04	2.59
2002-03	1.29	1.25	1.62	1.56	1.88	1.82	2.09	2.03
2003-04	1.08	1.09	1.35	1.37	1.57	1.59	1.76	1.78

Note: Market prices of sugarcane i.e. the prices actually received by the growers as collected during the field surveys by APCom have been used for computing the BCRs for the respective crop years.

7.4.2 Parity between Market Prices of Fertilizers and Sugarcane

33. The parity ratios between market prices of fertilizers and sugarcane refer to the quantity of sugarcane needed to purchase a certain quantity of chemical fertilizers. Table-9 presents overtime picture regarding purchasing power of sugarcane in terms of fertilizer nutrients N and P.

34. As per data presented in Table-9 ratio between prices of fertilizers and that of sugarcane having fluctuated between 12.45 to 19.11 for nitrogen and between 18.94 to 20.82 for phosphorus, during the period of 1994-95 to 2000-01 was the most favourable to sugarcane in 2000-01. The quantity of sugarcane needed to buy one tonne of nitrogen in 2000-01 stood at 12.45 tonnes and of phosphorus at 18.94 tonnes. Fertilizer prices have since continued to rise while market prices of sugarcane trended downward. Consequently, with the passage of each crop year the quantity of sugarcane required to buy the same amount of fertilizers has been increasing. At the prevailing market prices of

sugarcane and fertilizers in 2003-04 crop season buying one tonne of nitrogen requires selling of 19.28 tonnes of sugarcane while 27.77 tonnes of sugarcane would suffice to purchase one tonne of phosphorus. These are the highest quantities of sugarcane required to buy the given quantity of fertilizer during the reference period i.e. 1994-95 – 2003-04.

Table-9: Ratio Between Prices of Fertilizers (Nutrients) and Sugarcane: 1994-95 to 2003-04

Crop year	Prices of fertilizer nutrients		Average market price of sugarcane	Quantity of sugarcane needed to buy one nutrient tonne of	
	N	P_2O_5		N	P_2O_5
	Rupees per tonne			Tonnes	
1994-95	10130	11036	530	19.11	20.82
1995-96	10326	13198	625	16.52	21.12
1996-97	13478	19509	975	13.82	20.01
1997-98	15652	18658	925	16.92	20.17
1998-99	15108	18870	850	17.77	22.20
1999-00	15217	24915	962	15.82	25.90
2000-01	14783	22476	1187	12.45	18.94
2001-02	17391	24499	1050	16.56	23.33
2002-03	17040	25420	942	18.09	26.98
2003-04	17830	25690	925	19.28	27.77

Notes:

1. The prices of N and P have been worked out from those of Urea and DAP, which were used in estimating the cost of production of sugarcane in the respective support price policy papers.
2. The prices of sugarcane i.e. the prices actually received by the growers as collected during the field surveys by APCom have been used for computing parity ratios for the respective crop years.

7.5 Domestic demand, supply, stocks and prices of sugar

7.5.1 Domestic demand, supply and stocks

35. Data on domestic production, imports, exports, stocks and consumption of sugar during 1993-94 to 2002-03 are detailed in Annex-V. Annual per capita availability/consumption of sugar during this period has averaged at 21.64 kgs.

36. At the beginning of sugar year 2002-03 (Oct.-Sept.) the country had stocks of 637 thousand tonnes. Sugar production during the year has been reported at 3,677 thousand tonnes. Accounting for exports of 81 thousand tonnes and imports of 9 thousand tonnes the end year stocks in 2002-03 come to 759 thousand tonnes. Thus, the actual disappearance/consumption of sugar during 2002-03 was 3,483 thousand tonnes.

37. According to the 2nd estimates of 2003-04 crop, sugarcane production is reported to increase to 52,586 thousand tonnes from 52,056 thousand tonnes in last year. Assuming the proportionate increase in sugar processing from cane, sugar out put should increase to 3,700 thousand tonnes. However, as the sugarcane production rises, the proportion of cane going to sugarmills also increases as farm level uses of sugarcane in gur making and other activities do not increase by same ratio. Based on the analysis of past trend in sugar production in relation to cane, 3,710 thousand tonnes of sugar may be produced during 2003-04. The sugar industry estimates sugar production at 3,800 thousand tonnes during current season. Adding 759 thousand tonnes of opening stocks, total availability of sugar during 2003-04 should range from 4,469 to 4,559 thousand tonnes.

38. Trend forecast of per capita sugar consumption comes to 22.08 kgs in 2003-04. Accordingly, domestic requirements for 2003-04 for a mid year population of 156.08 million (as on 1st April 2004) work out to 3,446 thousand tonnes. In view of the foregoing supply and demand situation the country would have substantial surplus stocks of sugar.

7.5.2 Behaviour of sugar prices in domestic market

39. During 2002, sugar prices ranged between Rs 1,862 and Rs 2,138 per 100 kgs whereas in 2003 these ranged between Rs 1,677 and Rs 2,150. The overall average market price during 2002 was Rs 2,042 per 100 kgs which decreased to Rs 1,869 per 100 kgs during 2003 (Annex –VI).

40. The prices of sugar showed a rising but cyclical trend during last decade i.e. from 1993-94 to 2003-04. The average price which stood at Rs 1,196 per 100 kgs in 1993-94 increased to Rs 1,713 per 100 kgs during 2003-04. However, during this period price moved up in cycles. Upto 1996-97 price increased continuously but in the following year it decreased. Then for the next four years price continued increasing upto 2000-01 and have since been declining (Annex-VII and Figure 5).

41. The support price of sugarcane, has increased from Rs 21.50 in 1993-94 to 40.00 per 40 kgs in 2003-04 in the Punjab and the NWFP and from Rs 21.75 to Rs 41.00 per 40 kgs in Sindh showing annual average increases of 6.41 and 6.54 per cent respectively. However, market price (actually received by the growers) has experienced considerable year to year fluctuations. It has ranged between Rs 21.50 to Rs 44 in Punjab, Rs 21.50 to Rs 47 in NWFP and Rs 21.75 to Rs 58 per 40 kgs in Sindh. Sometimes market prices have ruled much higher than the support price and sometimes ruled below it. Average annual increase in market price of sugarcane comes to 6.41, 6.93 and 6.54 per cent in the Punjab, the NWFP and Sindh respectively. The behaviour of sugarcane prices has been shown in Annex-VIII.

42. Based on monthly average wholesale price of sugar from 1993-94 to 2003-04, seasonal indices have been calculated and depicted in Figure-6. The prices of sugar generally tend to rise in March-April and continue rising upto August-September. With the start of new crushing season from November onwards, the prices generally start falling.

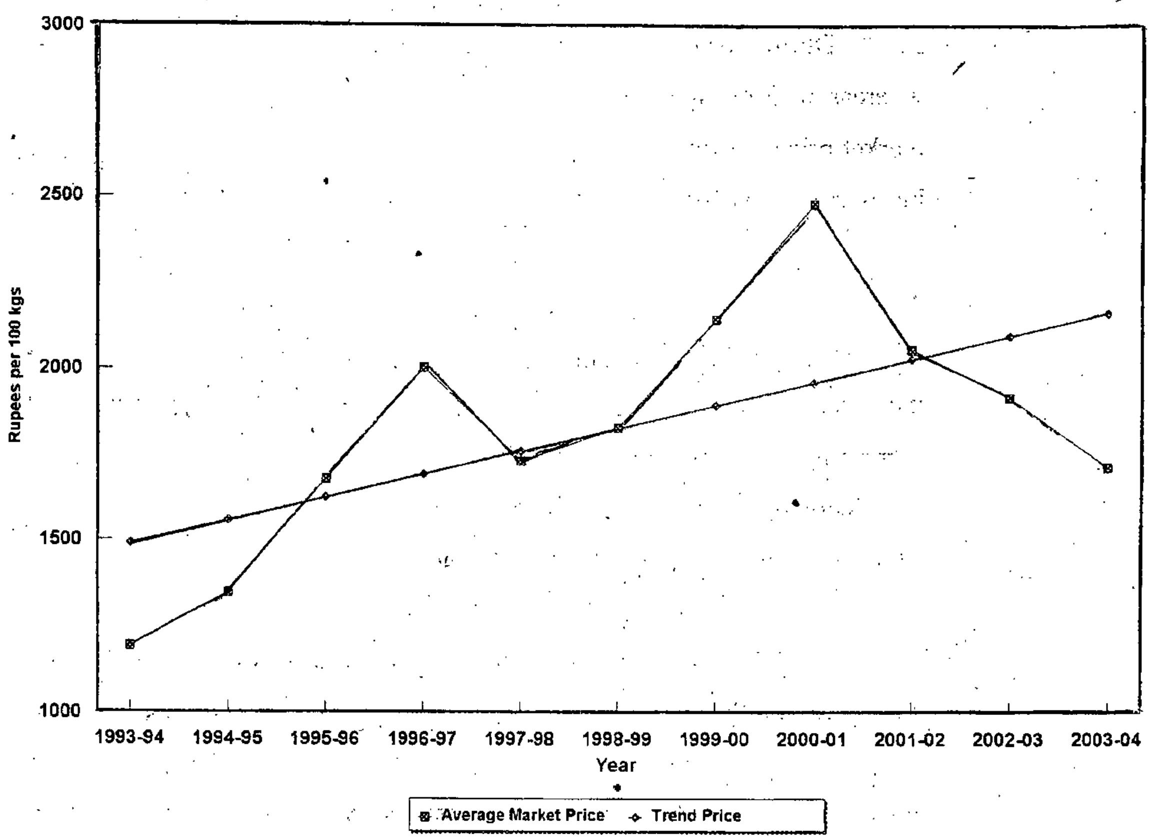

Figure-5: **LONG TERM TREND OF WHOLESALE PRICES OF SUGAR: 1993-94 TO 2003-04.**

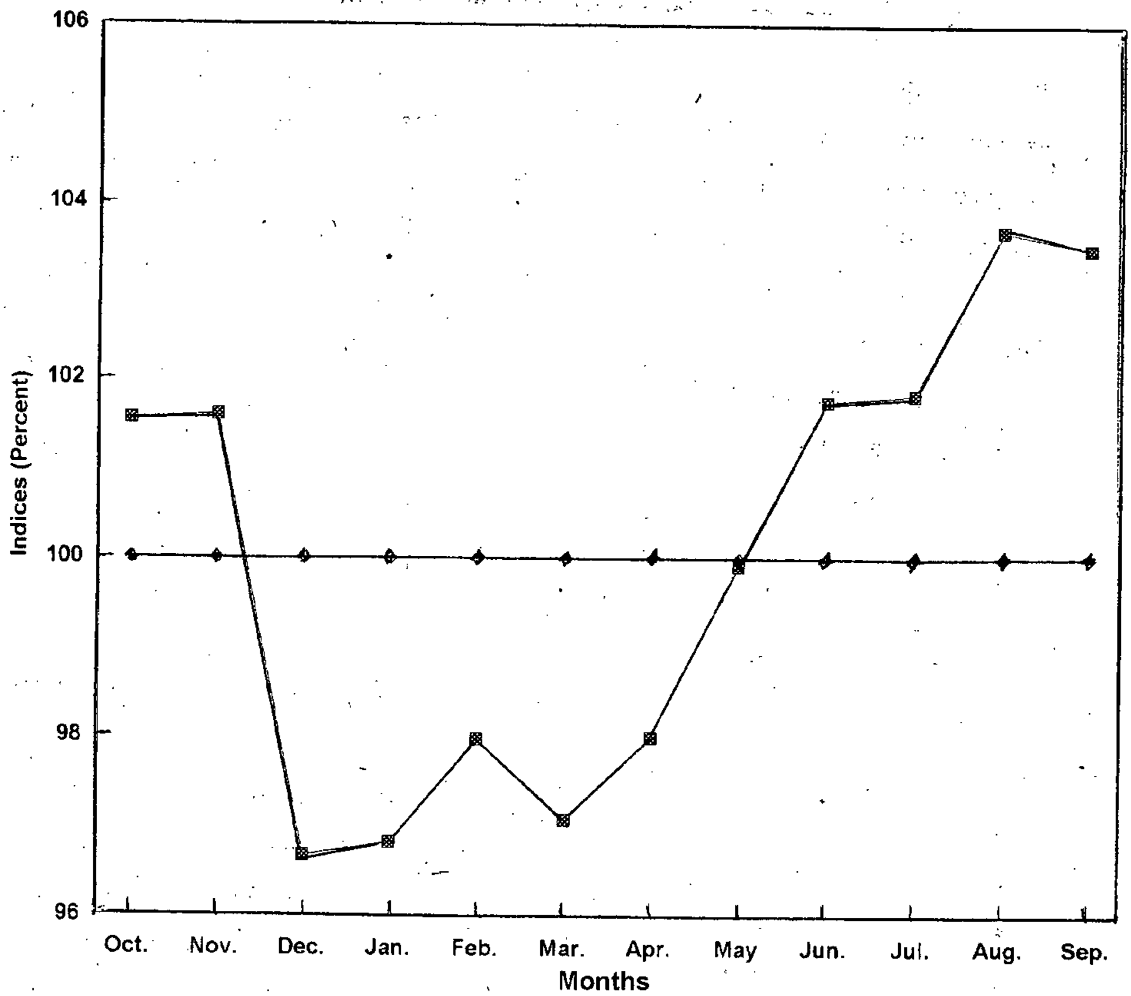

Figure 6: SEASONAL INDICES OF SUGAR PRICES: 1993-94 TO 2002-03

7.6 Comparative Economics of Sugarcane and Competing Crops

43. Resource allocation among the competing enterprises is primarily governed by various economic considerations reflected in their gross cost, gross income, gross margin, net income, output-input ratio, etc. Sugarcane, an annual crop, is grown in the irrigated regions of the country. It occupies the fields round the year. Consequently, it competes for land, water and other farm resources with various kharif as well as rabi crops as the land planted to sugarcane may not be available for growing other crops in a given year. The economics of sugarcane and competing crops/combinations has been analysed in terms of input-output prices paid and received by the growers during the 2003-04 crop year. A summary of various economic indicators, for the Punjab and Sindh is provided in Table-10 and 11. The results are briefly discussed below.

Punjab

44. According to the APCom's field survey of sugarcane growing districts and the press reports, the market price of sugarcane, by and large, has hovered around Rs 34 per 40 kgs although the Provincial Government has notified a minimum purchase price of Rs 40 per 40 kgs for the 2003-04 crop at the mill-gate. Low prices realized by the growers have affected adversely the economic position of sugarcane against competing crops. The cost incurred in sugarcane farming is not being recovered by the output prices received. Accordingly, returns to overall investment are quite poor and the output-input ratio has fallen below one, i.e. the break-even point.

45. Sugarcane is out competed by the competing crop combinations in terms of output-input ratio as well as revenue per day of crop duration. In case of returns to irrigation water, sugarcane enjoying an edge over the rice combinations lags far behind cotton rotations. Sugarcane also falls way behind cotton-sunflower and cotton– wheat rotations in terms of revenue per rupee of purchased inputs cost but edges out basmati-wheat and basmati–sunflower rotations.

Table-10: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in the Punjab: 2003-04 Crops

Crop/crop combination	Output-input ratio	Gross revenue per		
		Rupee of purchased inputs cost	Day of crop duration	Acre-inch of irrigation water
		——— Rupees ———		
1. Sugarcane	0.87	2.63	42.02	344.92
2. Cotton+Wheat	1.31	2.92	74.25	799.62
3.Cotton+Sunflower	1.45	3.67	82.18	717.23
4. Basmati+Wheat	1.02	2.03	58.74	281.93
5.Basmati+Sunflower	1.16	2.57	66.41	268.98

Source: Annex-IX

Sindh

46. In Sindh too, sugarcane growers have not received the purchase price, i.e. Rs 41 per 40 kgs, announced by the provincial government. As per press reports and the information compiled by APCom's survey teams visiting Sindh during December 2003, growers are not getting, on the average, more than Rs 35 per 40 kgs at the mill-gate which does not cover the cost of production. Thus the output-input ratio of sugarcane has fallen below one, i.e. the break-even point. As per results of various indicators given in Table-11 , the economics of sugarcane cultivation does not compare favourably against competing crops.

Table-11: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in Sindh: 2003-04 Crops

Crop/crop combination	Output-input ratio	Gross revenue per		
		Rupee of purchased inputs cost	day of crop duration	acre-inch of irrigation water
		--------- Rupees --------		
1. Sugarcane	0.93	2.46	41.81	287.35
2. Cotton+Wheat	1.34	3.28	61.52	783.00
3. Cotton+Sunflower	1.43	3.92	70.29	674.80
4. IRRI+Wheat	1.14	2.63	50.63	256.72
5. IRRI+Sunflower	1.24	3.26	59.81	248.46

Source: Annex-IX

7.6.1. Economics of sugarcane: Inter Provincial comparison

47. The comparative economics of sugarcane and its competing crops both in the Punjab and Sindh do not provide a healthy picture for sugarcane. It is out-competed by the competing crops in terms of output-input ratio and revenue per day of crop duration in both the provinces. In respect of revenue per rupee of purchased inputs cost, sugarcane is the least profitable in Sindh while it ranks third in the Punjab. In case of revenue per unit of irrigation, sugarcane does better than rice combinations but is no match to those of cotton.

48. The overall returns to investment in sugarcane farming in Sindh as compared to those in Punjab, as reflected by output/input ratio are higher primarily due to 20 per cent higher yield. The crop duration in Sindh is 16 months against 13 in the Punjab but there is not much to choose between the two provinces in respect of returns per day of crop duration. In view of its longer duration, the crop in Sindh requires more water and greater use of other inputs as indicated in the Table - 12. The expenses on the use of fertilizers and other inputs are about 32 per cent higher in Sindh.

49. The higher yield in Sindh resulting from the greater use of these inputs and irrigation water compensates to a certain extent for the additional expenses, but the overall returns to use of purchased inputs lags behind in Sindh. Inspite of higher crop yield, sugarcane farming in terms of water use efficiency does not offer promising returns in Sindh.

Table-12: Inputs Use and Crop Yield in Sugarcane Cultivation in Sindh Versus Punjab: 2003-04 Crop

Item	Uunit	Sindh	Punjab	Edge in Sindh over Punjab (Per cent)
- Crop duration	Crop days	488	394	(+) 24
- Irrigation water	Acre-inches	71	48	(+) 48
- Inputs use (purchased)	Rs/acre	8290	6289	(+) 32
- Fertilizer use:	Nutrient Kgs			
N	"	104	56	(+) 86
P	"	39	34	(+) 15
- Crop yield	40 kg units	676	565	(+) 20

Source: Annex-IX

7.7 Prices of Sugarcane on the Basis of "Gur" Prices

50. Gur making from sugarcane is an important cottage industry in some areas of the NWFP and Punjab. It is, inter alia, influenced by the prices of gur, sugar, sugarcane and the problems faced by the growers in marketing of sugarcane. Thus, there is a need to compare the economics of supplying cane to the mills with the profitability of gur making. For this purpose, prices of cane have been worked out from the wholesale prices of gur. Details are given below:

- **NWFP**

51. In the NWFP, the wholesale prices of 'gur' during November-January 2004, have averaged at Rs 578 per 40 kgs. Accounting for various expenses involved in gur making i.e. processing, marketing and chemicals used in the process, net value of 400 kgs of sugarcane required to produce 40 kgs of gur comes to Rs 403. Thus, farm gate opportunity cost (net worth) of 40 kgs of sugarcane comes to Rs. 40.3. Adding transport cost of cane from the farm to the mill and the development cess which at present are estimated at Rs 3.97 per 40 kgs. the mill gate price of sugarcane would work out to Rs 44.27 per 40 kgs (Annex-X).

- **Punjab**

52. The wholesale price of gur received by the growers in the Punjab during crushing season (November-December) 2003 averaged at Rs 507 per 40 kgs. Accounting for the expenses involved in processing, use of chemicals and marketing net value of 400 kgs of sugarcane consumed in making 40 kgs of gur comes to Rs 346. Thus net value of 40 kgs sugarcane at farm level comes to Rs 34.60 per 40 kgs. Adding Rs 4.75 as transportation charges and development cess, mill gate price of sugarcane calculates to Rs 39.35 per 40 kgs (Annex-X).

7.8 Price of Sugarcane Worked Back from Average Wholesale Market Price of Sugar

53. The prices of sugarcane, the principal raw material for producing sugar, has a direct bearing on sugar price, which in turn affects the demand for sugarcane as well. Accordingly, price of cane can also be worked back from the market price of sugar. Wholesale market price of sugar in different markets during current season (November-January) 20003-04 has averaged at Rs 17,570 per tonne or Rs 17.57 per kg. After taking into account the wholesalers margin @ 5 per cent or Rs 732 per tonne and sales tax @ 15 per cent or Rs 2,196 per tonne, net receipts to the sugar mills calculates to Rs 14,642 per tonne. Ratio between the value of raw material (sugarcane) and processing cost has been estimated at 66:34. At this ratio processing cost comes to Rs 4,948 per tonne. Using provincial bench mark recoveries of 8.50 per cent for the Punjab and the NWFP, and 8.70 per cent for Sindh, mill gate prices of 40 kgs of sugarcane in the Punjab and NWFP work back to Rs 32.86 and Rs.33.63 in Sindh. Details may be seen in Annex-XI.

7.9 World Supply, Demand, Stocks, Trade and Price Situation of Sugar

7.9.1 Supply, demand, stocks and trade

54. The data on world balance sheet of sugar (raw equivalent), for the period of 2001-02 to 2003-04 are presented in Table-13:

Table-13: World Balance Sheet of Sugar (Raw Equivalent): 2001-02 to 2003-04 (Oct-Sept)

S.No	Item	2001-02	2002-03 ~~(Estimated)~~	2003-2004 ~~(Forecast)~~	Changes in 2003-04 over 2002-03
		------- Million tonnes ---------			Per cent
1.	Opening stocks	61.07	62.79 62.79	~~64.58~~ 65.12	(+) 2.85 (+)3.71
2.	Production	137.44	147.91 148.99	146.99 146.50	(-) 0.62 (-)1.67
3.	Total supply (1+2)	198.51	210.70 211.78	211.57 211.62	(+) 0.41 (-)0.08
4.	Disappearance (consumption)	134.96	141.55 142.06	145.62 145.88	(+) 2.88 (+)2.69
5.	Stock Adjustment *	(-) 0.76	(-) 4.57 (-)3.82	(-) 1.44 —	(-) 68.49 (-)3.82
6.	Ending stocks (3-4+5)	62.79	64.58 65.12	64.51 65.35	(-) 0.11 (+)0.35
7.	Trade (export)	39.84	40.77 40.82	41.30 40.70	(+) 1.30 (-)0.29
8.	Trade (import)	39.08	40.02 40.04	39.86 40.31	(-) 0.40 (+)0.67

Note: * Including adjustment for unknown net trade.

Source: Sugar/International sugar organization, Quarterly Review, May 2003 for 2001-02 and November 2003 for 2002-03 and 2003-04

Source. Quarterly market out look, February 2004
International Sugar Organization

55. World sugar production during 2002-03 is estimated at 147.91 million tonnes, an all time record and 10.47 million tonnes (7.62 per cent) more than that of 2001-02. Accounting for opening stocks of 62.79 million tones, global supply of sugar in 2002-03 was reported at 210.70 million tonnes, up by 12.19 million tonnes (6.14 per cent) over the corresponding supply of 198.51 million tones in 2001-02.

56. The world consumption reported at 141.55 million tonnes in 2002-03 is 6.59 million tones (4.88 per cent) higher than that of previous year. End year stocks in 2002-03 are estimated to have increased to 64.58 million tones.

57. International Sugar Organisation has forecast global production of sugar in 2003-04 at 146.99 million tonnes, and consumption at 145.62 million tones. End year stocks are projected at 64.51 million tones.

7.9.2 International Prices of Sugar

58. The international prices of raw (fob Caribbean ports) and white (fob London) sugars from 1994-95 to 2003-04 are presented in Annex-XII. The movements in these prices are depicted in Figure-7.

59. The prices of both raw and white sugar have been fluctuating during the period under review. During 1994-95, the prices of raw sugar averaging at US $ 302.47 per tonne had declined to $ 146.20 by 1998-99. During the next two years, prices recovered and averaged at $ 205.91 per tonne in 2000-01, but declined to $ 151.01 in the next year. During 2002-03 the prices staged some recovery and averaged at $ 179.03 per tonne. However, during 2003-04 prices have been declining and averaged at $ 132.72 per tonne (upto November, 2003).

60. The prices of white sugar during the period under reference have followed a pattern similar to those of raw sugar and decreased from $ 396.61 per tonne in 1994-95 to $ 191.43 in November 2003.

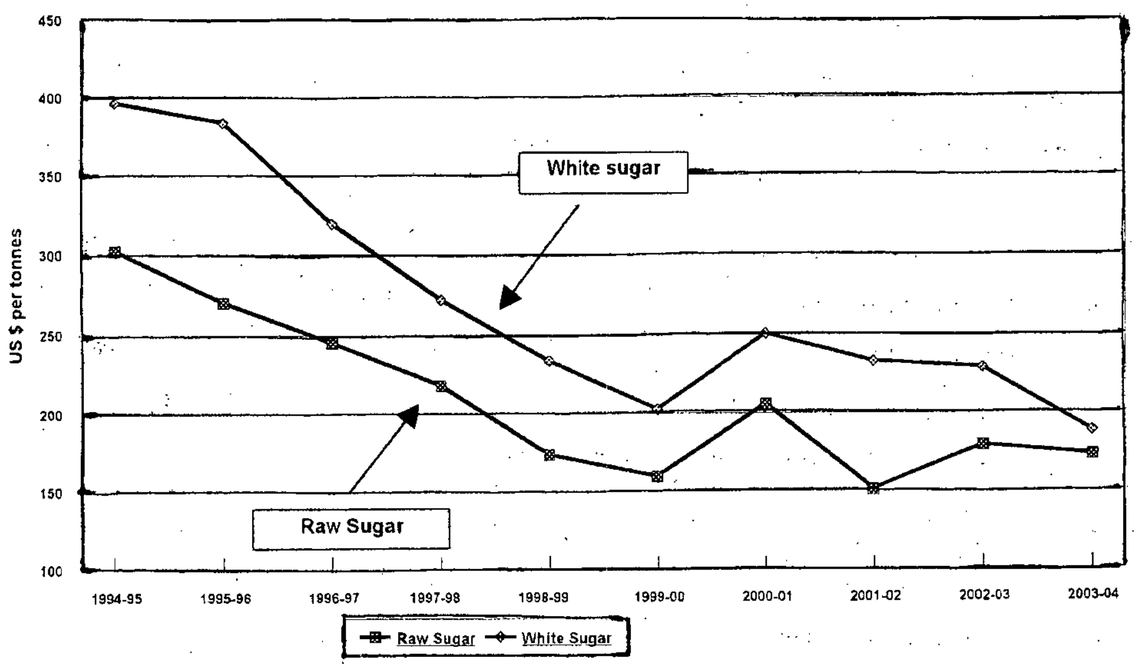

Fig - 7: INTERNATIONAL PRICES OF SUGAR:1994-95 TO 2003-04

61. The differential between prices of raw and white sugar has ranged between $ 44 and $ 114 per tonne i.e. 18 to 35 per cent of the white sugar price.

7.10 Import and Export Parity Prices

62. Estimation of the import parity prices of a commodity is helpful in determining the opportunity cost of resources used in its domestic production while export parity prices are helpful in ascertaining its competitiveness in international market. Since Pakistan has been importer in some years and exporters in the others, both the import and export parity prices of sugarcane have been worked out for analyzing price policy options for the next crop season.

63. Both the import and export parity prices have been calculated on the basis of white sugar price (fob London). However, financial and economic analysis has been carried out for working out import parity price, while calculations of export parity price are based on economic analysis only. Inter-bank exchange rate selling for import parity and buying for export parity prices has been used in the calculations. Detailed calculations in this connection are given at Annexes-XIII and XV while results are summarized in Table-14.

Table-14: Import/Export Parity Prices of Sugarcane as Worked Back from Average fob (London) Prices of Sugar

Period	Base price	Mill-gate prices of sugarcane in			
		Punjab and NWFP		Sindh	
		Economic price	Financial price	Economic price	Financial price
	US $/tonne	---------------------- Rs per 40 kgs ----------------			
Import Parity Prices					
1. During 1998-99 to 2002-03	225.87	39.23	51.58	40.15	52.79
2. During 2003-04 (Oct-Nov)	188.19	34.12	44.65	34.92	45.70
Export Parity Prices					
1. During 1998-99 to 20002-03	225.87	26.93	-	27.56	-
2. During 2003-04 (Oct-Nov)	188.19	22.15	-	22.67	-

Source: Annexes-XIII to XV.

7.11 Economic Efficiency in Sugarcane Production

64. In view of the economic importance of sugarcane the efficiency of resources used in its production has been evaluated by estimating its nominal protection coefficient (NPC), effective protection coefficient (EPC), and domestic resource cost coefficient (DRC), the most commonly used parameters in this context. These parameters have been estimated under situations of both imports and exports of sugar, and are based on the cost of production of sugarcane data as used in APCom's Sugarcane Policy Papers. To ascertain the impact of overtime changes in input-output prices, the analysis has been carried out for the 1999-00 to 2003-04 crops. Moreover, to capture regional variations in the resource use efficiency, NPCs, EPCs and DRCs have been calculated for major cane growing provinces of Punjab and Sindh. The coefficients are summarized in Table – 15 .

7.11.1 Nominal Protection Coefficient (NPC),

65. The NPCs estimated for the Punjab under sugar importing scenario have been less than one for the crop years of 1999-00, 2001-02 and 2002-03 implying that the cane growers did not receive economic prices during these years. However, in 2000-01 and 2003-04 crop years NPCs of 1.08 and 1.02 respectively reflect a positive support to the cane growers as the prices received are higher than the import parity prices.

66. The NPCs estimated under exporting situation have ranged from 1.33 to 1.99 implying that the prices realized by the growers have been much higher than the corresponding export parity/economic prices. This further reflects that sugarcane cultivation for exporting sugar is not an economic proposition.

67. The NPCs estimated for Sindh suggest that prices of sugarcane received by the growers have been much higher than the import parity prices during the period of 1999-00 to 2001-02. However, during 2002-03 growers received 11 per cent less than the corresponding import parity price. In the current crushing season prices received by the growers are at par with the import parity price.

68. The estimation of the NPCs under exporting scenario reveals that like the cane growers of Punjab, growers in Sindh have received prices much higher than those warranted by the export parity prices of sugarcane.

7.11.2 Effective Protection Coefficient (EPC)

69. Effective protection coefficient is the ratio between the value added in producing a commodity at private prices and at social prices. Unlike the NPC, which ignores the distortions in the input markets, EPC also takes into account the impact of policy interventions in the input markets. Thus, it is a more meaningful measure for analysing the protection/taxation of a given sector / commodity.

70. The analysis of the EPCs estimated for the Punjab under importing country scenario reveals that except in 2000-01 the EPCs have been less than one during the period under study implying that cane growers were implicity taxed ranging from 3–18 per cent, through input-output pricing policies. However, in case of EPCs estimated using export parity prices of sugarcane in output pricing reveal a different picture altogether, i.e. of positive support to sugarcane ranging from 23-108 per cent.

71. The EPCs estimated for Sindh (Table-15) reveal that under importing scenario the sugarcane farming enjoyed support during the period from 1999-00 to 2001-02. However, during 2002-03 and 2003-04 EPCs reflect implicit taxation of sugarcane cultivation.

Table – 15: Economic Efficiency Coefficients for Sugarcane: 1999-00 to 2003-04

Province/Year	Based on					
	Import Parity Prices			Export Parity Prices		
	NPCs	EPCs	DRCs	NPCs	EPCs	DRCs
PUNJAB						
1999-00	0.99	0.97	0.60	1.54	1.59	0.97
2000-01	1.08	1.07	0.48	1.55	1.59	0.71
2001-02	0.93	0.86	0.64	1.38	1.35	1.00
2002-03	0.88	0.82	0.69	1.33	1.28	1.08
2003-04	1.02	0.94	0.91	1.99	2.08	1.57
Average (from 1999-00 to 2003-04)	0.98	0.93	0.64	1.54	1.54	1.01
SINDH						
1999-00	1.18	1.18	0.58	1.82	1.93	0.93
2000-01	1.18	1.17	0.48	1.69	1.74	0.70
2001-02	1.18	1.09	0.54	1.75	1.65	0.80
2002-03	0.89	0.82	0.65	1.33	1.28	0.99
2003-04	1.00	0.93	0.82	1.66	1.65	1.42
Average (from 1999-00 to 2003-04)	1.09	1.06	0.60	1.65	1.66	0.93

72. The EPCs estimated under exporting scenario are much higher than one for the entire period implying support ranging from 28 to 93 per cent to sugarcane related sectors.

7.11.3 Domestic Resource Cost Coefficient (DRC)

73. The DRC indicates the opportunity cost of domestic resources used per unit of the value added (at social prices) in the production of a commodity. The numerator in these calculations is the opportunity cost of non-tradable factors used in domestic production while denominator is the value addition calculated at social prices. DRC coefficient of greater than one indicates a "comparative disadvantage" in domestic production as the cost associated with its domestic production is greater than the economic cost of corresponding imports. A situation where domestic resource cost coefficient is less than one implies "comparative advantage" in domestic production as it can save/generate

foreign exchange at costs less than the corresponding cost of imports. It may however be pointed out that DRCs are sensitive to the changes in the opportunity cost of non tradable inputs as well as the border prices of outputs and inputs.

74. The DRCs for sugarcane crop estimated at import parity prices are less than one, both in the Punjab and Sindh. Thus, cane production in both the provinces is efficient in terms of its domestic resource cost. The inter - provincial comparison of the DRCs suggest that Sindh has marginally higher comparative advantage than Punjab.

75. No doubt, the results are sensitive to the changes in the prices of inputs including water, and of output as indicated by the rising domestic resource cost coefficient, overtime. Nevertheless, the estimates of domestic resource cost coefficients, under importing situation do not support the commonly held perception of comparative disadvantage in sugarcane cultivation in Pakistan.

76. Under exporting scenario the DRCs of sugarcane production in the Punjab though still less than one during 1999-2000 and 2001-2002, were however much higher than the corresponding coefficients estimated at import parity prices. As a result of the developments in the inputs and output markets, both domestic and international, during 2002-03 and 2003-04, DRCs have become greater than one. Thus, sugar exports are not a viable proposition at the prevailing input - output relationships and the prices thereof. In case of Sindh DRCs which even under exporting scenario were less than one upto the year 2002-03 exceed one in 2003-04, reflecting comparative disadvantage in exports of sugar in 2003-04.

7.12 To sum up

77. The likely pricing options for sugarcane, 2004-05 crop emerging from foregoing analysis of relevant factors are summarized in Table-16,followed by a brief discussion on the subject.

Table - 16 : Price Policy Options for Sugarcane : 2004-05 Crop

S.No	Basis	Likely prices of sugarcane at mill gate		
		Punjab	NWPF	Sindh
		Rupees per 40 Kgs		
1.	Cost of production of sugarcane (Table – 5)	41	37	40
2.	Market price realized by growers (2003-04)	34	42	35
3.	Domestic parity prices worked back from :			
	i) Average wholesale price of "gur" during November – December, 2003 (Annex-X)	39	44	-
	ii) Average wholesale prices of sugar during 2003-04 crushing season (Annex-XI)	33	33	34
4.	If real value of cane price for 2003-04 crop were to be equated with the level of 1990-91	39	39	41
5.	Import parity prices (economic) as worked back form the average fob (London) price of white sugar (Annex-XIII):			
	i) During 1998-99 to 2002-03	39	39	40
	ii) During October – November, 2003	34	34	35
6.	Export parity price (economic) as worked back from the average fob (London) price of white sugar (Annex-XV			
	i) During 1998-99 to 2002-03	27	27	28
	ii) During October – November, 2003	22	22	23
7.	Cost of domestic resources involved in: (Table – 15):	Rupees per US $		
	i) Producing cane for sugar import substitution			
	- Based on 2003-04 prices of sugar	53	-	48
	- Based on average prices of sugar 1999-2004	37	-	35
	ii) Producing cane for exports of sugar			
	- Based on 2003-04 prices of sugar	91	-	82
	- Based on average prices of sugar 1999-2004	59	-	54

Note: Figures have been rounded off.

78. The mill gate Cost of Production (COP) of sugarcane for the 2004-2005 crop at prevailing inputs' prices is estimated at Rs 41 per 40 kg in the Punjab, Rs 37 in the NWFP and Rs 40 in Sindh. These costs reflect increases of 2.8 to 5.3 percent over the corresponding costs in 2003-2004. effective prices of sugarcane accruing to the farmers in the current season are reported at Rs 34 per 40 kgs in the Punjab, and Rs 35 in Sindh and do not cover even the COP.

79. Based on the average wholesale prices of 'gur' during the current crushing season (November-December 2003) mill gate prices of sugarcane are estimated at Rs 39 per 40 kgs in the Punjab and Rs. 44 in NWFP. The prices of sugarcane worked back from the wholesale prices of sugar in the domestic market come to Rs 33 per 40 kgs in the Punjab and NWFP and Rs. 34 per kgs in Sindh.

80. The import parity prices (economic) of sugarcane estimated from the 5 years average (1999-2003) fob (London) price of white sugar come to Rs 39 - 40 per 40 kgs. When calculated on the basis of October – November, 2003 prices of sugar, the parity prices of sugarcane come to Rs 34 – 35 per 40 kgs.

81. The export parity prices of sugarcane at the mill gate, as calculated from the medium and short term average fob (London) prices of white sugar are estimated at Rs 27 - 28 per 40 kgs and Rs 22 – 23, respectively. The domestic resource cost of one dollar's worth of sugar exports, at the current price through sugarcane cultivation, is thus estimated at Rs 82 to 91. However, for import substitution, costs of the domestic resources used in sugarcane production work out to Rs 48 - 53 per one dollar against the current exchange rate of Rs 57 per US dollar. Thus, exports of sugar are not a viable proposition.

82. The analysis of time series data on sugarcane area and production suggests expansion/contraction phase spanning over a period of two years before changing into the next mode. This is primarily in view of the wide spread practice of ratooning. Area under the 2003-04 crop in response to the low prices of sugarcane for last year and better prospects of competing crops has reduced by 6.7 per cent in the Punjab, accounting for 66 per cent of the sugarcane area in the country.

83. In view of the foregoing situation, the pricing policy in the context of sugarcane should aim at consolidating the gains and restricting the sugarcane cultivation to the most suitable lands/regions. Given the current input-output relationship and the international prices, there is not much leeway for increasing the price of sugarcane. In the given situation of : (i) low market prices of sugar and sugarcane, (ii) poor prospects for exports of sugar, (iii) recurring water shortages and high water requirements of sugarcane, the over-riding consideration of the government pricing policy should be to send the correct signal to farmers of reducing area under the crop but improving crop yield through judicious use of inputs and improved crop husbandry. The farmers also need to be protected against the rampant mal-practices in the marketing of sugarcane such as purchases of CPRs at discount prices by the middlemen, underweighment, delayed payments by the sugar mills etc. The purchases of CPR's at discount prices by the middlemen, under-weighment of sugarcane must be dealt with sternly to curb these mal-practices and end exploitation of farmers.

84. In the context of paying better prices to the growers addressing the problems faced by the sugar industry such as the availability of cash credit, disposal of surplus stocks and regulating the imports have assumed critical import. The Cost Accounts Organization or the Ministry of Industries should estimate the ex-mill cost price of sugar keeping in view the cost of sugarcane, processing cost, sucrose recovery etc. The imports of sugar should be so regulated as to ensure the ex-mill price of sugar worked out by the M/o Industries to the sugar mills.The problems of liquidity faced by the industry also need to be addressed.

85. There is also scope for providing relief in the cost of purchased farm inputs through the adjustments of sales taxes and other levies which the Government should seriously consider. However, the current policy of fixing the prices of cane by the provincial governments in view of the difficulties faced by the growers as well as the industry needs to be reconsidered and the prices of sugarcane be determined by the federal government. The prices once announced after due consideration of relevant factors should be ensured to the growers.

8. LINKING PRICES OF SUGARCANE TO ITS QUALITY

86. The existing system of payment of price to sugarcane growers in Pakistan is not related to the quality of their produce. If an individual grower sells his cane of higher sucrose contents, he does not get higher price for that cane. However, in the past some mills had been paying quality premium at the end of the season on the basis of seasonal recovery. So the system neither encouraged the farmers to improve the quality of cane nor to grow varieties with high sucrose contents because for them weight was the only consideration. For improving the situation and to enhance the efficiency both at farm and mill level, it is imperative that price of cane be linked to its sucrose contents. For making payment of price according to the quality of sugarcane, , the APCom has been suggesting various measures in the past. But due to one or the other reason, the subject has not received the due attention of the sugar industry and policy makers. If the Government decides to link sugarcane price to its sucrose contents the APCom can provide a working paper on the subject for further action in this regard.

9. MARKETING OF SUGARCANE

87. The sugarcane as one of the main cash crops of Pakistan has a large impact on the well being of community. Due to perishable nature of the produce, it cannot be stored after its harvesting and has to be processed either into gur/khandsari at the farm or into sugar by the sugar mills. Thus, its marketing plays a pivotal role in this regard. For ascertaining the situation regarding marketing of sugarcane, APCom conducted a mini field survey in the main sugarcane growing areas during the months of December, 2003 and January, 2004. The problems faced by the growers are discussed in the following paragraphs.

9.1 Under weighment

88. The underweighment of cane at purchase centers and the mills premises is a common phenomenon on the part of mills and their agents and the private purchase centres. The scales and weighbridges installed at the procurement centres do not record

the correct weight. The extent of underweighment varies from place to place and for each mill. The growers have alleged that underweighment was upto the extent of 10-20 per cent of weight or about 40-50 maunds per trolley load of 350-450 maunds. The district governments may install their own weighbridges to solve this problem and ban the use of temporary weighbridges at purchase centres.

9.2 Undue deductions

89. It has been noticed that mills are making deductions on the plea that poor quality cane with high trash elements is being brought by the farmers. In some places these deductions go upto 10 per cent. For the betterment of the situation, the growers are needed to be educated to properly clean the trash before supply to mills, on the one hand and to put some check by the Cane Commissioners against such high undue deductions, on the other hand.

9.3 Delayed payments

90. In the beginning of the season, the payments are generally made within two weeks but as the season progresses to the end, the payments are delayed by months and in some cases by seasons. The mills are of the view that this happens due to liquidity problem. Thus, there is a need to impose penalties on late payments as laid down in the Sugar Factories Control Act and also to enhance the liquidity of the sugarmills by lifting sugar at a certain pre-determined price by the public sector.

9.4 Presence of middlemen

91. The presence of middlemen is considered necessary in marketing the agricultural produce. But since manufacturing of sugar is a chemical process, the presence of middlemen in sugarcane supply to the mills causes delay and hence reduction in sugar recovery. The middlemen, therefore, in sugarcane marketing do harm to the mills and the growers. Thus, the involvement of middlemen in sugarcane supply needs to be banned through administrative measures.

9.5 The purchase of CPRs

92. Since some of the mills delay the payments, the growers are compelled to sell the CPRs at discount ranging from Rs 2 – 5 per 40 kgs of cane price. This practice causes huge losses to the growers. Therefore, it needs to be stopped altogether or margin be restricted to Rs 1 per 40 kgs only. Moreover, the mills should also be compelled to make payments within two weeks after cane delivery as laid down in the Sugar Factories Control Act so that the need for selling the CPRs is minimized.

9.6 Use of sugarcane cess fund

93. The provincial governments collect and maintain the accounts of sugarcane cess funds. The cess fund is to be utilized for the construction of new roads and improvement of the existing ones and link roads including other infrastructure in the area. The fund can also be utilized for research and development of sugarcane crop. The provincial governments are known to have accumulated huge amounts of cess funds which needs to be properly used on construction of infrastructure and evolvement of new varieties of sugarcane.

9.7 Amendments in Sugar Factories Control Act, 1950

94. The sugarmills function under the provisions of the Sugar Factories Control Act, 1950. Many changes have occurred in cane marketing after de-zoning and the functioning of the Act has become less effective. So there is a need that the Act may be amended in accordance with the current needs, especially the promotion of the provisions of the contract system between growers and the mill and the removal of provisions regarding prohibition of gur making and zoning etc.

10. VALUE-ADDITION AND VERTICAL INTEGRATION IN SUGAR INDUSTRY

95. In view of the falling trend in the world prices of sugar and large-scale investments in the domestic sugar industry it is imperative to improve the efficiency of resource use in sugarcane production and its processing. For improving productivity in sugarcane cultivation a number of steps have been discussed in this Report. For improving the productivity in sugar processing the requirement is not only to improve the efficiency but also value addition through vertical integration. It is understood that sugar has become a by-product in many of sugar producing countries as the revenue accruing form the sale of other products manufactured from the molasses and bagasse have out paced the revenue from the sale of sugar. In the wake of fast approaching globalization and WTO requirements the sugar industry of Pakistan which relies on sugar manufacturing only and has not paid much attention to the production of other value added products, would also have to go into value adding business. The likely products which can be manufactured form the molasses include alcohol, citric acid, lysine, monosodium glutama, liquid sugar, yeasts etc. While bagasse can be used in the production of chipboard, paper compressed fiber and even electricity.

11. IMPROVING PRODUCTIVITY

96. The raw material requirement of sugar industry comprising 75 - 78 sugar mills, with crushing capacity of about 350 thousand tonnes per day has been met through expanding acreage under sugarcane. This demand-led horizontal expansion in cane production has not only resulted in extension of sugarcane cultivation to marginal areas but also aggravated the water shortage. Sugarcane a high water delta crop poses serious competition to other important crops: cotton, rice, wheat, etc. Thus, further expansion in sugarcane area already spanning over one million hectares, given the recurring water shortages and the increasing demand for water from other crops and non farm uses is no more a viable option. With the increasing requirements of other food and cash crops to meet the ever expanding demand from burgeoning population, it is of utmost importance to increase the productivity of resource use in agriculture through all the possible means.

97. On the basis of available evidence, there exists a vast scope for the improvement in yield of cane and its sucrose contents through improved crop management as well as

its processing. Pakistan at present does not compare favourably on both these counts with other cane producing countries. In terms of average cane yield Pakistan ranks 15 in the world . The progressive cane farmers in Pakistan usually harvest around 40 tonnes of sugarcane per acre while the average farmers do not go beyond 20 - 25 tonnes. The potential of existing cane varieties under optimal conditions of inputs use is 50 tonnes or so. Australia obtains 5 tonnes of sugar per acre against 1.7 tonnes of Pakistan. A number of factors/constraints have been identified by the Commission in this context in consultation with the crop experts and farmers. Accordingly, the APCom in its Support Price Policy for 2002-03 and 2003-04 crops of sugarcane emphasized on increasing productivity and for that purpose suggested various measures. However, as these measures were not reflected in the MINFAL's summary, these are reiterated for favour of consideration.

11.1 Varietal development

98. The development of new varieties of sugarcane is a lengthy process requiring primarily the sugarcane fuzz either through its local production or imports from abroad. The poor infrastructural support for breeding work and climatic conditions in the country except in few areas have not permitted the former. Moreover, the cane breeding programme has been quite limited and confined to a few centers. The programme is also constrained due to insufficient funds and land resources.

99. Considering the financial constraints of Sugarcane Research Institutes, the Sugar Board in its 39th meeting held on 17th August 1992 decided that provincial governments should set aside 5 per cent of the cess fund for research and development of sugarcane. Since then ECC of the Cabinet in its annual meetings for sugarcane has been directing the provincial governments for the implementation of the above decision but except release of a few lacs of rupees by the government of NWFP allocation of cess fund for cane research development has been confined to paper work. Therefore, APCom emphasizes the implementation of the decisions about the allocation of cess fund. It is also suggested that the research stations concerned with varietal development should be strengthened and their research programmes monitored and reviewed periodically through peer review.

11.2 Land preparation

100. Sugarcane is generally cultivated after cotton and rice. Being deep rooted crop deep ploughing followed by disc/harrow is necessary to provide better conditions for proper development of root system. The field surveys conducted by APCom on sugarcane have shown that only 30-40 per cent of the cane growers have adopted this practice. A large number of farmers are even not aware of the importance of the use of deep tillage implements in land preparation. High cost of the operation/non-availability of needed equipment on custom hire rates are also a major constraint. The Agriculture Extension Departments need to launch educational campaigns to apprise the farmers about the proper methods of land preparation for sugarcane cultivation.

11.3 Provision of seed of approved varieties

101. The researchers/breeders have developed a number of high yielding varieties of sugarcane for early, mid and late seasons, which if adopted may help increase the cane yield by 20-25 per cent. However, their adoption is predicated on the availability of their disease free seed. According to the information obtained from Sugarcane Research Centres, high yielding cane varieties recommended for Punjab include: SPF-213, SPF-234, COJ-84, BF-162, CP-43-33, CP-77-400, CP-72-2086, CPF-237 and HSF-240. Yield potential of these varieties realized at research farms ranges from 80 to 100 tonnes per hectare with sugar recovery from 10-12.5 per cent. CO-1148 is an Indian variety not recommended for cultivation but due to its physical weight and good ratooning it had been adopted by a large number of growers. Its cultivation though on the decline is still continuing as a large chunk of sugarcane area in the province.

102. For Sindh BL-4 ,PR-1000 and BF-129 are the recommended varieties. Like CO-1148 in Punjab, a disco variety is being cultivated in Sindh but it has low sugar content and is not approved for cultivation. The recommended varieties for NWFP are: CP-72-2086, CP-77-400, Mardan-92, and Mardan-93. All these varieties if cultivated according to their recommended seasons, may give cane yield of 900-1000 maunds per acre and sucrose recovery of more than 10 per cent.

103. Farmers generally use their commercial crop as seed without its treatment against fungal diseases because no institutional arrangements are available for the production, multiplication and distribution of quality seed of high yielding varieties. In the wake of dezoning, sugar mills are also reported to have stopped their cane development activities including the supply of improved seed to the growers. The APCom suggests the following measures:

i) Provincial Agriculture Departments should launch an aggressive campaign for educating the growers regarding the sowing of improved varieties and discouraging the cultivation of unapproved varieties.

ii) The sugar industry should provide incentive to the growers for growing cane of high sucrose varieties in the form of quality premium.

iii) The responsibility of production, multiplication and distribution of certified seed of sugarcane be assigned to the sugar mills, as they are the main beneficiaries of increased production of sugarcane. For this purpose sugar mills should establish their Cane Development Centres either individually or collectively. These centres in collaboration with the progressive growers and sugarcane researchers should undertake the multiplication and distribution of certified cane seed.

iv) The sugarmills should provide the facilities of hot water treatment of cane setts to the growers alongwith technical guidance for using the technique.

v) The Cane Development Centres of the sugar mills should also function as regular institution for extending technical advisory services to sugarcane growers in co-operation with the provincial agricultural research and extension departments.

11.4. Low plant population

104. Lack of adequate plant population remains an important factor in low productivity of sugarcane. The research on sugarcane has found that even good quality seed does not provide more than 60 per cent germination implying that quantity of seed should be so adjusted to get optimum crop stand and in turn optimum crop yield. In general 80-100 maunds seed of thin and 100-120 maunds of thick varieties of cane is recommended for cultivating one acre. Nevertheless to ensure 100 per cent germination this quantity of seed must be enhanced through following double sett sowing method recommended by

experts. The seed setts should possess two buds and be put in furrows by joining their ends and may be covered with 2-3 inches thick layer of soil. It is also suggested that the seed should be used from fresh crop of 6-8 months old. In order to ensure a good crop stand gap filling should be practiced and seed nurseries be developed for this purpose. The task seems to be of advisory nature and growers have to be persuaded for adopting recommendations on the subject.

11.5 Balanced use of fertilizers

105. Chemical fertilizers play an important role in enhancing crop productivity but real key for getting maximum returns from the investment on fertilizers is their balanced and timely application. Overtime, though fertilizer use has increased but due to widening of NP ratio productivity gains have been sub-optimal. The survey reports on use of fertilizers have shown that only a small fraction of cane growers have adopted balanced use of fertilizers. This imbalance in nutrient application adversely affects the per hectare yield of sugarcane as well as quality of the produce.

106. The empirical research has proved that nitrogenous fertilizers stimulate vegetative growth, phosphatic fertilizers help nourishing of roots and strengthening of plants and potassic fertilizers improve/enhance the recovery of sugar and create resistance against drought and some diseases. Experiments have further shown that an average production of 1000 maunds of cane from an acre removes 72 kgs of N, 36 kgs of P and 136 kgs of K from the soil. Keeping in view the fertilizer efficiency and to keep the soil fertility intact, double of the above quantity of fertilizers needs to be applied. However, this also depends on the nutrients already available in the soil. Our soils though not deficient in potash but need some application of this nutrient for improving the efficiency of other fertilizers. The current use of 3 kgs of potash per acre on the average is too low to provide good results. The judicious and balanced use of NP & K fertilizers is imperative for improving the productivity of sugarcane and its sucrose contents.

107. Although research on fertilizer use in the country is much ahead of other research areas, yet growers are seldom aware of the recommendations/conclusions in this context. Timely availability of required fertilizers, provision of technical guidance regarding

proper mix of various brands of fertilizers, determining optimum nutrient requirement based on soil analysis and management of scarce water resources are seen as lacking factors affecting the efficiency of fertilizers used. The provincial governments should launch campaigns to educate the growers about the importance of the use of balanced doses of various fertilizers based on proper plant/soil analysis and the timings and methods of use of various fertilizers.

11.6 Use of press mud/organic matter

108. As a result of intensive cropping most of our lands/soils have become deficient in organic matter and in turn possess poor texture. This phenomenon has affected output-input response causing economic losses. Organic matter of these soils can be improved/compensated through adding composts, FYM and adopting green manuring practices but intensive cropping does not allow this. Press mud is a waste and by product of sugar industry containing 2 per cent of N, 4 per cent of $P_2 O_5$ and 1 per cent of $K_2 O$. Presently, the press mud is used as fuel in brick kilns which is a dual loss to the society, firstly through destroying useful nutrients and secondly through causing pollution in the atmosphere. The provincial governments need to discourage burning of press mud as fuel and promoting its use as organic matter/manure in crop production. The sugar mils should supply press mud to the cane growers free of cost instead of selling for non-farm uses. Apparently it may not appeal to the sugarmills. However, if press mud is properly applied to sugarcane fields increased production of cane in turn will yield higher economic returns to the sugarmills.

11.7 Plant Protection

11.7.1 Weed control

109. During the early stages of sugarcane growth weeds compete with the plants for nutrients available in the soil and thus causing a significant loss in cane yields. The empirical research has found that proper inter-culture and hoeing after 60-80 days of crop sowing effectively in eradicating the weeds. However, high cost of labour beside its shortage results in ineffective control of weeds. Use of weedicides to eradicate weeds is therefore strongly advised.

11.7.2 Control of diseases

110. Sugarcane is attacked by a number of diseases. These diseases greatly influence cane yields and sucrose recovery. The most prevalent diseases are red rot, wilt, whip smut, mosaic, and ratoon stunting. Some of these diseases are difficult to identify by farmers, but their attacks cause considerable reduction in yield. Most of the diseases are seed borne. To guard against seed and soil borne diseases the seed treatment with fungicides is necessary. Hot water treatment of seed against diseases like red rot has also been found beneficial and needs to be popularised. However, this facility can not be provided to the growers at their farms. Only sugar mills can be affective in this context. Earthing up of the sugarcane crop after two months of sprouting serves as preventive measures against borer attack and lodging. Moreover, this practice checks tillering at late stages of crop development preventing uneven crop stand and promote uniform maturity. The Provincial agriculture departments should launch an educational campaign for the growers and the sugar mills on the subject.

11.7.3 Biological control of sugarcane pests

111. Sugarcane crop is attacked by borers, termites, pyrilla, bugs etc which cause 10-35 per cent loss in production and 0.25 to 1.25 per cent in sucrose recovery. Generally chemical control measures are recommended for protecting the crop from the above mentioned pests/insects. The experience and research have shown that use of chemicals also kill many predators and natural enemies of these pests. Moreover, when plants have grown in size and length severe attack of pests can not be controlled through the use of chemicals as manual/mechanical spraying of the crops is not possible. Alternatively granular pesticides do offer the solution but are costly and also not effective in controlling stem, top and "gurdaspuri" borers. Some traditional measures like burning of trash are also applied but this practice destroys the eggs and larvae of some useful pests and encourages population of harmful pests, sometimes to beyond economic injury level. Thus practice of "spray and kill" and burning of trash needs to be replaced by Integrated Pest Management (IPM) technology based on the use of cultural methods and biological measures to control sugarcane pests and diseases.

112. The concept of biological control is based on the fact that each insect/pest has a complement of parasites, predators and diseases that are part of that pest's co-evolved natural checks and balances. Among these commonly known parasites/predators are Epi-pyropes for sugarcane pyrilla and cotesia flavipes and trichograma for sugarcane borers. The identification of species of trichograma and other parasites/predators for controlling sugarcane pests is no doubt a good achievement of research but exploitation of real benefits of this technology needs artificial rearing of parasites/predators of sugarcane pests on commercial scale and their adoption by the growers. The public sector institutions do not have sufficient resources for this task, Therefore, sugar mills, also being the direct beneficiaries of increased production and improved quality of the produce, need to spearhead the cause of IPM. Some sugar mills have already established their system of rearing predators and distributing these to the growers at nominal prices. It has been reported that in the areas of those sugar mills which distributed the cards containing eggs of artificially reared parasites/predators attack of pest has reduced. This practice should be adopted by other sugar mills also. The government should stress upon the PSMA to ensure establishment of IPM labs for rearing of predators at each mill. The provincial agriculture department can also play a vital role in educating the growers about various cultural practices in controlling the pests and in the distribution and adoption of biological control techniques.

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ANNEX-I

AREA,YIELD AND PRODUCTION OF SUGARCANE:1993-94 TO 2003-04

YEARS	PUNJAB	SINDH	NWFP	BALOCHISTA	PAKISTAN
AREA			***000 HECTARES***		
1993-94	596.2	265.8	100.3	0.5	962.8
1994-95	656.7	249.7	102.1	0.5	1009.0
1995-96	605.6	254.4	102.5	0.6	963.1
1996-97	604.2	251.2	108.4	0.7	964.5
1997-98	685.3	261.6	108.6	0.7	1056.2
1998-99	780.3	270.8	103.3	0.7	1155.1
1999-00	672.1	230.6	106.3	0.8	1009.8
2000-01	615.5	238.8	105.9	0.6	960.8
2001-02	656.8	240.7	101.5	0.7	999.7
2002-03	735.3	258.6	104.9	0.8	1099.6
2003-04	686.3	259.9	104.2	0.4	1050.8
YIELD			***TONNES PER HECTARE***		
1993-94	41.1	58.0	44.6	50.2	46.1
1994-95	43.0	57.3	44.7	55.8	46.7
1995-96	44.4	54.0	44.7	49.2	47.0
1996-97	39.7	52.2	44.7	51.4	43.5
1997-98	46.9	61.2	45.6	53.6	50.3
1998-99	42.8	63.0	45.7	54.4	47.8
1999-00	40.3	62.0	46.3	54.3	45.9
2000-01	43.4	50.5	45.2	53.7	45.4
2001-02	48.4	47.4	47.2	50.0	48.1
2002-03	45.1	53.4	48.1	50.8	47.3
2003-04	48.5	54.7	48.5	47.5	50.0
PRODUCTION			***000 TONNES***		
1993-94	24510.8	15421.0	4470.1	25.1	44427.0
1994-95	28268.0	14310.3	4562.2	27.9	47168.4
1995-96	26880.0	13737.2	4583.0	29.5	45229.7
1996-97	24010.2	13110.6	4841.6	36.0	41998.4
1997-98	32110.6	15999.6	4956.5	37.5	53104.2
1998-99	33382.8	17050.7	4719.5	38.1	55191.1
1999-00	27081.3	14290.8	4917.1	43.4	46332.6
2000-01	26740.0	12049.7	4784.4	32.2	43606.3
2001-02	31803.1	11416.3	4787.2	35.0	48041.6
2002-03	33168.6	13797.6	5049.0	40.6	52055.8
2003-04	33297.2	14218.3	5050.1	19.0	52584.6

Sources:
1. From 1993-94 to 2000-01: Agricultural Statistics of Pakistan 2000-01, MINFAL,Islamabad
2. For 2002-2003: Final estimates Provided by Provincial Agriculture Departments
3. For 2003-2004: Second estimates of Punjab, Sindh, NWFP and Balochistan Provided by provincial Agriculture Departments

ANNEX-II

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN THE PUNJAB: 2003-04 AND 2004-05 CROPS

Sr. No.	Operations / inputs	Avg No. of oprs/units/ acre	2003 - 04 Crop Cost per unit	2003 - 04 Crop Cost per acre	2004 - 05 Crop Cost per unit	2004 - 05 Crop Cost per acre	Change in 2004-05 over 2003-04
1	2	3	4	5=3*4	6	7=3*6	8=7-5
				-----Rupees-----			
1.	Land preparation:						
	1.1 Deep ploughing	0.476	395.00	188.02	410.00	195.16	7.14
	1.2 Rotavator	0.152	435.00	66.12	450.00	68.40	2.28
	1.3 Ploughing	7.847	145.00	1137.82	150.00	1177.05	39.23
	1.4 Planking	3.309	75.00	248.18	75.00	248.18	0.00
	1.5 Levelling	0.561	190.00	106.59	200.00	112.20	5.61
2.	Seed bed preparation:						
	2.1 Ploughing/Furrow making	0.467	145.00	33.86	150.00	35.03	1.17
	2.2 Planking	0.193	75.00	7.24	75.00	7.24	0.00
	2.3 Trench/Ridge making						
	2.3.1 Manual (m.days)	0.106	95.00	5.04	100.00	5.30	0.26
	2.3.2 Tractor	0.700	145.00	50.75	150.00	52.50	1.75
	2.4 Bund making						
	2.4.1 Manual (m.days)	1.655	95.00	78.61	100.00	82.75	4.14
	2.4.2 Tractor	0.158	145.00	11.46	150.00	11.85	0.39
3.	Seed and Sowing operations:						
	3.1 40 kg units	6.578	45.00	148.01	45.00	148.01	0.00
	3.2 Marlas	10.640	225.00	1197.00	225.00	1197.00	0.00
	3.3 Harvesting, stripping and making of set (m.days)	4.796	95.00	227.81	100.00	239.80	11.99
	3.4 Transport	-	-	105.00	-	115.00	10.00
	3.5 Sowing of sets (m.days)	0.781	95.00	37.10	100.00	39.05	1.95
	3.6 Contract sowing	-	-	115.00	-	120.00	5.00
4.	Interculture and Earthing up:						
	4.1 Manual/binding of plants	0.609	375.00	228.38	395.00	240.56	12.18
	4.2 Bullock/tractor	2.008	145.00	291.16	150.00	301.20	10.04
5.	Plant Protection:						
	5.1 Weedicides	0.124	217.00	26.91	220.00	27.28	0.37
	5.2 Granules	0.070	211.00	14.77	215.00	15.05	0.28
	5.3 Sparys	0.331	194.00	64.21	195.00	64.55	0.33
	5.4 Others	0.161	448.00	72.13	450.00	72.45	0.32
6.	Irrigation:						
	6.1 Canal	8.900	-	177.16	-	177.16	0.00
	6.2 Private tubewell	4.440	325.00	1443.00	352.00	1562.88	119.88
	6.3 Mixed	2.160	77.00	166.32	79.00	170.64	4.32
7.	Labour for irrigation and water course cleaning (m.days)	4.860	95.00	461.70	100.00	486.00	24.30
8.	Farm Yard Manure:						
	8.1 Material	-	-	490.00	-	500.00	10.00
	8.2 Transport & application	-	-	365.00	-	400.00	35.00
9.	Fertilizers: (bags)						
	9.1 DAP	1.280	750.00	960.00	898.00	1149.44	189.44
	9.2 Urea	1.730	411.00	711.03	418.00	723.14	12.11
	9.3 Nitrophos	0.350	535.00	187.25	628.00	219.80	32.55
	9.4 SSP	0.010	259.00	2.59	307.00	3.07	0.48
	9.5 CAN	0.010	277.00	2.77	289.00	2.89	0.12
	9.6 SOP	0.070	799.00	55.93	779.00	54.53	-1.40
	9.7 Gypsum	0.440	40.00	17.60	40.00	17.60	0.00
10.	Fert. transport and application	3.890	22.00	85.58	23.00	89.47	3.89
11.	Mark up @ 11.0 % per annum for 13 months on items 1 to 10 minus item 6.1	-	-	1427.48	-	1186.64	-240.84
12.	Land rent for 13 months	-	4500.00	4875.00	4500.00	4875.00	0.00
13.	Weighted average land tax @ Rs 120/acre/ annum for 13 months	-	-	130.00	-	130.00	0.00
14.	Management charges for 13 months	-	-	471.00	-	535.00	64.00
15.	Harvesting & stripping (40 kg units)	565.150	4.50	2517.74	5.00	2797.49	279.75
16.	Expected escalation in cost of selected items	-	-	671.00	-	680.00	9.00
17.	Total cost (items 1 to 16)	-	-	19679.29	-	20336.34	657.05
18.	Yield (40 kg units)	-	-	565.15	-	565.15	0.00
19.	Cost of production at farm level: (Rs/40 kgs)						
	19.1 Including land rent	-	-	34.82	-	35.98	1.16
	19.2 excluding land rent	-	-	26.20	-	27.36	1.16
20.	Marketing expenses: (Rs/40 kgs)						
	20.1 Transport, etc.	-	-	4.50	-	5.00	0.50
	20.2 Development cess	-	-	0.25	-	0.25	0.00
21.	Cost of production at mill-gate: (Rs/40 kgs)						
	21.1 Including land rent	-	-	39.57	-	41.23	1.66
	21.2 excluding land rent	-	-	30.95	-	32.61	1.66

Note: Mark-up for 2003-04 crop has worked out @ 14 per cent per annum.

1035.089
828.772

ANNEX-III

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN SINDH 2003-04 AND 2004-05 CROPS

Sr. No.	Operations / inputs	Avg No. of oprs/units/ acre	2003 - 04 Crop Cost pe unit	2003 - 04 Crop Cost per acre	2004 - 05 Crop Cost pe unit	2004 - 05 Crop Cost per acre	Change in 2004-05 over 2003-04
1	2	3	4	5=3*4	6	7=3*6	8=7-5
				---Rupees---			
1.	Land preparation :						
	1.1 Deep ploughing	0.523	390.00	203.97	440.00	230.12	26.15
	1.2 Ploughing	5.606	210.00	1177.26	220.00	1233.32	56.06
	1.3 Planking	1.577	105.00	165.59	110.00	173.47	7.88
	1.4 Levelling	0.972	210.00	204.12	220.00	213.84	9.72
2.	Seed bed preparation:						
	2.1 Ploughing/Furrow making	1.136	210.00	164.61	220.00	172.44	7.84
	2.2 Planking	1.340	105.00	97.08	110.00	101.71	4.62
	2.3 Trench/ridge making						
	2.3.1 manual (m.days)	0.074	95.00	4.85	100.00	5.11	0.26
	2.3.2 tractor (hrs)	0.174	170.00	20.41	180.00	21.61	1.20
	2.4 Bund making (m.days)						
	2.4.1 manual (m.days)	0.403	95.00	26.42	100.00	27.81	1.39
	2.4.2 tractor (hrs)	0.812	170.00	95.25	180.00	100.85	5.60
3.	Seed and Sowing operations:						
	3.1 40 kg units	64.118	55.00	2433.28	55.00	2433.28	0.00
	3.2 Ghuntas	0.685	1340.00	633.35	1340.00	633.35	0.00
	3.3 Harvesting, stripping and making of set (m.days)	4.420	95.00	289.73	100.00	304.98	15.25
	3.4 Transportation	-	-	200.00	-	220.00	20.00
	3.5 Sowing of sets (m.days)	0.588	95.00	38.54	100.00	40.57	2.03
	3.6 Contract sowing	-	-	185.00	-	195.00	10.00
4.	Interculture and Earthing up:						
	4.1 Manual	1.762	360.00	634.32	380.00	669.56	35.24
	4.2 Bullock/tractor	1.725	210.00	362.25	220.00	379.50	17.25
5.	Plant Protection :						
	5.1 Weedicides	0.344	295.00	101.48	297.00	102.17	0.69
	5.2 Granules	0.342	204.00	69.77	205.00	70.11	0.34
	5.3 Sprays	0.398	210.00	83.58	211.00	83.98	0.40
6.	Irrigation						
	6.1 Canal	20.880	-	181.87	-	181.87	0.00
	6.2 Private tubewell	2.450	178.00	436.10	188.00	460.60	24.50
7.	Labour for irrigation and water course cleaning (m.days)	5.859	95.00	556.61	100.00	585.90	29.29
8.	Farm Yard Manure:						
	8.1 Material	-	-	730.00	-	750.00	20.00
	8.2 Transport & application	-	-	350.00	-	385.00	35.00
9.	Fertilizers: (bags)						
	9.1 DAP	1.512	739.00	1117.37	880.00	1330.56	213.19
	9.2 Urea	3.625	410.00	1486.25	418.00	1515.25	29.00
	9.3 Nitrophos	0.376	563.00	211.69	680.00	255.68	43.99
	9.4 CAN	0.185	288.00	53.28	313.00	57.91	4.63
	9.5 AS	0.046	300.00	13.80	400.00	18.40	4.60
	9.6 SOP	0.085	800.00	68.00	750.00	63.75	-4.25
10.	Fert. transport and application	5.829	22.00	128.24	23.00	134.07	5.83
11.	Mark up @ 11.0 % per annum for 16 months on item 1 to 10 minus item 6.1	-	-	2338.24	-	1928.05	-410.19
12.	Land rent for 16 months	-	2500.00	3333.33	2500.00	3333.33	0.00
13.	Land tax @ Rs 200/acre/annum for 16 months	-	-	266.67	-	266.67	0.00
14.	Drainage cess	-	-	24.00	-	24.00	0.00
15.	Management charges for 16 months	-		579.00		658.00	79.00
16.	Harvesting & stripping (40 kg units)	676.020	4.50	3042.09	5.00	3380.10	338.01
17.	Expected escalation in the cost of selected item	-	-	692.00	-	645.00	-47.00
18.	Total cost (items 1 to 17)	-	-	22799.38	-	23386.90	587.52
19.	Yield (40 kg units)	-	-	676.02	-	676.02	0.00
20.	Cost of production at farm level: (Rs/40 kgs)						
	20.1 including land rent	-	-	33.73	-	34.59	0.86
	20.2 excluding land rent	-	-	28.80	-	29.66	0.87
21.	Marketing expenses: (Rs/40 kgs)						
	21.1 Transport, etc.	-	-	4.50	-	5.00	0.50
	21.2 Development cess	-	-	0.32	-	0.32	0.00
22.	Cost of production at mill-gate: (Rs/40 kgs)						
	22.1 including land rent	-	-	38.55	-	39.91	1.36
	22.2 excluding land rent	-	-	33.62	-	34.98	1.37

Note: Mark-up for 2003-04 crop has worked out @ 14 per cent per annum.

ANNEX-IV

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN NWFP: 2003-04 AND 2004-05 CROPS

Sr. No.	Operations / inputs	Avg No. of oprs/units/ acre	2003 - 04 crop Cost pe unit	2003 - 04 crop Cost per acre	2004 - 05 crop Cost pe unit	2004 - 05 crop Cost per acre	Change in 2004-05 over 2003-04
1	2	3	4	5=3*4	6	7=3*6	8=7-5
				-------Rupees-------			
1.	Land preparation:						
	1.1 Deep ploughing/Rotavator	0.665	420.00	279.30	450.00	299.25	19.95
	1.2 Ploughing	2.776	165.00	458.04	180.00	499.68	41.64
	1.3 Planking	0.435	85.00	36.98	90.00	39.15	2.17
	1.4 Levelling	0.344	165.00	56.76	180.00	61.92	5.16
2.	Seed bed preparation:						
	2.1 Ploughing/Furrow making	0.982	165.00	84.26	180.00	91.92	7.66
	2.2 Planking	0.027	85.00	1.19	90.00	1.26	0.07
	2.3 Trech/Ridge making (tractor hrs)	0.039	165.00	3.35	180.00	3.65	0.30
	2.4 Bund making (m.days)	1.274	90.00	59.62	95.00	62.94	3.31
3.	Seed and Sowing operations:						
	3.1 40 kg units	76.337	55.00	2183.24	55.00	2183.24	0.00
	3.2 Harvesting, stripping and making of set (m.days)	3.671	90.00	171.80	95.00	181.35	9.54
	3.3 Transport	-	-	170.00	-	185.00	15.00
	3.4 Sowing of sets (m.days)	4.097	90.00	191.74	95.00	202.39	10.65
4.	Interculture and Earthing up :						
	4.1 Manual/binding of plants	1.642	415.00	681.43	440.00	722.48	41.05
	4.2 Bullock/tractor	1.859	165.00	306.74	180.00	334.62	27.89
5.	Plant Protection:						
	5.1 Weedicides	0.336	297.00	99.79	300.00	100.80	1.01
	5.2 Granules	0.094	261.00	24.53	264.00	24.82	0.28
	5.3 Sprays	0.306	186.00	56.92	188.00	57.53	0.61
	5.4 Others	0.261	251.00	65.51	253.00	66.03	0.52
6.	Irrigation:						
	6.1 Canal	15.19	-	499.20	-	499.20	0.00
	6.2 Private tubewell	2.61	220.00	574.20	225.00	587.25	13.05
	6.3 Private canal (manual labour)	2.43	10.00	24.30	10.00	24.30	0.00
7.	Labour for irrigation and water course cleaning (m.days)	7.953	90.00	715.77	95.00	755.54	39.77
8.	Farm Yard Manure:						
	8.1 Material	-	-	780.00	-	800.00	20.00
	8.2 Transport & application	-	-	490.00	-	530.00	40.00
9.	Fertilizers: (bags)						
	9.1 DAP	0.830	765.00	634.95	900.00	747.00	112.05
	9.2 Urea	1.970	409.00	805.73	418.00	823.46	17.73
	9.3 Nitrophos	0.330	565.00	186.45	660.00	217.80	31.35
	9.4 CAN	0.130	290.00	37.70	300.00	39.00	1.30
10.	Fert. transport and application	3.260	22.00	71.72	23.00	74.98	3.26
11.	Mark up @ 11.0 % per annum for 15 months on item 1 to 10 minus item 6.1	-	-	1606.55	-	1325.83	-280.73
12.	Land rent for 15 months	-	4500.00	5625.00	4500.00	5625.00	0.00
13.	Weighted average land tax @ Rs 120/acre/ annum for 15 months	-	-	93.75	-	93.75	0.00
14.	Management charges for 15 months	-	-	543.00	-	617.00	74.00
15.	Harvesting & stripping (40 kg units)	585.460	4.50	605.95	5.00	673.28	67.33
16.	Expected escalation in cost of selected items	-	-	435.00	-	365.00	-70.00
17.	Total cost (items 1 to 16)	-	-	18660.46	-	18916.40	255.93
18.	Yield (40 kg units)	-	-	$\boxed{585.46}$	-	$\boxed{585.46}$	0.00
19.	Cost of productionat farm level: (Rs/40 kgs)						
	19.1 including land rent	-	-	31.87	-	32.31	0.44
	19.2 excluding land rent	-	-	22.27	-	22.70	0.44
20.	Marketing expenses: (Rs/40 kgs)						
	20.1 Transport, etc.	-	-	3.70	-	4.50	0.80
	20.2 Development cess	-	-	0.27	-	0.27	0.00
21.	Cost of production at mill-gate: (Rs/40 kgs)						
	21.1 Including land rent	-	-	35.84	-	37.08	1.24
	21.2 excluding land rent	-	-	26.24	-	27.47	1.24

Note: Mark-up for 2003-04 crop has worked out @ 14 per cent per annum.

Notes for Annex-II to IV.

1. The physical input-output parameters for estimating cost of production for sugarcane 2004-05 crop have been adopted from the Support Price Policy for sugarcane 2003-04 crop, APCom's Series No. 203.

2. Seed and related costs (items 2 and 3) for the fresh planted crop have been estimated @ 69 and 52 per cent of their original values for Sindh and NWFP respectively in view of the incidence of ratooning reported at 31 and 48 per cent during sugarcane's large field survey for 1999-00 crop. In case of the Punjab where the incidence of ratooning was much higher, these costs have been taken @ 50 per cent of their original cost.

3. The wage rates, farm inputs prices and custom hire rates of field operations involved in the sugarcane cultivation have been revised in view of the prevailing market rates as collected through the mini field survey conducted by the APCom during December 2003 in the major sugarcane growing regions of the Punjab, Sindh and in January 2004 in NWFP.

4. The prices of seed have maintained at the last year's level in view of the prevailed depressed purchase prices of sugarcane.

5. The cost of plant protection has not been increased in light of the information obtained from the Director, Plant Protection Department, karachi, that the increasing trend in the prices of pesticides, insecticides etc. has been arrested on account of new generic and low cost pesticides and insecticides. However, the cost of labour component (10 per cent of the total cost) has been revised in light of new wage rate.

6. The cost of supplementary irrigation has been updated in view of rise @ about 9.45 per cent in the prices of diesel. Based on the ratios of electric and diesel tube-wells of 11: 89 in the Punjab, 41: 59 in Sindh and 79: 21 in NWFP, reported in the Agriculture Statistics of Pakistan, 2001-02, MINFAL (Economic Wing), Islamabad, the magnitude of increases has been estimated as 8 per cent in the Punjab, 6 per cent in Sindh and 2 per cent in the NWFP.

7. The rates of chemical fertilizers have been revised in view of the fertilizers prices published by the Federal Bureau of Statistics, Islamabad for the week ending on 1st January, 2004 and supplemented with the data obtained through the field survey as mentioned above.

8. **The management charges for a manager looking after a 25-acre farm and devoting one-fourth of his time to the managerial activities have been worked at Rs 4109 per month for a Field Assistant at the 10th stages in BPS-6, including special additional allowance @ 25 per cent and 15 per cent ad-hoc relief announced in the 2003-04 budget.**

9. **In view of the 1999-00 crop survey, about 1 per cent of the acreage under sugarcane was harvested in lieu of sugarcane tops in the Punjab and 77 per cent in NWFP. The expenditure on account of harvesting and stripping has been adjusted accordingly.**

10. **The likely escalation in the cost of operations like interculture, plant protection, supplementary irrigation, nitrogenous fertilizer, harvesting/stripping and marketing during 2004-05 crop year has been estimated as 8 per cent in the Punjab, 6 per cent in Sindh and 7 per cent in the NWFP on the basis of weighted average annual increase in their costs for the last 4 years.**

11. **The land rentals have been kept at the last year level in view of the depressed purchase prices of sugarcane as reported during the mini field survey conducted by APCom in the major growing areas of the Punjab, Sindh and NWFP.**

159.82

ANNEX - V

PER CAPITA. AVAILABILITY (CONSUMPTION) OF SUGAR:
1993-94 TO 2002-03 (October - September)

S.No.	Item	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
		Thousand tonnes									
1	Opening stocks as on 1st October	224	309	265	104	245	513	371	27	621	637
2	Production	2922	3001	2470	2393	3555	3542	2429	3016	3249	3677
3	Imports	8	4	166	604	11	4	421	633	27	9
4	Exports	139	328	29	----	477	648	22	----	8	81
5	Closing stocks as on 30 September	309	265	104	245	513	371	27	621	637	759
6	Net availability (item 1+2+3-4-5)	2706	2721	2768	2856	2821	3040	3172	3055	3252	3483
		Million									
7	Population on first April (a)	124.04	127.00	130.04	132.96	136.19	139.07	142.34	145.64	149.16	152.87
		Kgs per annum									
8	Per capita availability (consumption)	21.82	21.43	21.29	21.48	20.71	21.86	22.28	20.98	21.80	22.78
9	Average per capita availability										
	i) Average (1993-94 to 2002-03)				~~21.64~~						
	ii) Forecast for 2003-04				~~22.08~~						

Note: (a) Population of AJ&K, NAs and Afghan refugees have also been included:

Sources:

1. For Stocks and Production: Pakistan Sugar Mills Association, Islamabad.
2. For Imports and Exports: Federal Bureau of Statistics, Karachi.
3. For Population of Pakistan: Economic Survey, 2002-03.
4. For Population of AJ&K and NAs: Population Census Organization, Islamabad.
5. For Population of Afghan refugees: Kasmir Affairs and Northern Areas and States and Frontier Regions Division, Government of Pakistan, Islamabad.

ANNEX-VI

MONTHLY AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 2002 AND 2003

Year/Month	Lahore	Faisalabad	Karachi	Hyderabad	Peshawar	Average
			Rupees per 100 kgs			
2002						
January	1931	1908	1905	1866	1934	1909
February	1997	2039	1977	2039	2091	2029
March	2041	2093	2122	2103	2125	2097
April	2100	2042	2125	2058	2125	2090
May	2119	2019	2071	2024	2063	2059
June	2090	2026	2050	2028	2025	2044
July	2106	2112	2094	2069	2102	2097
August	2100	2066	2131	2050	2094	2088
September	2138	2096	2135	2078	2113	2112
October	2113	2076	2099	2048	2119	2091
November	1988	1960	2018	1978	2056	2000
December	1867	1862	1917	1868	1946	1892
Average	**2049**	**2025**	**2054**	**2017**	**2066**	**2042**
2003						
January	2124	2082	2070	2048	2140	2093
February	2090	1946	1950	1978	2150	2023
March	1856	1860	1828	1868	1930	1868
April	1856	1860	1786	1790	1900	1838
May	1946	1890	1856	1815	1940	1889
June	1910	1879	1846	1753	1914	1860
July	1880	1860	1810	1768	1890	1842
August	1840	1817	1768	1778	1860	1813
September	1800	1782	1760	1773	1820	1787
October	1834	1865	1850	1775	1934	1852
November	1828	1770	1835	1750	1863	1809
December	1786	1736	1700	1677	1853	1750
Average	**1896**	**1862**	**1838**	**1814**	**1933**	**1869**

Source: ALMA, Karachi.

ANNEX-VII

ANNUAL AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 1993-94 TO 2003-04 (October - September)

Year (October - September)	Lahore	Faisalabad	Karachi	Hyderabad	Peshawar	Average	Increase (+) decrease (-) in average price over previous year
	----------	----------	----------	Rupees per 100 kgs	----------	----------	Percent
1993-94	1200	1185	1188	1173	1233	1196	----
1994-95	1355	1348	1333	1345	1368	1350	12.88
1995-96	1695	1705	1650	1625	1718	1679	24.38
1996-97	1988	2020	1975	1923	2110	2003	19.33
1997-98	1745	1713	1720	1643	1835	1731	-13.58
1998-99	1865	1861	1823	1726	1864	1828	5.59
1999-00	2179	2168	2087	2082	2183	2140	17.06
2000-01	2551	2524	2482	2353	2566	2478	15.82
2001-02	2069	2042	2063	2022	2073	2054	-17.11
2002-03	1939	1906	1892	1872	1972	1916	-6.71
2003-04 *	1768	1680	1663	1630	1825	1713	-10.61

Note: Average price upto January 2, 2004.

Source: ALMA, Karachi.

ANNEX- VIII

COMPARISON OF AVERAGE WHOLESALE MARKET PRICES OF SUGAR AND SUGARCANE VS SUPPORT PRICE OF SUGARCANE: 1993-94 TO 2003-04

Year (Oct - Sep)	Average wholesale market price of of sugar (a)	Support price of sugarcane			Market price (Mill gate) of sugarcane (b)		
		Punjab	N.W.F.P	Sindh	Punjab	N.W.F.P	Sindh
	Rs/100 kgs	Rupees per 40 kgs					
1993-94	1196	21.50	21.50	21.75	21.50	21.50	21.75
1994-95	1350	24.00	24.00	24.50	42.00	24.00	58.00
1995-96	1679	35.00	35.00	36.00	35.00	44.00	40.00
1996-97	2003	35.00	35.00	36.00	30.00	35.00	36.00
1997-98	1731	35.00	35.00	36.00	36.00	37.00	48.00
1998-99	1828	35.00	35.00	36.00	44.00	45.00	50.00
1999-00	2140	42.00	42.00	43.00	37.00	47.33	51.00
2000-01	2478	40.00	40.00	43.00	35.00	42.00	36.00
2001-02	2054	40.00	40.00	43.00	35.00	42.00	36.00
2002-03	1916	40.00	40.00	43.00	35.00	42.00	36.00
2003-04	1713*	40.00	40.00	41.00	40.00	42.00	41.00
Average increase per annum (Percent)	**3.66**	**6.41**	**6.41**	**6.54**	**6.41**	**6.93**	**6.54**

Note a) Average prices of Lahore, Faisalabad, Karachi, Hyderabad, and Peshawar markets during the crushing season i.e October-September.

* Prices are upto January 2, 2004.

Sources:
1. MINFAL, Islamabad.
2. ALMA, Karachi.

ANNEX IX

ECONOMICS OF SUGARCANE AND COMPETING CROPS AT PRICES REALIZED BY GROWERS: 2003-04 CROPS

Province/crops/ crop combinations	Crop duration	Water used	Gross cost	Cost of purchased inputs	Gross revenue	Gross margin	Net income	Output-input ratio	Revenue per: Rupee of Purchased inputs cost	Revenue per: Crop day	Revenue per: Acre inch of water used
1	2	3	4	5	5	7=6-5	8=6-4	9=6/4	10 = 6/5	11=6/2	12 = 6/3
	Days	Acre Inches	---- Rupees per acre ----						------ Rupees ------		
Punjab											
1. Sugarcane	394	48	18932	6289	16556	10267	-2376	0.87	2.63	42.02	344.92
2. Cotton	240	22	13843	6127	21718	15591	7875	1.57	3.54	90.49	987.18
3. Basmati paddy	180	58	10728	5883	11678	5795	950	1.09	1.99	64.88	201.34
4. IRRI paddy	180	62	9193	4984	8278	3294	-915	0.90	1.66	45.99	133.52
5. Wheat	180	17	9932	4540	9467	4927	-465	0.95	2.09	52.59	556.88
6. Sunflower (spring)	144	22	7848	2479	9840	7361	1992	1.25	3.97	68.33	447.27
7. Cotton+Wheat	420	39	23775	10667	31185	20518	7410	1.31	2.92	74.25	799.62
8. Cotton+Sunflower	384	44	21691	8606	31558	22952	9867	1.45	3.67	82.18	717.23
9. Basmati paddy + wheat	360	75	20660	10423	21145	10722	485	1.02	2.03	58.74	281.93
10. Basmati paddy+Sunflower	324	80	18576	8362	21518	13156	2942	1.16	2.57	66.41	268.98
11. IRRI paddy + wheat	360	79	19125	9524	17745	8221	-1380	0.93	1.86	49.29	224.62
12. IRRI paddy+Sunflower	324	84	17941	7463	18118	10655	1077	1.06	2.43	55.92	215.69
Sindh											
1. Suagarcane	488	71	21889	8290	20402	12112	-1487	0.93	2.46	41.81	287.35
2. Cotton	240	18	11009	4411	17152	12741	6143	1.56	3.89	71.47	952.89
3. IRRI paddy	180	56	7751	3465	9540	6075	1789	1.23	2.75	53.00	170.36
4. Wheat	180	15	8253	3455	8687	5232	434	1.05	2.51	48.26	579.13
5. Sunflower (Spring)	144	22	7848	2479	9840	7361	1992	1.25	3.97	68.33	447.27
6. Cotton+Wheat	420	33	19262	7866	25839	17973	6577	1.34	3.28	61.52	783.00
7. Cotton+Sunflower	384	40	18857	6890	26992	17264	8135	1.43	3.92	70.29	674.80
8. IRRI paddy+Wheat	360	71	16004	6920	18227	11307	2223	1.14	2.63	50.63	256.72
9. IRRI paddy+Sunflower	324	78	15599	5944	19380	13495	3781	1.24	3.26	59.81	248.46

Notes for Annex-IX

1. The economic analysis presented in the above exercise is based on the input-output prices for 2003-04 crops.

2. The data regarding input-output parameters have been adopted from the APCom's support price policy papers for sugarcane, seed cotton, rice paddy and wheat, 2003-04 crops. However, the relevant data for sunflower and canola were adopted from the support price policy for non-traditional oilseeds, 2000-01 crops with necessary adjustments in input prices for updating costs and incomes for the 2003-04 crop. To incorporate the escalations in input prices which occurred during the growing period of 2003-04 crops, some marginal revisions have been made as under:

   2.1 The cost of supplementary irrigation has been adjusted in view of rise in power tariff and diesel prices, and ratio of diesel and electric tubewells in the Punjab at 85 and 15 percent and in Sindh at 46 and 54 percent. Accordingly, the weighted average increase in energy charges works to 2.15 percent in Punjab and 2.54 percent in Sindh for sugarcane, cotton and rice crops. The corresponding increase calculates to 11.05 per cent in Punjab and 5.98 per cent in Sindh for wheat.

   2.2 The cost of fertilizers has been revised in view of their prices prevailed at the time of application for the respective crops in 2003-04 season.

3. Water use has been estimated from the number of irrigations as reported in the cost of production estimates of the respective crops assuming each irrigation of 3 inches and 'rauni' of 4 inches.

4. The following prices as realized by the growers for different crops are adopted for the analysis:

   4.1 The 2003-04 wheat crop is yet to be harvested. Therefore the support price of wheat at Rs 350 per 40 kgs for 2003-04 crop has been adopted for the current analysis.

   4.2 It has been reported by the Director, Crop Reporting Service, Department of Agriculture, Lahore that the super basmati occupies 70 per cent while basmati-385 accounts for 13 per cent of total rice area during the current crop season in the Punjab. Accordingly, the weighted average wholesale prices for basmati paddy during Oct-Jan 2003-04 in the major producer area markets calculate to Rs 498 per 40 kgs. The wholesale prices for IRRI paddy averaged at Rs 245 per 40 kgs during Sep-Nov 2003 in the Punjab. In Sindh, the average wholesale market prices of IRRI paddy in the main producer area markets during the post-harvest months are reported at Rs 257 per 40 kgs in the APCom's field survey.

   4.3 The wholesale market prices of seed cotton during the post-harvest months of Sep-Jan 2003-04 in the main producer area markets have averaged at Rs 1299 per 40 kgs in the Punjab as reported by the Directorate of Agriculture (E&M), Lahore. In Sindh, the corresponding prices are reported at Rs 1135 per 40 kgs by the PCCC, Karachi.

4.4 The 2003-04 sunflower crop is yet to be harvested. The market price of this crop is not regularly reported by any agency. However, it was reported by the PODB Islamabad that the Solvent Extraction Plants would purchase sunflower at Rs 670 per 40 kgs from the growers during 2003-04 season.

4.5 The market prices of sugarcane are not available from any agency. However, the mill-gate prices in the major cane producing areas are, by and large, reported around Rs 34 per 40 kgs in the Punjab and Rs 35 in Sindh by the farmers to the APCom's survey teams. The press reports also reflect a similar situation on prices of sugarcane.

5. The market prices have been adjusted for the marketing expenses to make them effective at the farm level. These expenses amount to Rs 4.75 per 40 kgs in Punjab and Rs 4.82 in Sindh for sugarcane, Rs 15 for seed cotton, Rs 13 for rice paddy and Rs 14 for wheat and oilseed crops.

6.	Gross income	=	(Yield per acre multiplied by price of principal produce at farm gate) plus (value of by-products per acre).
7.	Cost of purchased inputs	=	Cost incurred on seed and related items, fertilizer, supplementary irrigation including labour, canal water rate, pesticides and weedicides.
8.	Gross margin	=	Gross income minus cost of purchased inputs.
9.	Net income	=	Gross income minus gross cost.
10.	Output-input ratio	=	Gross income divided by gross cost
11.	Revenue per rupee of purchased inputs cost	=	Gross income divided by cost of purchased inputs
12.	Revenue per crop day	=	Gross income divided by crop duration in days.
13.	Revenue per acre-inch of water used	=	Gross income divided by irrigation water used in acre inches.

ANNEX - X

MILL - GATE PRICES OF SUGARCANE WORKED BACK FROM THE AVERAGE WHOLESALE PRICES OF GUR DURING ~~2003-04~~ 2004-05 CRUSHING SEASON (~~NOVEMBER~~ - DECEMBER)

S.No	Item	Unit	N.W.F.P	Punjab
1	Gur produced from 400 kgs of cane	Kgs	(a) 40.00	(a) 40.00
2	Market price of gur	Rs/40 kgs	~~578.00~~ 740	~~507.00~~ 660
3	Sale value of gur produced	Rupees	578.00 740	507.00 ~~660~~
4	Marketing cost of gur including transport, commission, etc.	Rupees	~~44.00~~ 50.00	20.00 30.00
5	Net value of gur at farm level (item 3 minus item 4)	Rupees	~~534.00~~ 690	487.00 630
6	Processing cost including cane crushing and labour used for gur making	Rupees	~~114.00~~ 120	~~121.00~~ 150
7	Cost of chemicals.	Rupees	17.00 22.00	20.00 25.00
8	Net value of 400 kgs of cane (item 5 minus 6 minus 7)	Rupees	403.00 [illegible]	346.00 455
9	Value of 40 kgs of sugarcane	Rupees	~~40.30~~ 53.80	34.60 45.50
10	Marketing cost of cane, i.e., transport and development cess.	Rupees	~~3.97~~ 5.77	4.75 5.75
11	Mill-gate price per 40 kgs of cane (item 9 plus 10)	Rupees	44.27 [illegible]	39.35 [illegible]

Notes: Based on the information collected during Agricultural Prices Commission field survey, [illegible] ~~December - January, 2003-04.~~ Dec [illegible]

(a) 10 percent recovery has been taken for NWFP and Punjab.

ANNEX - XI

MILL- GATE PRICES OF SUGARCANE WORKED BACK FROM THE AVERAGE WHOLESALE MARKET PRICES OF SUGAR DURING 2003-04 CRUSHING SEASON (NOVEMBER -JANUARY)

S.No	Item	Rupees per tonne	
1	Average wholesale market price of sugar (a)	~~17570~~ 18180	
2	Wholesale dealer margin @ 5 % on net price	732	
3	Sales tax @ 15 per cent on net price	2196	
4	Net price (item 1 minus 2 minus 3)	14642	
		Punjab & N.W.F.P	Sindh
5	Processing cost of sugar (b)	4978	4978
6	Value of cane to produce one tonne of sugar (item 4 minus 5)	9664	9664
7	Provincial recovery (Percent)	8.50	8.70
8	Tonnes of cane required to produce one tonne of sugar (100 divided by item 7)	11.76	11.49
9	Mill - gate price of sugarcane (Rupees per tonne) (item 6 divided by item 8)	821.40	840.72
10	Mill - gate price of sugarcane (Rs per 40 kgs)	32.86	33.63

18180
1902

Notes: a) Average price of Lahore, Faisalabad and Hyderabad market during current crushing season i.e., November to January 2, 2004.

b) Ratio between costs of cane and its processing into sugar has been estimated at 66:34 from publication " Cost of Production of Sugar" jointly prepared in 1996 by Agricultural Prices Commission and Business and Consultancy Services.

Source: 1. For average market price of sugar: ALMA, Karachi.

2. For sales tax: Central Board of Revenue (CBR), Islamabad

ANNEX - XII

AVERAGE INTERNATIONAL PRICES OF SUGAR: 1994-95 TO 2003-04 (OCT - SEP)

Years	ISA Daily price of Raw sugar (Fob and stowed Caribbean ports in bulk)		London Daily price of White sugar (fob and stowed European ports in bags of 50 kgs)		Difference between White and raw sugar prices		
Oct - Sep	US Cents/ lb	US$/ per tonne	US Cents/ lb	US$/ per tonne	US Cents/ lb	US$/ per tonne	Per cent of White Sugar
1994-95	13.72	302.47	17.99	396.61	4.27	94.14	23.74
1995-96	12.25	270.06	17.41	383.82	5.16	113.76	29.64
1996-97	11.10	244.71	14.48	319.23	3.38	74.52	23.34
1997-98	9.89	218.03	12.33	271.83	2.44	53.80	19.79
1998-99	6.63	146.20	9.79	215.83	3.16	69.63	32.25
1999-00	7.23	159.30	9.18	202.38	1.95	43.08	21.29
2000-01	9.34	205.91	11.35	250.29	2.01	44.38	17.71
2001-02	6.85	151.01	10.59	232.48	3.74	81.47	35.32
2002-03	8.12	179.03	10.36	228.35	2.24	49.32	21.59
2003-04 (Oct-Nov)	6.02	132.72	8.54	188.19	2.52	55.47	29.47
October	5.96	131.39	8.39	184.95	2.43	53.56	28.96
November	6.08	134.04	8.68	191.43	2.60	57.39	29.95

Source: International Sugar Organization, London "Monthly Market Reports and Press Summaries" (Various repots)

ANNEX- XIII

ECONOMIC IMPORT PARITY PRICES OF SUGARCANE AT MILL-GATE AS WORKED BACK FROM AVERAGE FOB (LONDON) PRICE OF WHITE SUGAR

Item	1998-99 to 2002-03		2003-04 (Oct-Nov)	
		.... US $ per tonne		
1. Average fob (London) price		225.87		188.19
2. Freight charges upto Karachi		30.00		30.00
3. C & f cost at Karachi port		255.87		218.19
	OR	... Rs. per tonne (a)...		
		14725		12557
4. Marine insurance (actual)		56		56
5. Import value (items 3+4)		**14781**		**12613**
6. L/C opening charges @ 0.5% of c&f cost		74		63
7. Foreign Bank charges (actual)		1		1
8. Mark up on retirement of documents by bank for 60 days @ 12% per annum of c&f cost		290		248
9. Wharfage, handling and stevedoring charges (Actual)		610		610
10. Allowance for shortage and unforeseen expenses @ 1% of c&f cost		147		126
11. Service charges of inspection @ 0.5% (cif) value		74		63
12. Importer commission @ 1% of c&f cost		147		126
13. Transport charges from Karachi to Lahore (b) including loading/unloading		1350		1350
14. Landed cost at Lahore (items 6 to 13)		**17475**		**15199**
	Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
15. Processing cost of sugar (c)	5941.50	5941.50	5167.55	5167.55
16. Value of cane to produce one tonne of sugar (item 14 minus Item 15)	11533.50	11533.50	10031.13	10031.13
17. Provincial base recovery level (%)	8.50	8.70	8.50	8.70
18. Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 17)	11.76	11.49	11.76	11.49
19. Price of one tonne of sugarcane (item 16 / item 18) (Rs per tonne)	980.74	1003.79	852.99	873.03
20. Price of 40 kgs of cane (Rs per 40 Kgs)	39.23	40.15	34.12	34.92

Sources:
i) For average fob (London) price: Annex-XII
ii) For freight, incidentals and duties: Trading Corporation of Pakistan, Karachi.

Notes:
(a) Worked out at the selling exchange rate of one US $ = 57.55 Pak rupees, annouced by State Bank of Pakistan as on January, 16, 2004.
(b) Assuming that imported sugar will be consumed at Lahore.
(c) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCom and Business & Consultancy Services.

Annex - XIV

FINANCIAL IMPORT PARITY PRICES OF SUGARCANE AT MILL-GATE AS WORKED BACK FROM AVERAGE FOB (LONDON) PRICE OF WHITE SUGAR

Item	1998-99 to 2002-03		2003-04 (Oct-Nov)	
	.... US $ per tonne			
1. Average fob (London) price	225.87		188.19	
2. Freight charges upto Karachi	30.00		30.00	
3. C & f cost at Karachi port	255.87		218.19	
	---Rs per tonne---			
	14725		12557	
4. Marine insurance (actual)	56		56	
5. Import value (items 3+4)	**14781**		**12613**	
6. Custom duty @25 % of import value	3695		3153	
7. Sales tax @ 15% of (Import value + Custom duty)	2772		2365	
8. Custom duty, Sales tax & Wharfage on empty bages	165		165	
9. Duty paid value (DPV)(items 5+6+7+8)	**21413**		**18296**	
10. Income tax @6% at import stage of DPV	1285		1098	
11. Income tax on empty bags(fixed)	40		40	
12. Income tax @3.5% of sale stage	925		801	
13. L/C opening charges @ 0.5% of c&f cost	74		63	
14. Foreign Bank charges (actual)	1		1	
15. Mark up on retirement of documents by bank for 60 days @ 12% per annum of c&f cost	290		248	
16. Wharfage, handling and stevedoring charges	610		610	
17. Allowance for shortage and unforeseen expenses @ 1% of c&f cost	147		126	
18. Sindh Govt excise duty @ 0.3% of DPV	64		55	
19. Service charges of inspection @ 0.5% (cif) value	74		63	
20. Importer commission @ 1% of c&f cost	147		126	
21. Transport charges from Karachi to Lahore (b) including loading/unloading	1350		1350	
22. Landed cost at Lahore (item 9+items 10 to 21)	**26421**		**22875**	
23. Less sales tax @ 15% on domestic production	3446		2984	
24. Cost of one tonne of imported sugar after deducting sale tax @ 15% of landed cost at Lahore	**22975**		**19891**	
	Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
25. Processing cost of sugar (c)	7811.36	7811.36	6763.06	6763.06
26. Value of cane to produce one tonne of sugar (item 24 minus item 25)	15163.22	15163.22	13128.30	13128.30
27. Provincial base recovery level (%)	8.50	8.70	8.50	8.70
28. Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 27)	11.76	11.49	11.76	11.49
29. Price of one tonne of sugarcane (item 26 / item 28) (Rs per tonne)	1289.39	1319.69	1116.35	1142.58
30. Price of 40 kgs of cane (Rs per 40 Kgs)	51.58	52.79	44.65	45.70

Sources: i) For average c&f price: Annex - XII
ii) For frieght, incidentals and duties: Trading Corporation of Pakistan, Karachi.

Notes: (a) Worked out at the selling exchange rate of one US $ = 57.55 Pak rupees, annouced by State Bank of Pakistan as on January, 16, 2004.
(b) Assuming that imported sugar will be consumed at Lahore.
(c) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCom and Business & Consultancy Services.

ANNEX-XV

ECONOMIC EXPORT PARITY PRICES OF SUGARCANE AT MILL-GATE AS WORKED BACK FROM AVERAGE FOB (LONDON)SUGAR PRICE OF WHITE SUGAR

Item	1998-99 to 2002-03		2003- 04 (Oct-Nov)	
	....US $ per tonne			
1. Average fob (London) price	225.87		188.19	
OR	... Rs. per tonne (a)...			
2. Average fob Karachi price (assuming equivalent to fob London price)	12954		10793	
3. Transport charges from interior Sindh to port, special packing, inspection transit insurance, loading and unloading, clearing and forwarding agents commission (b)	720		720	
4. Wharfage	40		40	
5. Bank commission @ 1 % of fob price	130		108	
6. Pre- shipment inspection charges@ 0.5 of fob price	65		54	
7. Ex-mill price of sugar (item 2 minus items 3 through 6)	11999		9871	
	Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
8. Processing cost of sugar (c)	4079.78	4079.78	3356.07	3356.07
9. Value of cane to produce one tonne of sugar (item 7 minus item 8)	7919.56	7919.56	6514.73	6514.73
10. Provincial base recovery level (%)	8.50	8.70	8.50	8.70
11. Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 10)	11.76	11.49	11.76	11.49
12. Price of one tonne of sugarcane (item 9 / item 11) (Rs per tonne)	673.16	689.00	553.75	566.78
13. Price of 40 kgs of cane (Rs per 40 Kgs)	26.93	27.56	22.15	22.67

Sources: i) For average fob (London) price: Annex-XII
ii) For incidentals and duties: Trading Corporation of Pakistan, Karachi.

Notes:
(a) Worked out the buying exchange rate of one US $ = 57.35 Pak rupees, annouced by State Bank of Pakistan as on January, 16, 2004.
(b) Assuming that the surplus sugar will be exported from Sindh province.
(c) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCom and Business & Consultancy Services.