APCOM SERIES No. 203

SUPPORT PRICE POLICY FOR SUGARCANE, 2003-2004 CROP

AGRICULTURAL PRICES COMMISSION
GOVERNMENT OF PAKISTAN
ISLAMABAD

January, 2003

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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

SUPPORT PRICE POLICY FOR SUGARCANE, 2003-04 CROP

INTRODUCTION

Sugarcane cultivation has played a vital role in the development of agriculture and industrial sectors of the economy. The crop is well integrated with the cropping patterns in the central and southern Punjab, upper and lower Sindh and the Peshawar - Mardan valley of the NWFP. Its share in value added by major crops has varied between 13 - 18 per cent during the last 5 years. The cultivation of sugarcane, the 4th largest crop in terms of area, has expanded at the average annual rate of 1.8 per cent during the last 10 years. The increasing cultivation of sugarcane, spreading over an area of one million hectares, has led to the establishment of the 2nd largest agro based industry in the country, comprising 78 sugar mills with potential to produce 5 million tonnes of sugar annually. Sugarcane farming a valuable source of fodder for the livestock, with its many forward and backward linkages, has provided avenues for large scale employment and the sugar mills located in the countryside have promoted the cause of rural development. The sugar sector also makes handsome contribution to the public exchequer in the form of many levies and taxes.

2. The sugarcane production, marketing and processing continue to be confronted with a host of problems. The growers are faced with increasing input prices, water shortages, etc. As a result of recurring water shortage element of risk in farm production is on the rise. Uncertainty about output price has also increased, adding to the problems of the farmers. The industry is facing increasing competition from cheap imports, idle capacity, and periodic fluctuations in the quantity and quality of raw material. It has also been periodically saddled with large stocks of unsold sugar. The relationship between the farmers and the industry characterized with mutual mistrust has been seldom friction free.

3. In view of the importance of sugarcane and sugar in the economy, the sector has been the focus of many policies and interventions which in the wake of liberalization of the economy are on decline. The government intervention in the sector is now limited to the fixation of purchase price of sugarcane and regulation of imports through adjustment of import duties. The federal government did not fix any support price of sugarcane for 2002-03 crop. Nevertheless, Governments of the Punjab in November 2002 and of Sindh in December 2002 fixed the minimum purchase prices of sugarcane, at factory gate, at Rs 40 and 43 per 40 kgs respectively.

4. The Cabinet in its meeting held on December 10, 2002 directed that in future support prices of all crops shall be announced two months ahead of the sowing season. Accordingly, to ascertain the input-out prices paid and received by the farmers, and the position of raw material supply to the industry and related issues, the Commission's officers conducted field surveys and visited sugar mills in the last week of December 2002 and held detailed discussions on issues faced by the growers and industry. The annual meeting of the APCom's Standing Committee on Sugarcane was convened, at Islamabad, on January 6, 2003. The meeting was attended by the representatives of farmers' organizations, progressive growers, crop experts and Government officials. The farmers highlighted their problems in marketing their produce with special reference to the uncertainty relating to the price in the wake of continuing row between the industry and the farmers.

5. The marketing of the produce, raw material as well as the end produce i.e. sugar, has emerged as the key issue requiring serious attention of the Government. Recurring water shortage is posing a serious challenge to the commercial cultivation of sugarcane as the crop requires large amounts of irrigation water. In view of the increasing input prices and competition for land and water from non farm uses, further expansion in the area under sugarcane is neither advisable nor sustainable. It may be in the interest of industry and farmers to reduce its area but promote the cultivation of improved varieties with judicious use of inputs and improved crop husbandry, with industry spearheading the research and development efforts so as to meet its raw materiel requirements.

6. The sugar industry, which in the country has expanded horizontally, needs vertical integration as there is a vast scope for manufacturing of various by-products. The manufacturing of spirit, yeast, acetic acid, citric acid, glucose etc. from the molasses and other products from the bagasse would help in reducing the cost of sugar which remains the principal produce of the industry in Pakistan but has become a by-product of the industry elsewhere.

7. The crushing season 2002-03 like the previous year had an inauspicious start. The season has been marred by a row between the farmers and the mills about the date of commencement and prices of sugarcane. The situation has been aggravated with the increasing role of middleman in the marketing of sugarcane, purchases of CPR's at discounted prices, complaints about under-weighment, etc.

8. Fixation of minimum/support price of sugarcane is not meant to replace the market based prices but to provide a floor to the market and correct the shortcomings of the imperfect market often characterized by collusion among the mills. Judiciously fixed prices of sugarcane supplemented with a pragmatic trade policy for sugar can play an important role in arresting the cobweb cycle in sugarcane/sugar production. The fixation of minimum price though essential to regulate the supply of raw material to the industry however cannot be a panacea for the ills afflicting the sector. The issues of linking payments to the quality of sugarcane, the widespread practice of under -weighment at purchase centres, the purchases of CPR's at discounted prices by the middlemen require the attention of the Government urgently. The Report in addition to these issues has also highlighted a number of areas which need attention of the concerned agencies to increase crop productivity, which remains low.

(Dr. Abdul Salam)
Chairman, APCom

January 30, 2003

2. SUMMARY OF FINDINGS AND RECOMMENDATIONS

2.1 FINDINGS

Provincial Shares in Area and Production

9. Punjab, Sindh and NWFP respectively account for 66, 24 and 10 per cent both in area and production of sugarcane. Their respective shares in the production of sugar are 61, 36 and 3 per cent.

Important Sugarcane Producing Districts

10. The most important districts for sugarcane cultivation are Faisalabad, Jhang, Sargodha, Kasur, T.T.Singh, R.Y.Khan, M.B.Din and Okara in Punjab; Hyderabad, Badin and Nawabshah in Sindh and Charsadda in the NWFP. Each of these districts annually produces about 1.5 million tonnes of sugarcane. Collectively these districts account for 64 per cent of the sugarcane produced in the country and out of 78 sugar mills, 39 are located in these districts. Thus, sugarcane farming and its processing play an important role in the economy of these districts. Accordingly, uncertainty in the production of sugarcane and its prices badly hurt farmer's income and well being of the farm and non-farm households in these districts.

Changes in Area and Production

- **Long-term**

11. During the period 1993-2003, sugarcane production is estimated to have increased @ 1.8 per cent per annum, attributable to 1.2 per cent annual expansion in area and 0.5 per cent improvement in yield.

12. Sugarcane production in the Punjab has increased @ 3.8 per cent per annum, on account of 2.1 per cent expansion in area and 1.6 per cent improvement in yield. In Sindh sugarcane production is estimated to have decreased by 2.0 per cent per year during the period under review due to decreases of 0.6 and 1.4 per cent in area and yield, respectively. In the NWFP production has been rising @ 0.9 per cent owing to increases of 0.3 per cent in area and 0.6 per cent in yield. In Balochistan, production has increased @ 3 per cent on account of increases of 2.3 and 0.7 per cent in area and yield, respectively.

- **Short-term : 2002-03 vs 2001-02 crop**

13. According to the second estimate, sugarcane production from the 2002-03 crop is 51.7 million tonnes, 7.5 per cent more than that of the 2001-02 crop. The rise in production is due to 9.7 per cent expansion in area as the yield has fallen by 2 per cent.

14. Sugarcane production in the Punjab estimated at 35.40 million tonnes in 2002-03 crop year is up by 11.3 per cent, attributable entirely to 13.6 per cent expansion in area as the yield has decreased by 2 per cent.

15. The area under sugarcane in Sindh has expanded by 2.8 per cent in 2002-03 However, inspite of this expansion in area, production of 11.38 million tonnes is somewhat less than that of last year.

16. In the NWFP, cane production estimated at 4.84 million tonnes is 1.2 per cent more than that of last year's, which is attributable to area expansion of 1.3 per cent.

Targets Vs Achievements 2002-03

17. FCA had fixed sugarcane production target for the 2002-03 crop at 46 million tonnes. The production estimated at 51.7 million tonnes has surpassed the target by 12.3 per cent as both the area and yield targets have been exceeded at the country level.

Cost of Production

Punjab

18. With average yield of 565 maunds (40 kgs) per acre, the farm level cost of production of sugarcane in the Punjab, during 2003-04 crop year, works out at Rs 34.59 Per 40 kg. Adding marketing costs of Rs 4.50 and development cess @ Rs 0.25 per 40 kgs, the mill-gate cost would be Rs 39.34 per 40 kgs, higher by Rs 2.63 (7 %) than the corresponding cost of Rs 36.71 for the 2002-03 crop.

Sindh

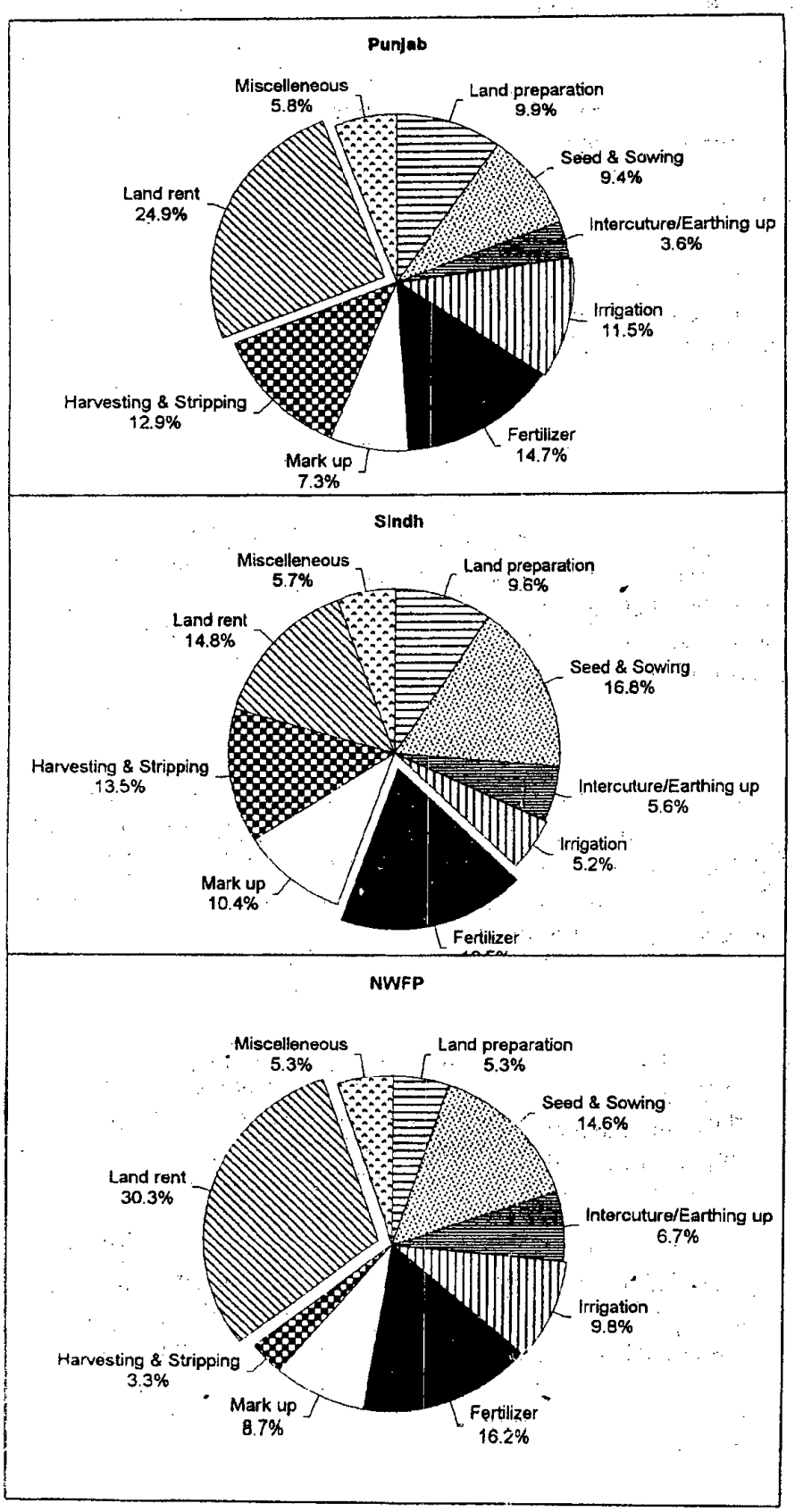
19. The farm level cost of production of sugarcane in Sindh in 2003-04 crop year is expected at Rs 33.33 per 40 kgs, based on the average yield of 676 maunds (40 kgs) per acre. Accounting for the marketing costs @ Rs 4.82 per 40 kgs, including development cess, the mill-gate cost would be Rs 38.15 per 40 kgs, reflecting an increase of Rs 1.90 (5 %) over the corresponding cost of the 2002-03 crop.

NWFP

20. With average yield of 585 maunds (40 kgs) per acre, the farm level cost of production of sugarcane in the NWFP, during 2003-04 crop year, is calculated at Rs 31.71 per 40 kgs. Adding the marketing costs, including development cess, @ Rs 3.97 per 40 kgs the mill-gate cost of production of sugarcane should work out at Rs 35.68 per 40 kgs which is higher by Rs 1.42 (4 %) over the cost of the 2002-03 crop.

21. The increases in COP of the 2003-04 crop year over the 2002-03 are primarily attributable to escalations in the costs of cultural operations and supplementary irrigation due to increases in prices of diesel and power tariff, rises in the prices of chemical fertilizers and land rentals. The major components of the cost of cultivation of sugarcane, by province, are shown on next page.

Structure Of Cost Of Cultivation of Sugarcane



Market Prices of Sugarcane, 2002-03 Crop

22. The middlemen were alleged to purchase cane for specific sugar mills. They were also purchasing CPRs on cash payments at discount prices of Rs 2-3 per 40 kgs as their profit/commission. The mills of lower Sindh were nevertheless purchasing cane at the support price of Rs 43 per 40 kgs but payments to growers were not yet being made. In the Punjab, price of cane being paid to the growers was reported at Rs 35-40 per 40 kgs. Reportedly, the mills pay a margin of Rs 2-3 to the middlemen. At the purchase centres, the growers are paid around Rs 32 or so in cash. In the NWFP, sugar mills were paying Rs 42 per 40 kgs of cane at the mill gate.

Nominal and Real Prices of Sugarcane

- **Real support prices**

23. The nominal support price of Sugarcane in the Punjab during the period of 1990-91 to 2002-03 indicate a cumulative increase of 162 per cent i.e. from Rs 15.25 in 1990-91 to Rs 40 in 2002-03 (Fixed by the Punjab Government). During the same period, the CPI has risen by 151 per cent. Consequently, the real support price of sugarcane in 2002-03 crop year, estimated at Rs 15.95 per 40 kgs, in terms of 1990-91 prices, shows an improvement of 5 per cent over corresponding price in 1990-91.

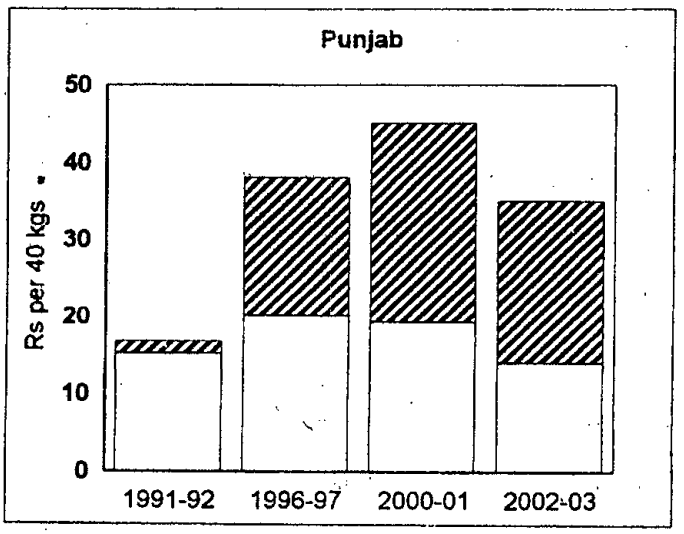
24. More or less a pattern similar to that discussed above for the Punjab has been observed in the nominal and real places of sugarcane in Sindh except for the last 2 years of the period covered in this report. The support price of sugarcane raised to Rs 43 per 40 kgs for 2001-02 crop after a period of 4 crop years. As a sequel, the real value of support price of sugarcane in Sindh became Rs 17.81 per 40 kgs, the highest during the period under review. For the 2002-03, the support price as notified by the Sindh Government is the same as for the last year while CPI has registered an increase of 4 per cent. Thus, the real value of support price of sugarcane has been eroded by 4 per cent in comparison to that of last year.

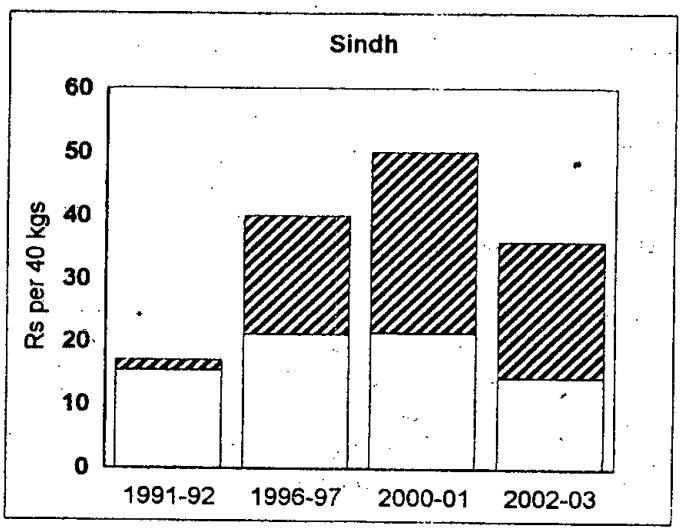
- **Real market prices**

25. The nominal market (mill-gate) price of sugarcane averaging at Rs 15.25 per 40 kgs in the Punjab has risen to Rs 35 per 40 kgs in the 2002-03, showing an overall increase of 130 per cent. During the same period, the cumulative inflation in terms of CPI has been about 151 per cent. Consequently, the real value of market (mill-gate) price of sugarcane in the Punjab has declined from Rs 15.25 to 13.96 in 2002-03 reflecting an erosion of 8 per cent in comparison to the value in 1990-91.

26. The nominal market (mill-gate) price of sugarcane averaging at Rs 15.75 per 40 kgs in Sindh has risen to Rs 36 per 40 kgs in the 2002-03 crop showing an overall increase of 129 per cent. During the same period, the cumulative inflation in terms of CPI is estimated at 151 per cent. Consequently, the real value of market (mill-gate) price of sugarcane in Sindh has fallen to Rs 14.36 per 40 kgs, less by 9 percent than that in 1990-91. The nominal and real prices of sugarcane for selected years are shown on next page.

Nominal and Real Prices of Sugarcane for Selected Years





Full bar represents nominal price and white part real price

Economics of Fertilizer Use on Sugarcane

- **Benefit cost ratio**

27. The BCRs computed for the use of fertilizers in sugarcane farming at various response ratios, for the period 1993 to 2003, have been greater than one, indicating fertilizer use on sugarcane has been profitable. The analysis based on the support price of sugarcane reveals that profitability rose to the highest level in 1997-98 but has decreased in the subsequent years. During 2002-03 it has declined by 5 to 6 per cent at various nutrient response ratios.

28. The BCRs based on marked prices reflect that profitability of fertilizer use on sugarcane is higher in Sindh as compared to that in the Punjab.

- **Parity between market prices of fertilizers and sugarcane**

29. The parity ratios between the prices of nitrogen and phosphatic fertilizers and that of sugarcane were estimated for the period 1993-94 to 2002-03. These ratios suggest that the quantity of sugarcane needed to buy one nutrient unit of nitrogen decreased from 19.11 units in 1994-95 to 12.45 in 2000-01. As a result of the increases in the prices of urea but fall in the prices of sugarcane received by the growers the quantity of sugarcane to purchase one unit of nitrogen has increased in 2001-02 and 2002-03 to 16.56 and 17.20 units respectively.

30. At the output-input prices relevant for the 1993-94 crop of sugarcane 17.12 units of cane were required to purchase one nutrient unit of P fertilizer. But due to greater increase in the price of phosphatic fertilizer, the parity ratio has become unfavourable over time as 25.90 units of sugarcane were required to purchase one unit of P_2O_5 in 1999-00 and 25.43 in 2002-03.

Domestic Supply, Demand, Stocks and Prices of Sugar

- **Domestic supply, demand and stocks**

31. Sugarcane production during 2002-03 reported at 51.7 thousand tonnes is 7.5 per cent above the last year's level. A quantity of 3,458 thousand tonnes of sugar may be produced from this cane in view of the past trend in sugarcane and sugar production. Adding opening stocks of 637 thousand tonnes, as reported by the industry, total availability of sugar during 2002-03 should be around 4.1 million tonnes.

32. Based on the trend forecast of per capita consumption of 21.06 kgs, domestic consumption requirements for 2002-03 sugar year (October – September) are estimated at 3,207 thousand tonnes.

- **Behaviour of sugar prices in domestic market**

Short term: 2001 and 2002

33. During 2001 average monthly wholesale prices of sugar ranged between Rs 1,900 and Rs 2,586 per 100 kgs. During the year 2002, prices have been ruling from Rs 1,862 to Rs 2,138 per 100 kgs. The overall average of sugar prices estimated at Rs 2,341 per 100 kgs in 2001 was 12.8 per cent higher than the average of Rs 2,042 in 2002.

Long term price behaviour: 1992-93 through 2002-03

34. The wholesale price of sugar averaging at Rs 1,180 per 100 kgs in 1992-93 has increased to Rs 1,957 in 2002-03. The year to year increases in average price of sugar during the period under reference have ranged between 1.4 and 24.4 per cent. However, during the years 1997-98, 2001-02 and 2002-03 prices experienced decreases of 13.6, 17.1 and 4.7 per cent respectively. The overall average increase in the wholesale prices of sugarcane during the last 10 years works out to 5.19 per cent per year.

35. The support prices of sugarcane during the same period have increased from Rs 17.50 to Rs 40 per 40 kgs in Punjab and Rs 17.75 to Rs 43 per 40 kgs in Sindh, showing annual average increase of 8.62 and 9.25 per cent respectively. The mill-gate prices of sugarcane have however increased to Rs 42 per 40 kgs in NWFP, Rs 35 per kgs in the Punjab and Rs 36 per 40 kgs in Sindh indicating annual average increases of 9.15, 7.18 and 7.33 per cent respectively.

Seasonal variations

36. The prices of sugar tend to rise in March/April and continue rising upto August-September. With the start of new crushing season from November onwards, the prices start falling.

Comparative Economics of Sugarcane and Competing Crops

- **Punjab**

37. The market price of sugarcane has hovered around Rs 35 per 40 kgs although the Provincial Government has notified a minimum purchase price of Rs 40 per 40 kgs at the mill-gate during the 2002-03 crushing season. Low price realized by the growers has weakened its economic position against competing crops. The returns to overall investment are not quite encouraging as the output-input ratio has fallen below one, i.e. the break-even point. Thus, the cost incurred in sugarcane cultivation is not being recovered by the output prices received in the current crushing season. Sugarcane is out competed by all the competing enterprises in terms of output-input ratio except IRRI-wheat rotation. However, sugarcane ranks second after cotton-sunflower rotation in case of returns to purchased inputs.

38. In respect of returns to irrigation water, sugarcane seems to have an edge over the rice combinations but falls behind cotton rotations. In case of returns per day of crop duration, all enterprises considered in the analysis out-compete sugarcane.

- Sindh

39. In Sindh too, sugarcane growers have not received the purchase price of Rs 43 per 40 kgs, announced by the provincial government. As per press reports and the information compiled by APCom's survey teams visiting Sindh in December 2002, growers are reported to realize average price of Rs 36 per 40 kgs at the mill-gate. Although it is a situation of break-even for sugarcane as the output-input ratio marginally exceeds unity but sugarcane is outperformed by all the competing enterprises in respect of output-input ratio except IRRI-wheat combination. Similarly, sugarcane falls behind all the competing alternates in terms of gross revenue per rupee of purchased input cost and per day of crop duration except IRRI-wheat rotation. In case of revenue per unit of irrigation, sugarcane performs better than rice combinations while the cotton combinations out compete all enterprises.

- Inter provincial comparison of comparative economics

40. The economic position of sugarcane and competing crops has followed a similar pattern in the Punjab and Sindh provinces in terms of 2002-03 prices. Sugarcane is out-competed by all the competing enterprises in respect of returns to overall investment and purchased inputs in both the provinces. In case of gross revenue per day of crop duration, sugarcane is the least profitable enterprise in the Punjab while it ranks second last, after IRRI-wheat rotation in Sindh. In case of returns to irrigation water, sugarcane is a better proposition than rice combinations but a losing concern in comparison to cotton combinations in both the provinces.

41. The inter – provincial comparison of the economics of sugarcane crop, between Punjab and Sindh, shows that the economic position of sugarcane in terms of returns to overall investment, as reflected by output/input ratio, is superior in Sindh. This is attributable to 20 per cent higher yield and marginally better prices of sugarcane during the current crushing season. However, in respect of the revenue per day of crop duration, there is not much of difference between the two provinces. Although the higher yield in Sindh, resulting from the greater use of various inputs and irrigation water, compensates for some of the additional expenses incurred in sugarcane farming, but the overall returns to the use of purchased inputs in Sindh lag behind that of the Punjab. Inspite of higher crop yield and low irrigation costs primarily because of cheaper canal water in Sindh, sugarcane farming in terms of water use efficiency in Sindh is not a very enviable proposition indicating need for improving the water use efficiency.

Prices of Sugarcane on the Basis of "Gur" Prices

42. The mill gate prices of sugarcane as worked back from the average wholesale price of gur during the 2002-03 (November-December) crushing season come to Rs 43.97, Rs 41.40 and Rs 41.67 per 40 kgs for NWFP, Punjab and Sindh, respectively.

Price of Sugarcane Worked Back From Average Wholesale Price of Sugar

43. From the average wholesale price of Rs 18,860 per tonne of sugar during the 2002-03 crushing season (November-January) sugarcane prices have been worked back. These are Rs 35.27 per 40 kgs in the Punjab and the NWFP and Rs 36.10 in Sindh.

World Production, Demand, Supply, Stocks and Trade Situation

44. The world production of sugar (raw) for 2002-03 is forecast at 141.75 million tonnes, 4.3 million tonnes more than the previous year. The consumption is expected to increase to 137.39 million tonnes and end year stocks projected to rise to 64.01 million tonnes. In view of the foregoing situation of rising production and stocks, the prices of sugar in international market are expected to witness a bearish trend.

International Prices of Sugar

45. The fob prices of raw sugar reported at US $ 203 per tonne during 1990-91 declined to $ 202 in 1991-92 but peaked at $ 302 in 1994-95. The prices, which have since experienced a number of fluctuations averaged at $ 206 per tonne during 2000-01. However, during 2001-02 prices fell sharply and hovered around $ 151 per tonne. During the 2002-03 (October – December) prices have averaged at US $ 172 per tonne.

46. The fob prices of white sugar during the last 10 years or so have followed a pattern similar to those of raw sugar. Averaging at US $ 303 per tonne during 1990-91 prices declined to $ 273 during 1992-93. Having reached US $ 397 per tonne in 1994-95 the prices following a downward trend in the next few years averaged at US $ 202 per tonne in 1999-00. During 2000-01 prices staging a recovery hovered around US $ 250 per tonne but slided downward in 2001-02 and averaged at US $ 221 per tonne.

47. The differential between prices of raw and white sugar during 1990-91 through 2001-02 has ranged between US $ 43 in 1999-00 to US $ 114 per tonne in 1995-96.

Import and Export Parity Prices

48. The mill gate import and export parity prices of sugarcane as worked back from the fob (London) prices of white sugar are summarized as below:

Period	Base Price US $/ tonne	Import Parity Price				Export Parity Price	
		Punjab & NWFP		Sindh		Punjab & NWFP	Sindh
		Economic	Financial	Economic	Financial	Economic	
		Rupees per 40 kgs					
1. During 2002-03 (Oct – Dec)	221	39.13	50.28	40.05	51.47	26.05	26.66
2. During 1997-98 to 2001-02	235	41.06	52.84	42.03	54.08	27.89	28.54

Source: Annexes – XVI to XVIII

Economic Efficiency in Sugarcane Production

49. The analysis of NPCs and EPCs, based on the average import parity prices, reflects implicit taxation of sugarcane farming in the Punjab but implicit subsidy in case of Sindh. Based on the average import parity prices domestic resource cost coefficient estimated at 0.66, both for the Punjab and Sindh vindicates the cultivation of sugarcane for meeting the domestic requirements of sugar in the country. However, the estimates of

these coefficients using the export parity prices suggest that given the current input-output relationship in sugarcane production and its processing, production of sugar beyond domestic requirements would require substantial subsidies.

Sum up

50. The position regarding the price policy options emerging from the analysis of relevant domestic and international factors is summed up below :

Price Policy Options for Sugarcane : 2003-04 Crop

S.No	Basis	Mill gate prices of sugarcane		
		Punjab	NWPF	Sindh
		Rupees per 40 Kgs		
1.	Cost of production of sugarcane (Annexes IV to VI)	39	36	38
2.	Market price realized by growers (2002-03)	35	42	36
3.	Domestic parity prices worked back from :		-	
	i) Average wholesale price of "gur" during November – December, 2002 (Annex-VII)	41	44	42
	ii) Average wholesale price of sugar during 2002-03 crushing season (Annex-VIII)	35	35	36
4.	If real value of support price for 2002-03 crop were to be equated with the level of 1990-91	38	38	40
5.	Import parity prices (economic) as worked back form the average fob (London) price of white sugar (Annex-XVI):			
	i) During 1997-98 to 2001-02	41	41	42
	ii) During October - December, 2002	39	39	40
6.	Import parity prices (financial) as worked back from the average fob (London) price of white sugar (Annex- XVII):			
	i) During 1997-98 to 2001-02	53	53	54
	ii) During October – December, 2002	50	50	52
7.	Export parity price (economic) as worked back from the average fob (London) price of white sugar (Annex- XVIII):			
	i) During 1997-98 to 2001-02	28	28	29
	ii) During October – December, 2002	26	26	27
8.	Cost of domestic resources involved in saving/earning foreign exchange (Table – 19) :	Rupees per US $		
	i) Producing cane for sugar import substitution			
	- Based on 2002-03 prices of sugar	42	-	40
	- Based on average prices of sugar 1999-2002	38	-	38
	ii) Producing cane for exports of sugar			
	- Based on 2002-03 prices of sugar	71	-	67
	- Based on average prices of sugar 1999-2002	63	-	61

Note: Figures have been rounded off.

Marketing of Sugarcane : Problems

51. This year cane crushing by the sugar mills commenced quite late, in the 3rd week of November in the Punjab and 2nd half of December in Sindh.

52. The prices received by farmers have hovered around Rs 36 per 40 kgs in Sindh and Rs 35 at the mill gate and Rs 32 at the purchase centres in the Punjab. In the NWFP purchase price of sugarcane has been around Rs 42 per 40 kgs at the mill gate. As cane supplies are short in the NWFP, and mills face tough competition from gur making, the farmers have not faced much of a problem in disposing their cane crop.

53. Delayed payments by mills in the Punjab and Sindh have increased the role of middlemen, who buy sugarcane from the growers on cash payment but pay Rs 4 - 5 per 40 kgs less than the mill gate price fixed by the Government. It is a common belief that middlemen are the agents of the sugar mills, who procure cane for the mills at reduced prices. Purchases from far off areas through middlemen and purchase centres by the mills encourage cross transportation of sugarcane, resulting in road congestion, traffic hazards on roads, long distance cartage of cane and reduction in sucrose recovery due to time lag between harvesting and crushing of cane. The middlemen are also purchasing CPRs on cash payments from the growers but at the discounted prices.

54. The sugarcane delivery at the mill gates by the farmers in their trollies involves long waiting time often stretching for 2-5 days against prompt delivery of cane through the transport engaged by mills. Thus, growers are compelled to use the rented transportation of the mills instead of their own especially in Sindh, which involves extra payments.

55. The underweighment and undue deductions by the mills on account of trash contents, binding material or poor quality of cane preparation were to the extent of 10-15 per cent of cane weight or 30-50 maunds per trolley load.

2.2 RECOMMENDATIONS

A. The Support Price

56. As per results of the analysis of relevant factors, summarized in paras – 172 to 179 of this Report, APCom recommend the following support prices to be applicable at mill gate, for the 2003-04 sugarcane crop :

Province	Rs per 40 kgs
Punjab and NWFP	40.00
Sindh and Balochistan	41.00

57. The recommended prices provide a margin of 2 to 12 per cent over the cost of produce and are close to the import parity prices of sugarcane.

B. Linking Prices of Sugarcane to its Quality

58. It is recommended that a Committee under the Secretary, MINFAL, with representatives of the Ministry of Industries, sugar mills, cane growers and other relevant agencies be constituted to devise the modus operandi for linking the purchase price of sugarcane to its quality so as to promote efficiency in the production and milling of sugarcane.

C. Sugar Price

i) Ex-mill price of sugar be worked out by the Ministry of Industries/Cost Accounts Organization, 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 price so as to ensure effective implementation of the support price of sugarcane.

ii) The international prices of sugar be monitored and import duty so adjusted that domestic industry is not saddled with unsold stocks.

D. Prices of Inputs

59. The cultivation of sugarcane, a long duration crop, requires substantial investment in the use of purchased farm inputs. Continuous increases in the prices of inputs like fertilizers, pesticides, power tariff for tube wells and diesel have adversely impacted on its comparative economics especially when output prices have declined. However, to maintain growers' interest in cultivating the sugarcane for meeting the domestic requirements of sugar, for which the country has comparative advantage, the government should provide relief to the growers through reducing sales taxes particularly on fertilizers, diesel, and farm machinery.

E. Improving Productivity

1. Varietal development

60. 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.

2. Promoting improved cultural practices

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

i) proper methods of land preparation for sugarcane cultivation;

ii) optimum plant population and the methods to achieve this;

iii) sowing the recommended and improved varieties and discourage the cultivation of unapproved varieties;

iv) methods and importance of weed control and plant protection;

v) 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;

vi) 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

vii) 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.

3. Role of Sugar industry in cane development

62. To help improve the productivity in sugarcane production, the sugar industry may be persuaded to take the responsibility of :

i) 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;

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

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

F. Value-addition in Sugar Industry

63. 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.

G. Marketing of Sugarcane

i) The Local Government institutions entrusted with the task should properly check the weight bridges and scales installed at mill gates and the purchase centres to control the menace of underweighment.

ii) The possibility of installing weigh bridges by an independent agency, say the market committees, District/Tehsil Governments, at the mill gates/procurement centres needs to be seriously considered in view of the wide spread complaints in this context.

iii) The weigh bridge/scales installed by middlemen at various places must be banned and the defaulters penalized.

iv) A campaign may be launched to educate the farmers about the benefits of complete removal of the trash from cane before supply to mills.

v) In order to minimize excessive deductions and quick payments for cane, the provisions of Sugar Factories Control Act, 1950 need to be strictly implemented by the Provincial Governments.

vi) Sugar mills should purchase cane from the nearby areas and the distant buying may be discouraged by them so as to minimize cross transportation of cane and improve sucrose recovery by crushing of fresh cane.

vii) Sugar Factories Control Act, 1950 may be amended to meet the requirements of the sugar sector in line with the needs of the future.

3. SUGARCANE PLANTING AND HARVESTING SEASONS

64. Sugarcane, a tropical crop requires a 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 provinces 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.

65. The planting time for the autumn crop depends on the monsoon rains. Accordingly, it can be advanced to August and may last upto November in some areas. The planting of spring crop continues upto April.

66. 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 NWFP.

4. PROVINCIAL SHARES IN AREA AND PRODUCTION

67. During three year period of 2000-01 to 2002-03 area under sugarcane has averaged at about one million hectares (2.52 million acres) and production at 47.8 million tonnes with an average yield of 46.9 tonnes per hectare. The provincial shares in area and production of sugarcane are given in Table-2 and depicted in Figures 1 and 2.

Table-2 : Provincial Shares in Area and Production of Sugarcane : Average of 2000-01 to 2002-03

Country/Province	Area		Production	
	000 hectares	Per cent	000 tonnes	Per cent
Pakistan	**1019 (2518)**	**100**	**47769**	**100**
Punjab	673 (1663)	66	31313	66
Sindh	242 (598)	24	11616	24
NWFP	103 (255)	10	4805	10

Note: Figures in parentheses are in thousand acres.

Source: Worked out from data in Annex-I.

4.1. Provincial Shares in Sugar Production

68. The annual production of sugar from sugarcane has averaged at 2.7 million tonnes during last three years (Table-3).

Table – 3 : Provincial Shares in Sugar Production : Average of 1999-00 to 2001-02

Country/Province	Sugar production*				Share
	1999-00	2000-01	2001-02	Average	
	000 tonnes				Per cent
Pakistan	**2414.7**	**2466.8**	**3197.8**	**2693.1**	**100.0**
Punjab	1315.6	1437.4	2152.2	1635.1	60.7
Sindh	996.3	968.2	941.0	968.5	36.0
NWFP	102.8	61.2	104.6	89.5	3.3

* From sugarcane only. The production of sugar from sugarbeet has averaged at 20 thousand tonnes in this period

Source: PSMA, Islamabad.

69. The shares of the Punjab, Sindh and NWFP in the average production of sugar from cane are estimated at about 61, 36 and 3 per cent, respectively.

PROVINCIAL SHARES IN AREA AND PRODUCTION OF SUGARCANE : AVERAGE OF 2000-01 TO 2002-03

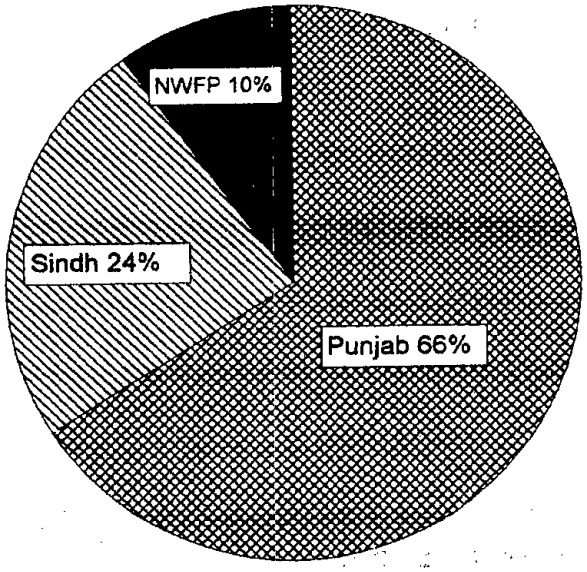


Fig - 1 : SHARES IN AREA

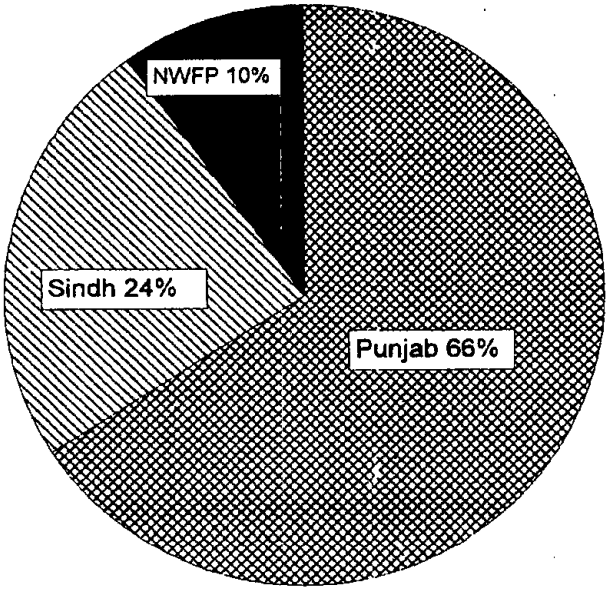


Fig - 2 : SHARES IN PRODUCTION

5. IMPORTANT SUGARCANE PRODUCING DISTRICTS

70. In view of its high water requirements sugarcane is cultivated in the irrigated areas only. Important sugarcane growing districts, producing more than half million tonnes of sugarcane per annum, are Faisalabad, Jhang, Sargodha, Kasur, T.T.Singh, R.Y. Khan, Mandi Bahauddin, Okara, Bahawalnagar, Bhakkar, Sheikhupura, Muzaffargarh, Vehari, Sahiwal, Pakpattan and Layyah from the Punjab; Hyderabad, Badin, Nawabshah, Khairpur, Thatta, Noushero Feroze, Sanghar and Mirpurkhas from Sindh, and Charsadda, Mardan and Peshawar from the NWFP (Annex-II). These 27 districts account for 90 per cent each of area and production of sugarcane in the country. Out of 78 sugar mills 60 are located in these districts (Annex-III).

71. Districts of Faisalabad, Jhang, Sargodha, Kasur, T.T. Singh, R.Y. Khan, M.B.Din, Okara, Hyderabad, Badin, Nawabshah and Charsadda each producing around 1.5 million tonnes of sugarcane are the most important in the context of sugarcane and sugar production in the country. Taken together these 12 districts account for 64 per cent of the total sugarcane produced in the country and 39 sugar mills are located there. Economy of these districts is largely based on sugarcane and sugar production. Any setback in production or the prices of sugarcane and sugar would adversely impact the economy of these districts.

6. AREA, YIELD AND PRODUCTION

72. During the decade ending in 2002-03, area under sugarcane in the country has ranged between 885 to 1155 thousand hectares (2186 to 2854 thousand acres), production from 38 to 55 million tonnes with average yield of 43 to 50 tonnes per hectare. Area under sugarcane shows a cyclical movement and a change from increase to decrease is discernable after two years (Figs – 3 to 5).

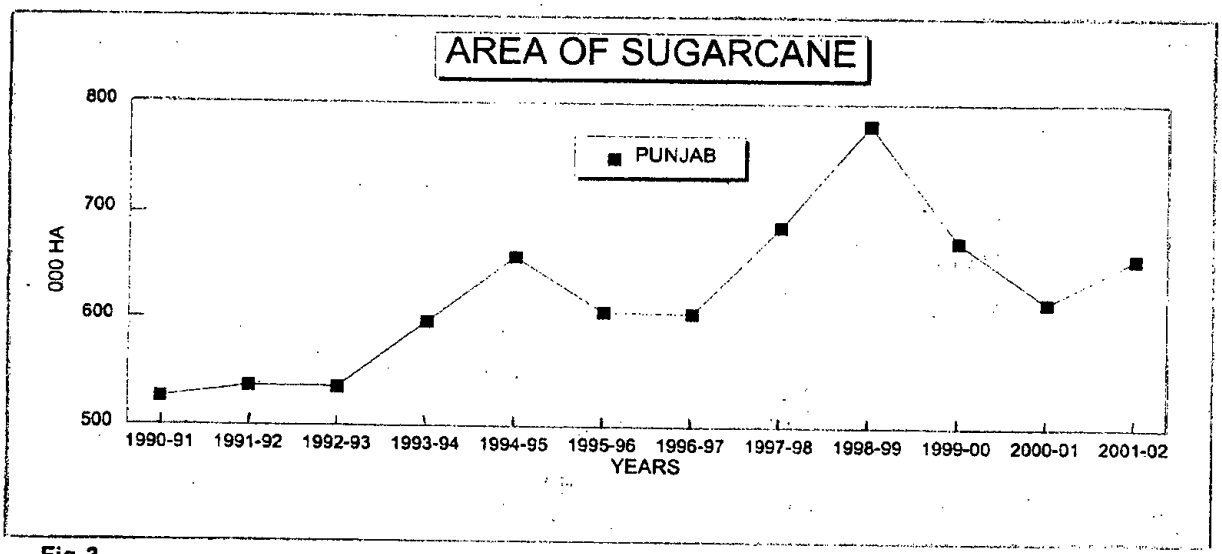


Fig-3

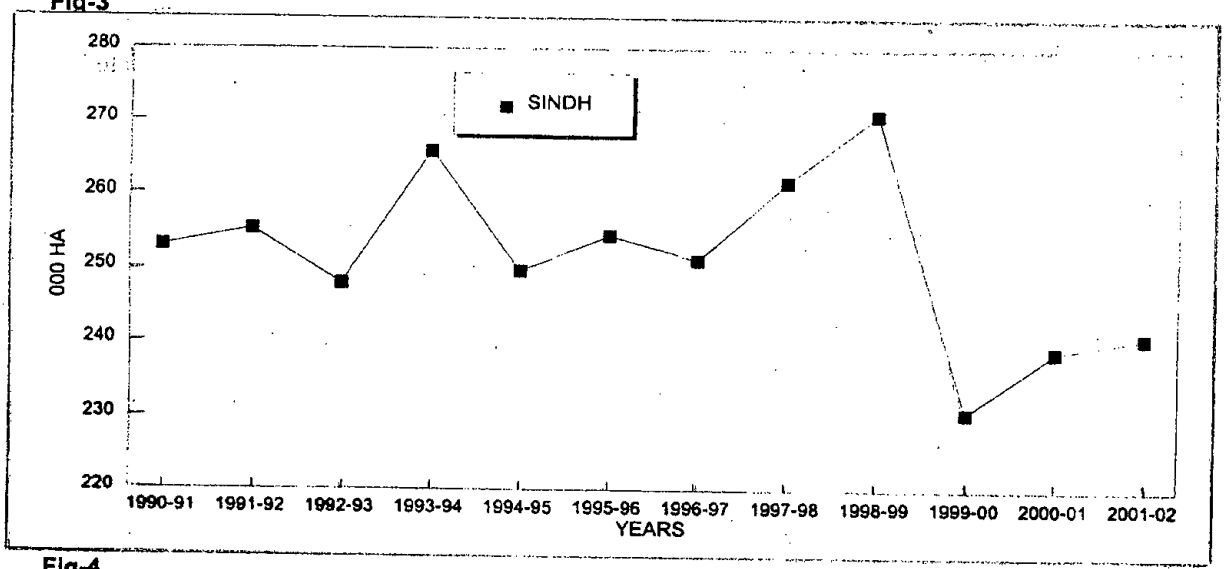


Fig-4

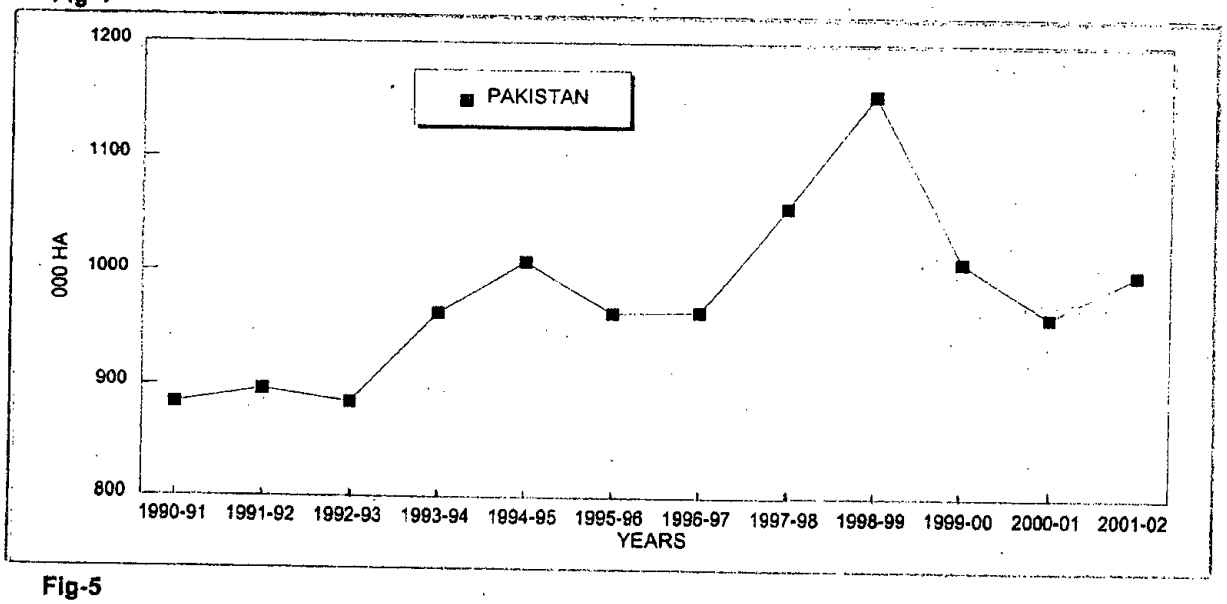


Fig-5

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

6.1 Long-term Changes: 1992-93 to 2002-03

74. During the ten year period ending in 2002-03, sugarcane production is estimated to have increased @ 1.8 per cent per annum due to 1.2 per cent expansion in area and 0.5 per cent improvement in yield (Table-4).

Table-4: Average Annual Growth Rates of Area, Yield and Production of Sugarcane: 1992-93 to 2002-03

Country/Province	Area	Yield	Production
	Per cent per annum		
Pakistan	**(+) 1.2**	**(+) 0.5**	**(+) 1.8**
Punjab	(+) 2.1	(+) 1.6	(+) 3.8
Sindh	(-) 0.6	(-) 1.4	(-) 2.0
NWFP	(+) 0.3	(+) 0.6	(+) 0.9
Balochistan	(+) 2.3	(+) 0.7	(+) 3.0

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.

75. Sugarcane production in the **Punjab,** during the period under reference, is estimated to have increased @ 3.8 per cent annually on account of 2.1 per cent expansion in area and 1.6 per cent improvement in yield. Sugarcane production in **Sindh** has declined @ 2 per cent per annum as yield fell @ 1.4 per cent and area contracted @ 0.6 per cent. In the **NWFP** production has increased @ 0.9 per cent per annum due to increases of 0.3 and 0.6 per cent in area and yield, respectively. **Balochistan** has experienced 2.3 per cent expansion in area of sugarcane, which has contributed to the increase in production alongwith the improvement in yield.

6.2 Short-term Changes: 2002-03 Vs 2001-02

76. According to second estimates provided by Provincial Agriculture Departments, sugarcane production from the 2002-03 crop is reported at 51.7 million tonnes, reflecting an increase of 7.5 per cent over the last year's level of 48 millions. The rise in production is solely due to 9.7 per cent expansion in area as yield has declined by 2 per cent (Table-5).

Table – 5 : Area, Yield and Production of Sugarcane: 2001-02 and 2002-03 Crops

Country/ Province	Area		Changes in 2002 - 03 over 2001 - 02	Yield		Changes in 2002 - 03 over 2001 - 02	Production		Changes in 2002 - 03 over 2001 - 02
	2001-02	2002-03		2001-02	2002-03		2001-02	2002-03	
	000 hectares		Per cent	Tonnes per hectare		Per Cent	000 tonnes		Per Cent
Pakistan	**999.7**	**1097.1**	**(+) 9.7**	**48.1**	**47.1**	**(-) 2.0**	**48041.6**	**51658.1**	**(+) 7.5**
Punjab	656.8	746.2	(+)13.6	48.4	47.4	(-) 2.0	31803.1	35397.2	(+)11.3
Sindh	240.7	247.5	(+) 2.8	47.4	46.0	(-) 3.0	11416.3	11383.0	(-) 0.3
NWFP	101.5	102.8	(+) 1.3	47.2	47.1	(-) 0.2	4787.2	4844.8	(+)1.2
Balochistan	0.7	0.6	(-) 14.3	50.0	55.2	(+) 10.4	35.0	33.1	(-) 5.4

Source: Annex-I

77. In the Punjab, sugarcane production reported at 35.4 million tonnes shows an increase of 11.3 per cent over the harvest in 2001-02, entirely due to 13.6 per cent expansion in area.

78. The area under sugarcane in Sindh has expanded by 2.8 per cent in 2002-03. However, inspite of this expansion in sugarcane cultivation, production of 11.38 million tonnes is somewhat less than that of last year.

79. In the NWFP, cane production estimated at 4.84 million tonnes is 1.2 per cent more than that of last year's, attributable to area expansion of 1.3 per cent.

80. The Crop Reporting Service of the Punjab Department of Agriculture and Sindh Department of Agriculture have attributed area expansion in 2002-03 crop season to its comparatively higher returns in 2001-02 crop year in relation to cotton.

7. TARGETS VS ACHIEVEMENTS OF AREA, YIELD AND PRODUCTION OF SUGARCANE: 2002-03 CROP

81. The Federal Committee on Agriculture (FCA) in its meeting held on 21-03-2002 had fixed the target of cane production, for 2002-03 crop, at 46 million tonnes. As per second estimates sugarcane production reported at 51.7 million tonnes has exceeded the target by 12.3 per cent (Table-6).

Table – 6 : Targets and Estimated Achievements of Area, Yield and Production of Sugarcane: 2002-03 Crop

Country/ Province	Area		Deviation from the target	Yield		Deviation from the target	Production		Deviation from the target
	Target	Achievement		Target	Achievement		Target	Achievement	
	000 hectares		Per cent	Tonnes per hectare		Per Cent	000 tonnes		Per Cent
Pakistan	**991.0**	**1097.1**	**(+) 10.7**	**46.4**	**47.1**	**(+) 1.4**	**46000.0**	**51658.1**	**(+) 12.3**
Punjab	650.0	746.2	(+) 14.8	44.5	47.4	(+) 6.7	28900.0	35397.2	(+) 22.5
Sindh	241.1	247.5	(+) 2.7	50.2	46.0	(-) 8.4	12100.0	11383.0	(-) 5.9
NWFP	100.0	102.8	(+) 2.8	50.0	47.1	(-) 5.8	5000.0	4844.8	(-) 3.1
Balochistan	-	0.6	-	-	55.2	-	-	33.1	-

Sources:
1) For targets : Minutes of the 76th meeting of FCA held on 21-03-2002 at Islamabad.
2) For achievements : Annex-I

82. Sugarcane production while exceeding the target by 22.5 per cent in the Punjab has fallen short by 5.9 and 3.1 per cent, in Sindh and NWFP, respectively.

8. FACTORS CONSIDERED IN DETERMINING THE SUPPORT PRICE

83. In formulating the price policy proposals for sugarcane, 2003-04 crop, following factors have been considered and analysed.

8.1 Cost of production of sugarcane

8.2 Market prices of sugarcane, 2002-03 crop

8.3 Nominal and real prices of sugarcane

8.4 Economics of fertilizer use on sugarcane

8.5 Domestic demand, supply, stocks and prices of sugar

8.6 Comparative economics of sugarcane and competing crops

8.7 Prices of sugarcane on the basis of 'gur' prices

8.8 Prices of sugarcane worked back from average wholesale market price of sugar

8.9 World supply, demand, stocks, trade and price situation of sugar

8.10 Import and export parity prices

8.11 Economic efficiency in sugarcane production

8.1 Cost of Production of Sugarcane

84. The cost of production of farm commodities constitutes an important consideration in their pricing. The cost of production of sugarcane for the 2003-04 crop has been updated by using the physical input-output parameters adopted in the Support Price Policy for Sugarcane 2002-03, Crop in conjunction with the latest input prices and custom rates of field operations. The input prices and rates of cultural operations were obtained through filed surveys conducted by the APCom in the major sugarcane growing areas of the Punjab, Sindh and NWFP during December, 2002. These rates were also supplemented with the information provided by the provincial agriculture departments and farmers in the meeting of APCom's Standing Committee on Sugarcane held on 6th January, 2003 at Islamabad. Details of the COP estimates for the Punjab, Sindh and NWFP are given in Annexes - IV to VI, while a summary of the results is presented in Table-7 and shown in Figure-6.

Table-7: Average Farmers' Cost of Production of Sugarcane: 2002-03 and 2003-04 Crops

Item	Unit	Cost estimates		Increase in 2003 - 04 over 2002 - 03
		2002-03 crop	2003-04 crop	
		Punjab		
1. Cost of cultivation	Rs/acre	17922	19549	1627
2. Yield	40 kgs/acre	565	565	-
3. Cost of production at farm level	Rs/40 kgs	31.71	34.59	2.88
4. Marketing cost including sugarcane development cess	Rs/40 kgs	5.00	4.75	(-) 0.25
5. Cost of production at mill-gate	Rs/40 kgs	36.71	39.34	2.63
		Sindh		
1. Cost of cultivation	Rs/acre	21245	22533	1288
2. Yield	40 kgs/acre	676	676	-
3. Cost of production at farm level	Rs/40 kgs	31.43	33.33	1.90
4. Marketing cost including sugarcane development cess	Rs/40 kgs	4.82	4.82	-
5. Cost of production at mill-gate	Rs/40 kgs	36.25	38.15	1.90
		NWFP		
1. Cost of cultivation	Rs/acre	17734	18567	833
2. Yield	40 kgs/acre	585	585	-
3. Cost of production at farm level	Rs/40 kgs	30.29	31.71	1.42
4. Marketing cost including sugarcane development cess	Rs/40 kgs	3.97	3.97	-
5. Cost of production at mill-gate	Rs/40 kgs	34.26	35.68	1.42

Source: Annex- IV to VI.

Punjab

85. The cost of raising one acre of sugarcane in the Punjab during 2003-04 crop year is estimated at Rs 19549, inclusive of land rent. Based on the average yield of 565 maunds (40 kgs) per acre, farm level cost of production works out to Rs 34.59 per 40 kgs. Adding marketing charges of Rs 4.50 and development cess @ Rs 0.25, the cost of producing and delivering sugarcane at mill-gate comes to Rs 39.34 per 40 kgs, reflecting

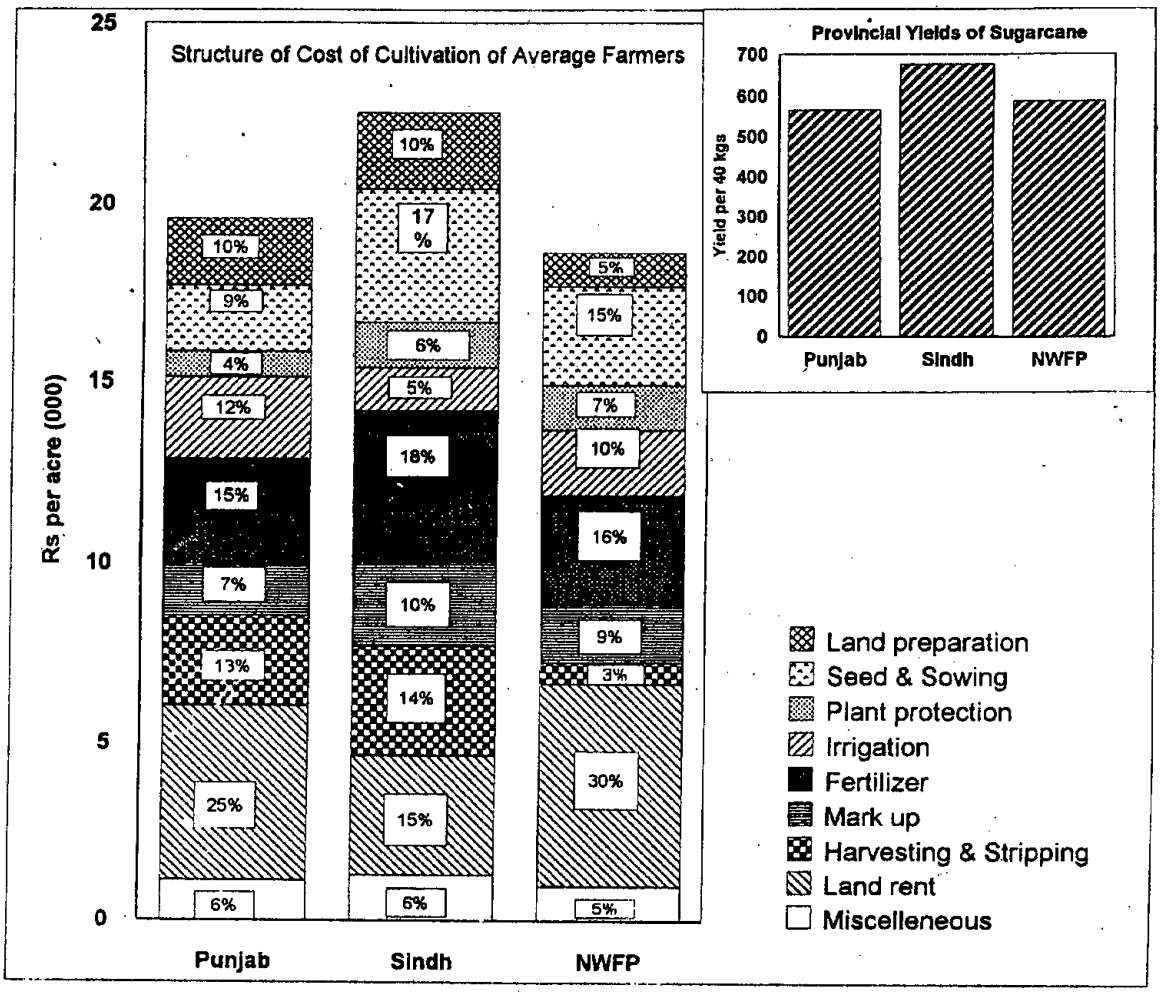

Structure of Cost of Cultivation of Average Farmers
Rs per acre (000)
25
20
15
10
5
0
10%
9%
4%
12%
15%
7%
13%
25%
6%
10%
17 %
6%
5%
18%
10%
14%
15%
6%
5%
15%
7%
10%
16%
9%
3%
30%
5%
Punjab
Sindh
NWFP
Land preparation
Seed & Sowing
Plant protection
Irrigation
Fertilizer
Mark up
Harvesting & Stripping
Land rent
Miscelleneous
Provincial Yields of Sugarcane
Yield per 40 kgs
700
600
500
400
300
200
100
0
Punjab
Sindh
NWFP

Fig-6

an increase of Rs 2.63 (7 per cent) over the corresponding cost of Rs 36.71 for 2002-03 crop (Table-7). Accounting for the weighted average land tax @ Rs 120 per acre per annum, the COP at mill-gate would be Rs 39.57 per 40 kgs, with land rent and Rs 30.95 without land rent.

86. Land rent (25 %), fertilizers including FYM (15 %), harvesting and stripping (13 %), irrigation (12 %), tillage operations for land preparation (10 %), and seed and sowing operations (9 %) are the important components in the cost of cultivation of sugarcane in the Punjab.

Sindh

87. Cultivating one acre of sugarcane in Sindh during 2003-04 crop year is likely to cost Rs 22533, including land rent. Based on the average yield of 676 maunds (40 kgs) per acre, cost of production at farm gate would be Rs 33.33 per 40 kgs. Accounting for the marketing costs and development cess @ Rs 4.82 per 40 kgs, the cost of the produce at mill-gate would be Rs 38.15 per 40 kgs, exceeding the corresponding cost of Rs 36.25 of the 2002-03 crop by Rs 1.90 (5 per cent). Adding the land tax @ Rs 200 per acre per annum, the COP at mill-gate would be Rs 38.54 per 40 kgs with land rent and Rs 33.62 without land rent.

88. Major components of the cost of cultivation of sugarcane in Sindh are: chemical fertilizers and FYM (18 per cent), seed and sowing operations (17 per cent), land rent (15 per cent), harvesting and stripping (14 per cent), cultural operations (10 per cent), mark-up (10 per cent) and irrigation (5 per cent).

NWFP

89. The cost of growing one acre of sugarcane in the NWFP in 2003-04 crop year is expected at Rs18567, including land rent. Distributing the cost over the average yield of 585 maunds (40 kgs), farm level cost of production of sugarcane works out at Rs 31.71 per 40 kgs. Adding the marketing expenses @ Rs 3.97 per 40 kgs, including development cess, the mill-gate cost of sugarcane from the 2003-04 crop should work out at Rs 35.68 per 40 kgs, higher by Rs 1.42 (4 per cent) than the cost of Rs 34.26 in 2002-03.

Accounting for the weighted average land tax @ Rs 75/acre/annum, the COP at mill-gate would be Rs 35.84 per 40 kgs, with land rent and Rs 26.24 without land rent.

90. The main constituents of the cost of cultivation of sugarcane in the NWFP are : land rent (30 per cent), chemical fertilizers and FYM (16 per cent), seed and sowing operations (15 per cent), irrigation (10 per cent), mark-up (9 per cent), interculture and earthing up (6 per cent) and tillage operations (5 per cent).

91. The overall structure of cost of cultivation of sugarcane giving the relative shares of various components is depicted in Fig. 7.

92. The increases in COP estimates in 2003-04 crop year over the 2002-03 are primarily attributable to the higher costs of cultural operations and supplementary irrigation because of increases in prices of diesel and power tariff, rises in the prices of chemical fertilizers and land rentals.

8.2 Market Prices of Sugarcane, 2002-03 Crop

93. During the current season, Federal Government has not fixed the support prices of sugarcane. Instead, the Punjab Government has fixed the minimum purchase price of sugarcane at Rs 40 per 40 kgs, and the Government of Sindh at Rs 43. In Punjab, the mills started their crushing campaign in November, while in Sindh most of the mills started in the middle of December 2002 or even after that.

94. At the time of APCom's survey in the last week of December 2002, sugar mills in Sindh were, by and large not, purchasing cane at the Government fixed price. In the upper and central Sindh rupees 3 to 8 per 40 kgs were deducted by mills for cartage if the farmers used the transportation facility of the mills. However, in case the cane was brought from the vicinity of neighbouring sugar mills, the transportation subsidy was being paid at Rs 0.50 to Rs 7 per 40 kgs. Thus, in a way the mills have tried to form an informal zone for having supplies of cane. The middlemen were alleged to purchase cane for specific sugar mills. They were also purchasing CPRs on cash payments at discount prices of Rs 2-3 per 40 kgs as their profit/commission. It has also been reported in the press that CPRs were being issued to farmers for Rs 36 per 40 kgs. In general, the

Structure Of Cost Of Cultivation of Average Farmers

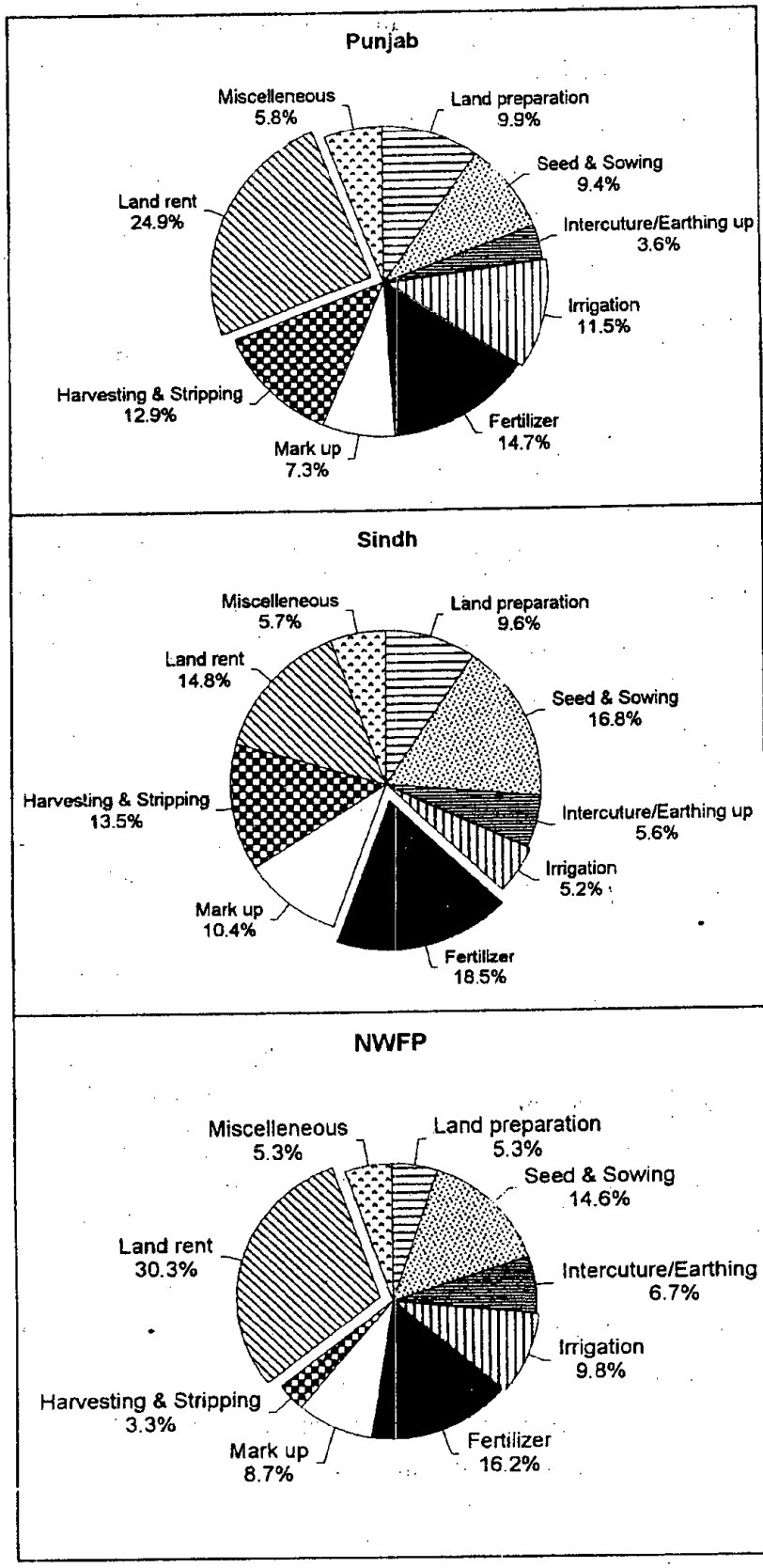


Fig. 7

growers were receiving much less than the price fixed by the Government. The mills of lower Sindh were nevertheless purchasing cane at the support price of Rs 43 per 40 kgs but payments to growers were not yet being made. Naturally, the growers were worried about the sale proceeds of cane and due to financial hardships were often obliged to sell their CPRs to middlemen. In some cases they were reported to receive from the middlemen Rs 5 per 40 kgs less than the support price. The overall assessment of the situation reveals that in Sindh, the farmers are getting around Rs 36 per 40 kgs of cane.

95. In the Punjab, price of cane being paid to the growers was reported at Rs 35 to 40 per 40 kgs. The purchase centres were however paying much less on the pretext of transport cost which has been allowed @ paisas 8 per 40 kgs per kilometer to the maximum limit of 40 kilometers. The purchases of CPRs by the middlemen at discounted prices have also been alleged by the farmers' organizations and the press. Reportedly, the mills pay a margin of Rs 2-3 to the middlemen. At the purchase centres, the growers are paid around Rs 32 per 40 kgs or so in cash. If the growers opt for Rs 40 at mill gate, then payments are not ensured to be made even upto the end of season. Thus, most of the growers opt for cash payments even accepting Rs 5 less than the mill gate price of Rs 40 per 40 kgs.

96. In the NWFP, sugar mills were paying Rs 42 per 40 kgs of cane at the mill gate. The payment of sale proceeds was arranged to growers within a fortnight or so. Thus, sugarcane growers in NWFP were getting better price than their counterparts in Sindh and Punjab.

8.3 Nominal and Real Prices of Sugarcane: 1990-91 to 2002-03 Crops

97. The government annually review and announce the support price of sugarcane. In 2001-02 ECC of the Cabinet had fixed the indicative prices of sugarcane at Rs 42 per 40 kgs for Punjab and at Rs 43 for Sindh but the Punjab Government fixed the minimum purchase price at Rs 40 per 40 kgs. For 2002-03 the Federal Government did not fix any price of sugarcane while the provincial governments of the Punjab and Sindh have respectively notified minimum purchase prices of Rs 40 and Rs 43 per 40 kgs at the mill gate. In the wake of dezoning sugar mills have been vying among themselves for the

supply of sugarcane. The middlemen have also emerged on the scene buying sugarcane from the growers, albeit, at prices different than those fixed by the government.

98. The changes in the prices of a commodity in relation to the overall inflation in the economy impact on its purchasing power, welfare and real income of its producers. To estimate the over time changes in the purchasing power of sugarcane, its nominal support and market (mill-gate) prices from 1990-91 to 2002-03 were deflated by the Consumer Price Index (CPI), the most common measure of inflation in the economy. The results of the exercise are set out in Tables-8 and 9 and also depicted in Figs 8 to 11.

8.3.1 Nominal and real support prices of sugarcane

99. The nominal and real support prices of sugarcane in the Punjab and Sindh from 1990-91 to 2002-03 are set out in Table-8 and depicted in Figs 8 and 9.

Table-8: Nominal and Real Support Prices of Sugarcane: 1990-91 to 2002-03

Crop year	Nominal Support prices		Consumer Price Index (CPI)	Real Support Prices	
	Punjab	Sindh		Punjab	Sindh
1	2	3	4	5=(2/4)x100	6=(3/4)x100
	Rupees per 40 kgs		1990-91=100	Rupees per 40 kgs	
1990-91	15.25	15.75	100.00	15.25	15.75
1991-92	16.75	17.00	110.58	15.15	15.37
1992-93	17.50	17.75	121.45	14.41	14.62
1993-94	18.00	18.25	135.14	13.32	13.50
1994-95	20.50	20.75	152.73	13.42	13.59
1995-96	21.50	21.75	169.21	12.71	12.85
1996-97	24.00	24.50	189.18	12.69	12.95
1997-98	35.00	36.00	203.96	17.16	17.65
1998-99	35.00	36.00	215.66	16.23	16.69
1999-00	35.00	36.00	223.39	15.67	16.12
2000-01	35.00	36.00	233.24	15.01	15.43
2001-02	40.00*	43.00	241.50	16.56	17.81
2002-03	40.00**	43.00**	250.77	15.95	17.15

Source: Economic Survey of Pakistan, (Statistical Supplement): 2001-02.

Notes: i) CPI for 2002-03 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) **Minimum purchase price fixed by the provincial governments of Punjab and Sindh

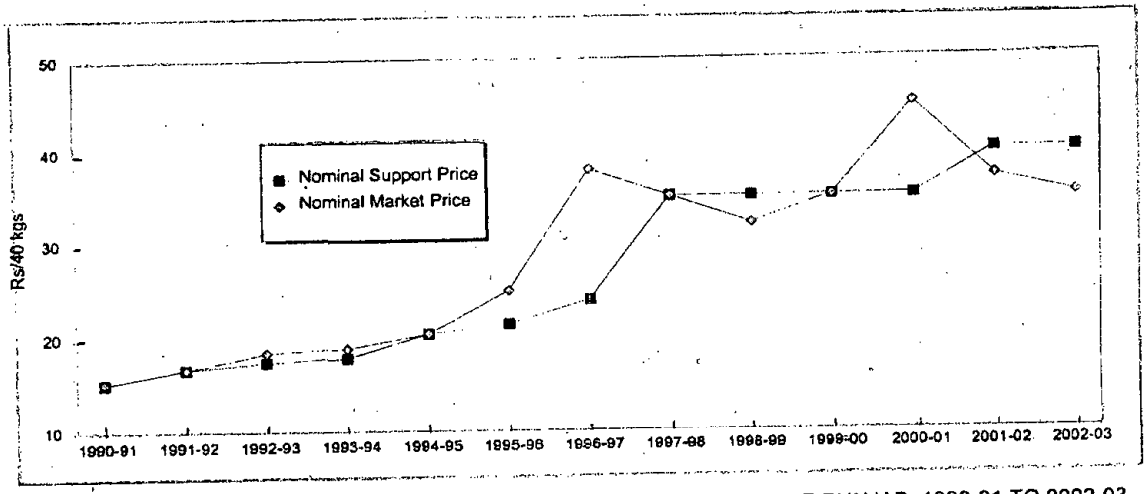


Fig. 8: NOMINAL SUPPORT AND MARKET PRICES OF SUGARCANE IN THE PUNJAB: 1990-91 TO 2002-03

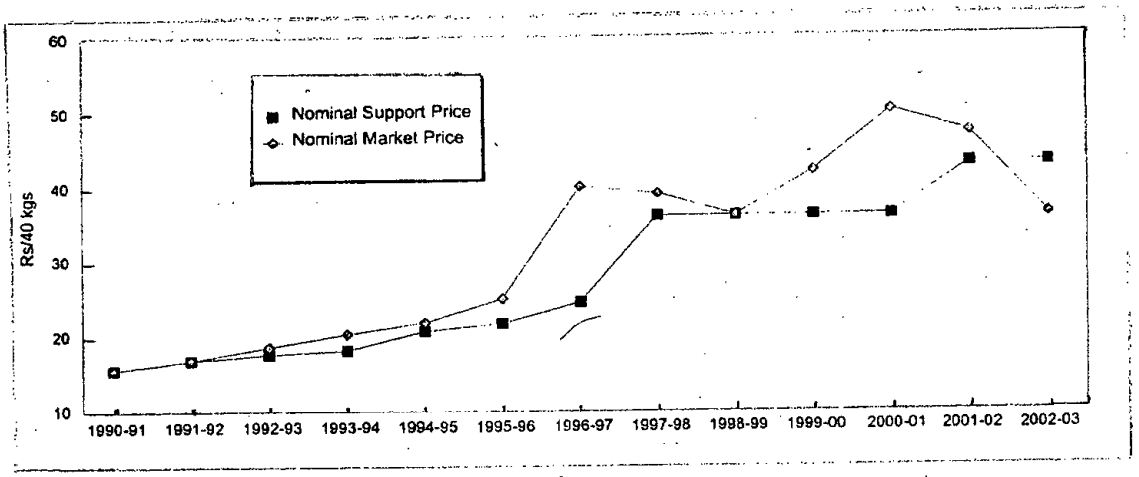


Fig. 9: NOMINAL SUPPORT AND MARKET PRICES OF SUGARCANE IN SINDH: 1990-91 TO 2002-03

100. As per data in Table-8, the nominal support price of sugarcane in the Punjab during the period of 1990-91 to 2002-03 indicate a cumulative increase of 162 per cent i.e. from Rs 15.25 in 1990-91 to Rs 40 in 2002-03. During the same period, the CPI has risen by 151 per cent. Consequently, the real support price of sugarcane in 2002-03 crop year, estimated at Rs 15.95 per 40 kgs, in terms of 1990-91 prices, shows an improvement of 5 per cent over the corresponding price in 1990-91.

101. The nominal support price of sugarcane during the period of 1990-91 to 1996-97 increased by 57 per cent while CPI rose by 89 per cent. As a result, the real support price of sugarcane during this period declined by 17 per cent, touching its lowest level i.e. 12.69 during the period under review. In the wake of 46 per cent jump in nominal support price in 1997-98 i.e. from Rs 24 to Rs 35 per 40 kgs, its real value increased sharply 35 per cent over the previous year. For the next three crop years i.e. 1998-99 to 2000-01, the government did not revise the support price while CPI experienced a cumulative rise of 8 per cent adversely affecting the real value of the support price.

102. For 2001-02 crop Federal Government announced an indicative price of Rs 42 per 40 kgs but later on the Punjab government fixed the price of sugarcane at Rs 40 per 40 kgs which resulted in an increase of 14 per cent in its nominal value and about 10 per cent in the real value. For 2002-03 crop, the Punjab Government has retained the price at last year's level. Accordingly, its real value is estimated at Rs 15.95, which is 4 per cent less than last year's level.

103. More or less a pattern similar to that discussed above for the Punjab has been observed in the nominal and real prices of sugarcane in Sindh except for the last 2 years of the period covered here. The support price of sugarcane was raised to Rs 43 per 40 kgs, for 2001-02 crop after a period of 4 crop years. As a sequel, the real value of support price of sugarcane in Sindh became Rs 17.81 per 40 kgs, the highest during the period reviewed here. For the 2002-03, the support price as notified by the Sindh Government is the same as for the last year while CPI has registered an increase of 4 per cent or so. Thus, the real value of support price of sugarcane has been eroded by 4 percent in comparison to that of last year.

8.3.2 Nominal and Real Market Prices of Sugarcane

104. The nominal and real market (mill-gate) prices of sugarcane in the Punjab and Sindh from 1990-91 to 2002-03 are set out in Table-9 and depicted in Figs 10 to 11.

Table-9: Nominal and Real Prices (Mill-gate) of Sugarcane: 1990-91 to 2002-03

Crop year	Nominal Market prices		Consumer Price Index (CPI)	Real Market Prices	
	Punjab	Sindh		Punjab	Sindh
1	2	3	4	5=(2/4)x100	6=(3/4)x100
	Rupees per 40 kgs		1990-91=100	Rupees per 40 kgs	
1990-91	15.25	15.75	100.00	15.25	15.75
1991-92	16.75	17.00	110.58	15.15	15.37
1992-93	18.50	18.75	121.45	15.23	15.44
1993-94	19.00	20.40	135.14	14.06	15.10
1994-95	20.50	21.90	152.73	13.42	14.34
1995-96	25.00	25.00	169.21	14.77	14.77
1996-97	38.00	40.00	189.18	20.09	21.14
1997-98	35.00	39.00	203.96	17.16	19.12
1998-99	32.00	36.00	215.66	14.84	16.69
1999-00	35.00	42.00	223.39	15.67	18.80
2000-01	45.00	50.00	233.24	19.29	21.44
2001-02	37.00	47.00	241.50	15.32	19.46
2002-03	35.00*	36.00*	250.77	13.96	14.36

Sources: i) Economic Survey of Pakistan, (Statistical Supplement): 2001-02.

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

Notes: i) CPI for 2002-03 has been projected in view of the average rise in CPI during the last three years.

ii) *Prices of sugarcane actually realized by growers as obtained through field survey conducted by APCom and discussed in the meeting of APCom Standing Committee on Sugarcane.

105. Table-9 reveals that the nominal market (mill-gate) prices of sugarcane averaging at Rs 15.25 per 40 kgs in the Punjab had risen to Rs 35 per 40 kgs in the 2002-03, showing an overall increase of 130 per cent. During the same period, the cumulative

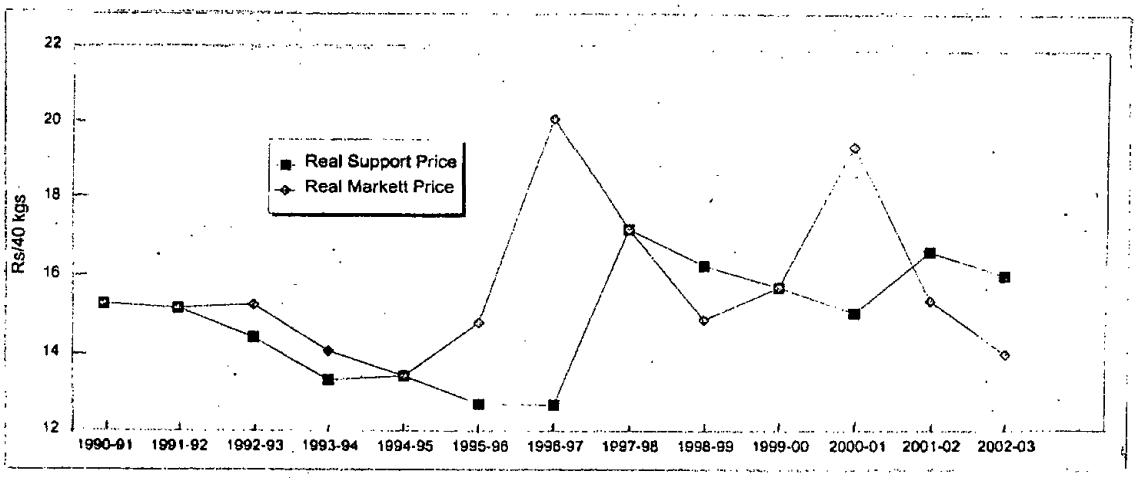


Fig. 10: REAL SUPPORT AND MARKET PRICES OF SUGARCANE IN THE PUNJAB: 1990-91 TO 2002-03

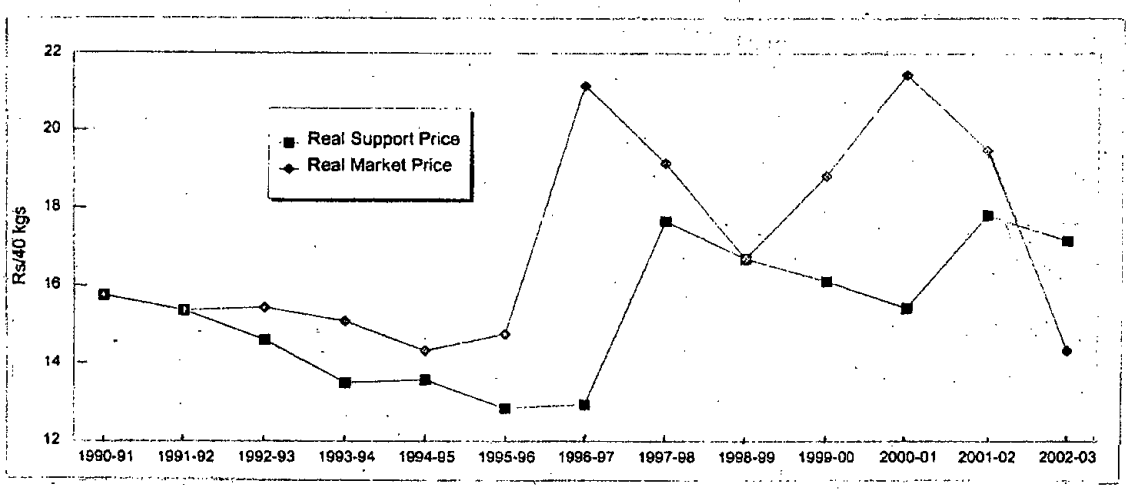


Fig. 11: REAL SUPPORT AND MARKET PRICES OF SUGARCANE IN SINDH: 1990-91 TO 2002-03

inflation in terms of CPI is estimated at 151 per cent. Consequently, the real value of market (mill-gate) price of sugarcane in the Punjab has declined from Rs 15.25 to 13.96 in 2002-03, reflecting an erosion of 8 per cent in the real value over the corresponding value in 1990-91.

106. The market prices of sugarcane showing an increasing trend from 1990-91 to 1996-97 experienced a cumulative increase of 149 per cent in comparison to overall rise of 89 per cent in CPI. As a result, the real value of market price (mill-gate) of sugarcane surged by 32 per cent, touching the highest value of Rs 20.09 per 40 kgs during the period under report in 1996-97. For the next three crop years i.e. from 1997-98 to 1999-00, as market prices ranged between Rs 32 to 35 per 40 kgs, the real value of market prices of sugarcane declined. In view of the short supply of cane during 2000-01, the market price in the Punjab rose to Rs 45 per 40 kgs, the highest level experienced by market price, which pushed the real value to Rs 19.29 per 40 kgs, the 2nd highest level during the period under report. The market prices declined to Rs 37 per 40 kgs in 2001-02 and to Rs 35 per 40 kgs in 2002-03. As a result, the real value of market price of sugarcane, in terms of 1990-91 prices, has dwindled from Rs 15.32 in 2001-02 to Rs 13.96 per 40 kgs in 2002-03, a decline of 9 per cent.

107. The nominal market (mill-gate) price of sugarcane reported at Rs 15.75 per 40 kgs in Sindh in 1990-91 has risen to Rs 36 per 40 kgs in 2002-03, an overall increase of 129 per cent. During the same period, the cumulative inflation as measured by CPI has been 151 per cent. Consequently, the real value of the market price of sugarcane has declined by 9 per cent. Nevertheless, the market prices have been characterized by many ups and downs.

108 The market prices of sugarcane in Sindh experienced an increasing trend from 1990-91 to 1996-97 reached to Rs 40 per 40 kgs, reflecting an overall rise of 154 per cent. The CPI during the same period rose by 89 per cent. As a sequel, the real value of market (mill-gate) prices from 1991-2001 surged by 34 per cent, and the 2nd highest value of Rs 21.14 per 40 kgs was recorded in 1996-97. During 2002-03, the market prices of sugarcane in Sindh has declined from Rs 47 to 36 per 40 kgs, reflecting a sharp decline of 23 per cent over the last year's level while CPI rose by 4 per cent. As a result, the real

market value of sugarcane reached at 2nd lowest level of Rs 14.36 from Rs 19.46 per 40 kgs, showing 26 per cent erosion against the previous year in terms of 1990-91 prices.

8.4 Economics of Fertilizer Use on Sugarcane

109. The ratio between marginal cost and marginal returns is an important indicator of the profitability of the use a of given input including fertilizer. The relationship between the cost of fertilizer and the value of its additional output influences its use on various crops. The parameters commonly estimated and analysed in this context are the benefit cost ratio (BCR) and parity between fertilizer and output prices. Estimation and analysis of these parameters in case of sugarcane are discussed here under.

8.4.1 Benefit Cost Ratio (BCR)

110. The BCR, relating to the use of fertilizer on a crop refers to the relation between gross expenditure on account of its use and the gross revenue accruing from the output(s) obtained from the application of fertilizer. The expenditure includes direct as well as indirect costs on account of fertilizer use like the material cost of fertilizer alongwith its financial cost, costs of transportation and application charges and the costs of harvesting, stripping, loading/unloading, transportation, etc. of the additional produce while benefits refer to the values of additional yield of sugarcane and its tops resulting from the use of fertilizer. The BCR of 1.0 indicates that the benefits are equal to costs. Higher the value of BCR, greater the profitability and vice versa.

111. The BCR is influenced by a number of factors, the most important being the quantity of output obtained per unit of fertilizer often referred to as response ratio and the price of the output. The response ratio depends upon the efficiency of crop production technology adopted and many other factors including soil type, crop rotation, irrigation, climatic conditions, agronomic practices, variety sown and level of management, etc. All these conditions vary from farm to farm and even from field to field on the same farm. To cover the wide range of responses, the BCRs for a range of response ratios i.e. 50 : 1, 70 : 1, 90 : 1 and 110 : 1 have been worked out in Annex- VII taking into account the current prices of fertilizers and average support price of sugarcane for 2002-03 crop. The

results of this exercise alongwith those of the previous years in this context are summarized in Table-10.

Table-10: Benefit Cost Ratios (BCRs) of Fertilizer Use on Sugarcane at Support Prices: 1993-94 to 2002-2003

Crop year	BCR at response ratios (sugarcane: Nutrient) of			
	50:1	70:1	90:1	110:1
1993-94	1.36	1.65	1.86	2.03
1994-95	1.39	1.69	1.93	2.12
1995-96	1.26	1.56	1.79	1.98
1996-97	1.19	1.47	1.70	1.89
1997-98	1.48	1.85	2.15	2.40
1998-99	1.47	1.84	2.14	2.39
1999-00	1.38	1.74	2.03	2.28
2000-01	1.42	1.77	2.06	2.30
2001-02	1.47	1.83	2.13	2.38
2002-03	1.38	1.73	2.02	2.26

Sources: 1. For 1993-94 to 2001-02 APCom's Support Price Policy Reports on Sugarcane.

2. For 2002-03: Annex-VII

112. The BCRs computed at different response ratios for the period 1993-94 to 2002-03 all being greater than one indicate fertilizer use on sugarcane crop has all along remained profitable. The highest profitability level, at all ratios, was observed during 19987-98 when support price of sugarcane was raised about 46 per cent. However, due to varying changes in the fertilizer prices and that of sugarcane these ratios have been lower since then. The analysis based on the support prices of sugarcane indicates that profitability during 2002-03 has declined by 5 to 6 per cent at various nutrient response ratios. However, the prices actually realized by the growers have been at variance with the prices fixed by the Government. Accordingly, the profitability from the application of fertilizer at the prices actually received by the farmers has also been worked out . The BCRs calculated at the prevailing prices at the mill gate as given in Table-11 also

confirm the profitability of the application of fertilizer on sugarcane. These data show that in most of the years profitability level is higher in Sindh because the growers in Sindh received higher prices for their produce as compared to in Punjab.

Table-11:- Benefit Cost Ratios (BCRs) of Fertilizer Use on Sugarcane at Market Prices:1995-96 to 2002-03

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

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.

8.4.2 Parity between market prices of fertilizers and sugarcane

113. The ratio between prices of fertilizers and sugarcane indicates the quantity of sugarcane required to purchase a certain quantity of chemical fertilizer. A favourable ratio between prices of fertilizer and the crop should encourage fertilizer use. As the prices of inputs and outputs do not change proportionately, the resulting ratio may favour or weigh against the output. To ascertain whether the price relationship between the sugarcane and fertilizer is conducive towards judicious use of fertilizer, parity ratio between average mill gate price of sugarcane received by the growers in the Punjab and Sindh for the period 1993-94 to 2002-03 were estimated and are given in Table-12.

Table - 12 : Ratio Between Prices of Fertilizers (Nutrients) Paid and of Sugarcane received by the farmers : 1993-94 to 2002-03

Crop year	Prices of fertilizer nutrients		Average mill-gate price of sugarcane	Quantity of sugarcane needed to buy one nutrient tonne of	
	N	P_2O_2		N	P_2O_2
	Rupees per tonne			Tonnes	
1993-94	8696	8423	492	17.67	17.12
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	16978	25096	987	17.20	25.43

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 at the mill-gate as collected during the field surveys by APCom have been used for computing parity ratios for the respective crop years.

114. As per data in Table-12, quantity of sugarcane needed to buy one nutrient tonne of nitrogen during the period 1993 to 2003 fluctuated between 12.45 to 19.11 tonnes. The lowest ratio of 12.45, between the prices of nitrogenous fertilizer and those of sugarcane was observed in 2000-01 crop season when Urea price declined by 2.9 per cent while the price of sugarcane improved by more than 23 per cent. However, in the 2001-02 the opposite and disproportionate change in the market prices of Urea and sugarcane increased the ratio to 16.56 to the disadvantage of growers. In the following year, 2002-03 crop season, purchasing power of sugarcane deteriorated by 3.9 per cent because of 6 per cent fall in the output price as compared to the 2001-02 crop season.

115. In case of phosphatic fertilizer it may be seen from the data that 17.12 units of cane were required to purchase one nutrient unit of P fertilizer during 1993-94. However, in the following years due to higher increase in the price of phosphatic fertilizer, the ratio between phosphatic fertilizer and that of sugarcane became unfavourable and reached 25.90 during 1999-00. This ratio moved in favour of cane during 2000-01 with numeric value of 19 but it again increased to 23.33 in 2001-02 and 25.43 in 2002-03 crop season adversely impacting the purchasing power of sugarcane.

116. The foregoing discussion indicates that during the decade under analysis parity ratios between cane prices and those of N fertilizer has moved within a narrow range weighing mostly in favour of cane. This relationship, thus have had impact on the use of N fertilizers. However, in case of phosphatic fertilizers the situation has become rather alarming as parity between cane prices and those of P fertilizer, except in few years has, continuously weighed against the growers resulting into low use of these fertilizers which in turn has led to severe imbalance in N P ratio.

8.5 Domestic Demand, Supply, Stocks and Prices of Sugar

8.5.1 Domestic demand, supply and stocks

117. The data on domestic sugar production, consumption and stocks etc. during 1992-93 to 2001-02 are given in Annex-VIII. Annual per capita availability of sugar has averaged at 21.40 kgs during this period.

118. The sugar year 2001-02 (Oct.-Sept.) began with opening stocks of 621 thousand tonnes and 3249 thousand tonnes of sugar was produced. Accounting for exports of 8 thousand tonnes and imports of 27 thousand tonnes and end year stocks of 637 thousand tonnes carried forward to 2002-03, net supplies/availability during 2001-02 amounted to 3,252 thousand tonnes. Distributing this over the population, per capita availability works out to 21.80 kgs in the year.

119. According to the 2nd estimates, sugarcane production from the 2002-03 crop reported at 51.7 million tonnes is 7.5 per cent above the last year's level. Assuming the proportionate increase in its processing by the mills, sugar output should increase to 3467 thousand tonnes during the current year, holding other factors constant.

120. As the sugarcane production rises, the proportion of cane going to sugar mills may increase as the farm level uses of sugarcane in 'gur' making and other activities do not increase after a threshold level. Accordingly in Annex-IX an attempt has also been made to estimate the relationship between sugarcane and sugar production by regressing data on sugar production on cane production for the last 10 years. Based on the analysis of past trend in sugar production in relation to cane, 3,458 thousand tonnes of sugar may be produced from 51,658 thousand tonnes of cane during 2002-03. MINFAL estimate 3,220 thousand tonnes whereas the sugar industry estimates sugar production at 3,523 thousand tonnes during current year. Adding 637 thousand tonnes of stocks carried forward from the previous year to the production, total availability of sugar during 2002-03 should be 4.1 to 4.2 million tonnes.

121. Trend forecast of per capita consumption of sugar comes to 21.06 kgs during 2002-03. Accordingly, domestic requirements of sugar for 2002-03, with mid year population of 152.29 million as on 1st April 2003 should work out to 3,207 thousand tonnes.

8.5.2 Behaviour of sugar prices in domestic market

122. The behaviour of open market prices of sugar in important domestic markets in short and long runs is discussed below:

8.5.2.1 Short term 2001 and 2002

123. Monthly average wholesale prices of sugar recorded in major consumption centres: Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets during 2001 and 2002 are presented in Annex-X. During 2001, average monthly wholesale prices ranged between Rs 1,900 (in Hyderabad market during December) and Rs 2,586 per 100 kgs (in Peshawar market during June). During the year 2002, average monthly wholesale prices

have ranged from Rs 1,862 (in Faisalabad market during December) to Rs 2,138 per 100 kgs (Lahore in September). The overall average of Rs 2,341 per 100 kgs in 2001 was 12.8 per cent higher than the average of Rs 2042 in 2002.

8.5.2.2 Long term price behaviour: 1992-93 through 2002-03

124. The annual average wholesale price of sugar in Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets from 1992-93 to 2002-03 (October – September) are given in Annex-XI and depicted in Fig-12. The average wholesale price of sugar which stood at Rs 1,180 per 100 kgs in 1992-93 has since increased to average at Rs 1,957 in 2002-03, showing average increase of 5.19 per cent per year. However, year to year increases in average price ranged between 1.4 and 24.4 per cent except the years 1997-98, 2001-02 and 2002-03 when prices actually decreased by 13.6, 17.1 and 4.7 per cent respectively. During the period under review maximum increase of 24.4 per cent was experienced during 1995-96.

125. The support prices of sugarcane, the principal raw material used in manufacturing of sugar, have in the meantime increased from Rs 17.50 to Rs 42.00 per 40 kgs in Punjab and NWFP and Rs 17.75 to Rs 43.00 per 40 kgs in Sindh, showing annual average increases of 8.62 and 9.25 per cent respectively. The mill-gate prices of sugarcane have however increased to Rs 42 per 40 kgs in NWFP, Rs 35 per 40 kgs in the Punjab and Rs 36 per 40 kgs in Sindh indicating annual average increase of 9.15, 7.18 and 7.33 respectively. Details may be seen in Annex -XII.

8.5.2.3 Seasonal variations

126. Based on monthly average wholesale price of sugar from 1992-93 to 2001-02, seasonal indices have been calculated and depicted in Fig-13. 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.

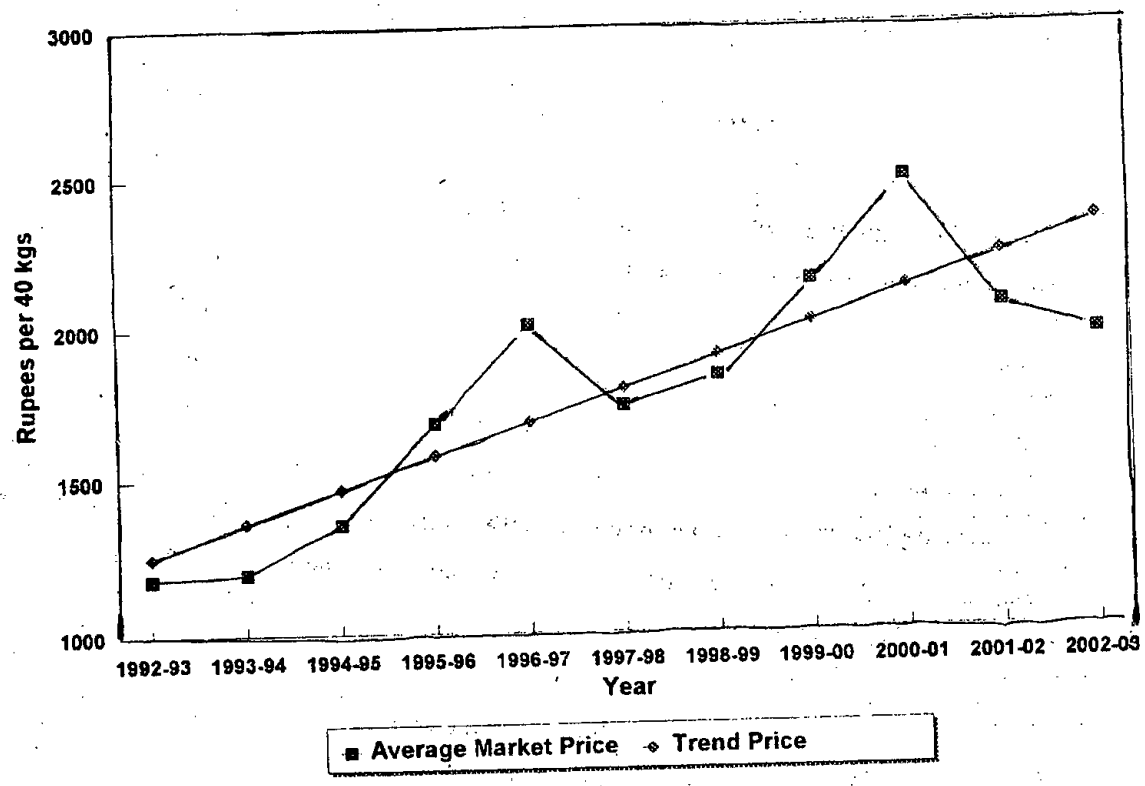


Figure-12: LONG TERM TREND OF WHOLESALE PRICES OF SUGAR: 1992-93 TO 2002-03 (OCTOBER - SEPTEMBER)

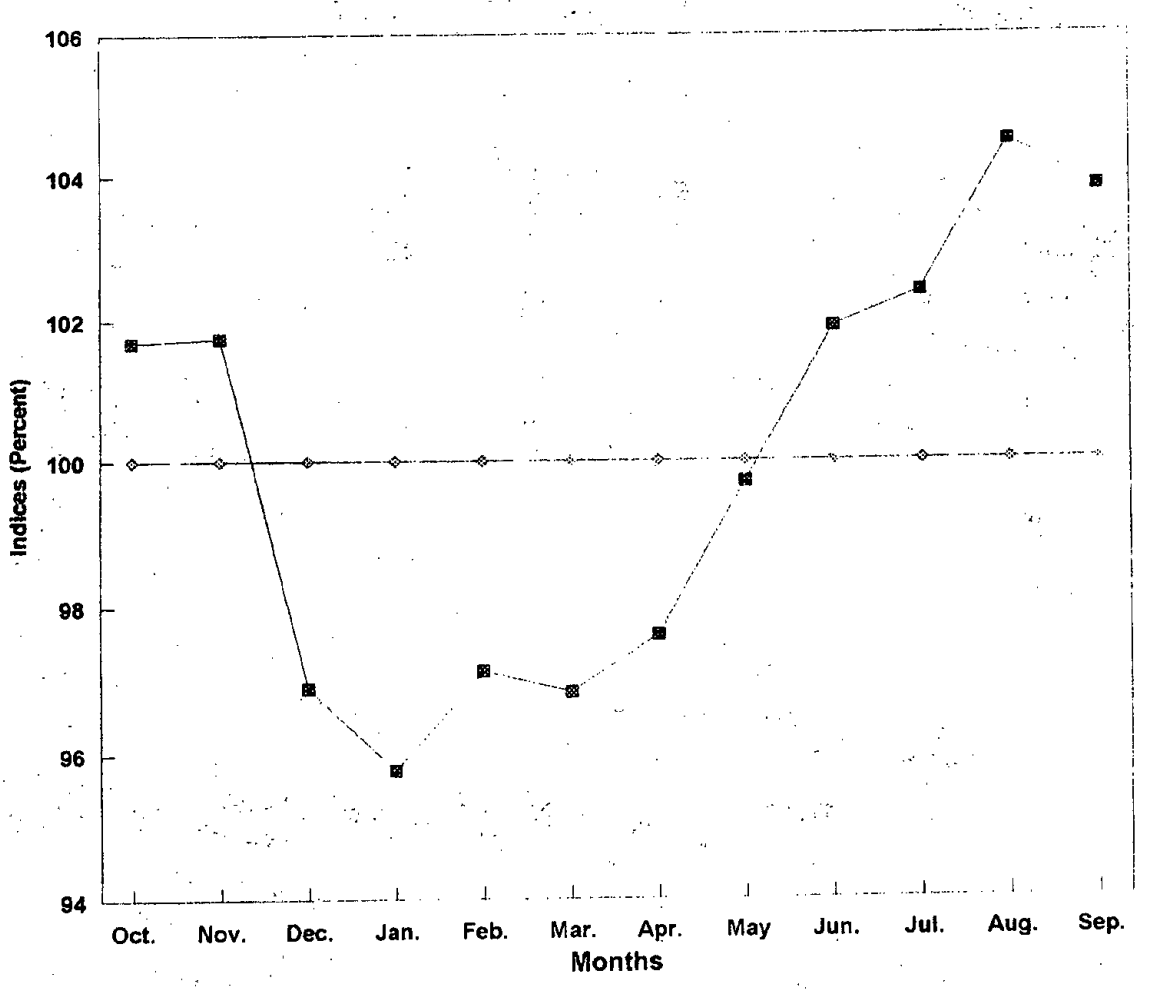


Figure -13: SEASONAL INDICES OF SUGAR PRICES: 1992-93 TO 2001-02

8.6 Comparative Economics of Sugarcane and Competing Crops

127. 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. The estimation of such indicators may provide useful insights into the pattern of resource use at farm level. These indicators are derived from the farm management data and input-output prices which are subject to change over time and space. In addition, the use of multiple criteria in ascertaining the patterns of resource allocation by the farmers may provide conflicting signals necessitating care in the interpretation of results of such analysis.

128. Sugarcane, an annual crop, is grown in the irrigated regions of the country. It occupies the fields year round. 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. Thus, the combination(s) of kharif/rabi crops would have to be considered in analysing their comparative economics. The likely crop combinations in this context may be cotton+wheat, cotton+sunflower, rice+wheat and rice+sunflower.

129. The economics of sugarcane and competing crops has been analysed in terms of input-output prices paid and received by the growers during the 2002-03 crop year.

130. The details of the analysis are presented in Annex-XIII. A summary of economic indicators like output-input ratio and returns per day of crop duration, revenue per rupee of purchased inputs cost and per unit of irrigation water for the Punjab and Sindh is also provided in Tables 13 and 14.

- **Punjab**

131. As per results of 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 35 per 40 kgs although the Provincial Government has notified a minimum purchase price of Rs 40 per 40 kgs at the mill-gate. Low prices realized by the growers for 2002-03 crop of sugarcane have weakened its economic position against competing crops. The returns to overall investment are not quite encouraging as the output-input ratio has fallen below

one, i.e. the break-even point. Thus the costs incurred in sugarcane cultivation are not being recovered by the output prices received in the current crushing season. Sugarcane is out competed by all the competing enterprises in terms of output-input ratio except IRRI-wheat rotation. However, sugarcane ranks second after cotton-sunflower rotation in case of returns to purchased inputs.

132. In respect of returns to irrigation water, sugarcane seems to have an edge over the rice combinations but falls behind cotton rotations. In case of returns per day of crop duration, all enterprises considered in the analysis out-compete sugarcane.

Table-13: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in the Punjab: 2002-03 Crops

Province/crops/ 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	0.96	2.97	43.03	353.23
2. Cotton+Wheat	1.04	2.35	55.38	596.36
3.Cotton+Sunflower	1.19	3.04	63.23	551.84
4. Basmati+Wheat	1.02	1.98	54.76	262.87
5.Basmati+Sunflower	1.19	2.57	64.01	259.23
6. IRRI+Wheat	0.90	1.79	44.84	204.33
7.IRRI+Sunflower	1.07	2.40	52.98	204.35

Source: Annex-XIII.

- **Sindh**

133. In Sindh too sugarcane growers have not received the support price of Rs 43 per 40 kgs, announced by the provincial government. As per press reports and the information compiled by APCom's survey teams visiting Sindh in December 2002, growers are reported to have realized average price of Rs 36 per 40 kgs at the mill-gate. Although it is a situation of break-even for sugarcane as the output-input ratio marginally exceeds unity but sugarcane is outperformed by all the competing enterprises in respect

of output-input ratio except IRRI-wheat combination. Similarly, sugarcane falls behind all the competing alternates in terms of gross revenue per rupee of purchased inputs cost and per day of crop duration except IRRI-wheat rotation.

134. In case of revenue per unit of irrigation, sugarcane performs better than rice combinations while cotton combinations out compete all enterprises.

Table-14: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in Sindh: 2002-03 Crops

Province/Crops/ 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	1.01	2.58	43.08	296.11
2. Cotton+Wheat	1.10	2.70	48.32	615.03
3. Cotton+Sunflower	1.23	3.36	57.32	550.25
4. IRRI+Wheat	1.00	2.28	41.61	211.00
5. IRRI+Sunflower	1.15	2.99	51.53	214.04

Source: Annex-XIII.

- **Inter province comparison of comparative economics**

135. The economic position of sugarcane and competing crops has followed a similar pattern in Punjab and Sindh provinces in terms of 2002-03 prices. Sugarcane is out-competed by all the competing enterprises in respect of returns to overall investment and purchased inputs in both the provinces. In case of gross revenue per day of crop duration, sugarcane is the least profitable enterprise in the Punjab while it ranks second last, after IRRI-wheat rotation in Sindh. In case of returns to irrigation water, sugarcane is a better proposition than rice combinations but a losing concern in comparison to cotton combinations in both the provinces.

136. The inter – provincial comparison of the economics of sugarcane crop, between Punjab and Sindh, shows that the economic position of sugarcane in terms of returns to overall investment, as reflected by output/input ratio, is superior in Sindh (Table - 15). This is attributable to 20 per cent higher yield and marginally better prices of sugarcane during the current crushing season. However, in respect of the revenue per day of crop duration, there is not much of difference between the two provinces. As per results of the farm survey, crop duration in Sindh is 16 months against 13 in the Punjab. Accordingly, the crop in Sindh requires more number of irrigations and greater use of other inputs. The expenses on the use of fertilizers and other inputs are about 40 per cent higher in Sindh. Although the higher yield in Sindh resulting from the greater use of these inputs and irrigation water compensates for some of the additional expenses incurred in sugarcane farming, but the overall returns to the use of purchased inputs in Sindh lags behind that of the Punjab. The expenses incurred on irrigation in the Punjab are much higher because of the greater reliance on tubewells. Inspite of higher crop yield and low irrigation costs because of cheaper canal water in Sindh, sugarcane farming in terms of water use efficiency in Sindh is not a very enviable proposition indicating greater need for improving the water use efficiency.

Table-15: Inputs Use and Sugarcane Yields in Sindh and Punjab: 2002-03 Crop

Item	Unit	Sindh	Punjab
Crop duration	Days	488	394
Irrigation water	Acre-inches	71	48
Inputs use (purchased)	Rs/Acre	8154	5707
Fertilizer use:			
N	Nutrient Kgs/Acre	104	56
P	Nutrient Kgs/Acre	39	34
Crop yield	40 Kg units	676	565

Source: Annex-XIII.

8.7 Price of Sugarcane on the Basis of "Gur" Prices

137. Processing of sugarcane into gur is a regular feature of sugarcane farming in the NWFP and Punjab. In Sindh, farmers are reported to have started gur making on a small scale. Accordingly, the value of cane has also been worked back from average wholesale prices of 'gur' after accounting for various costs involved in its processing and marketing during current crushing season (November-December 2002-03). Details are given in Annex-XIV and discussed as under:

- **NWFP**

138. The wholesale price of 'gur' received by the growers in NWFP during crushing season (November-December) 2002-03, averaged at Rs 650 per 40 kgs. Accounting for the expenses involved in processing sugarcane into 'gur' and its marketing, net value of 400 kgs of sugarcane required to produce 40 kgs of 'gur' comes to Rs 400 or Rs 40 per 40 kgs*. Adding the costs involved in delivering the cane to mills @ Rs 3.97 as transportation cost and development cess, opportunity cost of cane in NWFP comes to Rs 43.97 per 40 kgs at the mill gate (Annex-XIV).

- **Punjab**

139. The wholesale price of 'gur' received by the growers in the Punjab during crushing season (November-December) 2002-03, averaged at Rs 550 per 40 kgs. Accounting for the expenses involved in processing of sugarcane into gur including the cost of chemicals used in the process and in marketing of 'gur' net value of 400 kgs of sugarcane used in making 40 kgs of gur comes to Rs 366.50 or Rs 36.65 per 40 kgs. Adding Rs 4.75 as transportation charges and development cess, opportunity cost of cane in the Punjab comes to Rs 41.40 per 40 kgs at the mill-gate. Details may be seen in Annex-XIV.

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* Based on the discussions with the farmers and experts an average recovery of 10 per cent in gur making has been adopted for NWFP and Punjab and 11 per cent for Sindh in this exercise.

- **Sindh**

140. The wholesale price of 'gur' received by the growers of Sindh during crushing season (November –December) 2002-03, have averaged at Rs 550 per 40 kgs. Accounting for expenses involved in marketing of gur, and processing of sugarcane into gur including the cost of chemicals used in the process, net value of 400 kgs of sugarcane required to produce 44 kgs of gur comes to Rs 368.50 or Rs 36.85 per 40 kgs. Adding Rs 4.82 as transportation charges and development cess, the opportunity cost of cane in Sindh works out to Rs 41.67 per 40 kgs at the mill gate (Annex-XIV).

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

141. The prices of sugarcane, the principal raw material for producing sugar in Pakistan, has a direct bearing on the cost and prices of sugar which in turn affect the demand for sugarcane as well. Accordingly, price of cane can be worked back from the average wholesale market price of sugar after duly accounting for the cost of processing, taxes etc. Wholesale market price of sugar during current season (November-January) 2002-03 as available for different markets has averaged at Rs 18,860 per tonne or Rs 18.86 per kg. After taking into account the wholesaler's margin @ 5 per cent (Rs 786) per tonne and sales tax @ 15 per cent (Rs 2,358) per tonne on net price, net receipts accruing to the sugar mills are Rs 15,717 per tonne. Ratio between the value of raw material (sugarcane) and processing cost has been estimated at 66:34 in a report on the "Cost of Production of Sugar" jointly prepared by APCom and Business and Consulting Services in 1996. At this ratio processing cost comes to Rs 5,344 per tonne. Using provincial bench mark recoveries of 8.50 per cent for Punjab and NWFP and 8.70 per cent for Sindh, mill gate prices of sugarcane in the Punjab and NWFP work back to Rs 35.27 and in Sindh to Rs 36.10 per 40 kgs. Details may be seen at Annex-XV.

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

8.9.1 Supply, demand, stocks and trade

142. The data on world balance sheet of sugar (raw value), for the period of 2000-01 to 2002-03 is presented in Table-16:

Table-16: World Sugar Balance Sheet (Raw Value): 2000-01 to 2002-03 (Oct. – Sept.)

S.No.	Items	2000-01	2001-02 (Estimated)	2002-2003 (Forecast)	Changes in 2002-03 over 2001-02
		Million tonnes			Per cent
1.	Opening stocks	60.98	61.02	63.50	(+) 4.06
2.	Production	131.39	137.45	141.75	(+) 3.13
3.	Total supply (1+2)	192.37	198.47	205.25	(+) 3.42
4.	Disappearance (consumption)	131.35	134.67	137.39	(+) 2.02
5.	Ending stocks (3-4)	61.02	63.50	64.01	(+) 0.80
6.	Trade (export)	37.27	39.47	41.09	(+) 14.99

Note: Opening and end-year stocks may not agree with each other due to difference in exports and imports and trade in pipeline.

Source: International sugar organization, Quarterly Review, May 2002 for 2000-01 and November 2002 for 2001-02 and 2002-03

143. The world sugar production during 2001-02 is estimated at 137.45 million tonnes, 4.6 per cent more than that of 2000-01. With the addition of opening stocks of 61.02 million, global supply of sugar during 2001-02 stood at 198.47 million tonnes, up by 6.1 million tonnes over the corresponding supplies of 191.88 million tonnes in 2001-02.

144. The world consumption estimated at 134.67 million tonnes in 2001-02 is 3.32 million tonnes more than the consumption of last year. The end year stocks in 2001-02 increased to 63.50 million tonnes, 2.9 million tonnes or 4.7 per cent more than the previous year.

145. According to International Sugar Organization Bulletin, November 2002, World sugar production for 2002-03 is forecast at 141.75 million tonnes, more by 4.3 million tonnes or 3 per cent than the production of last year estimated at 137.45 million tonnes. Consumption is expected to increase from 134.67 million tonnes in 2001-02 to 137.39 million tonnes (two percent increase) in 2002-03 and end year stocks are to increase to 64.01 million tonnes from the previous level of 63.50 million tonnes.

146. Increase in production and end year stocks in 2002-03 suggests that prices of sugar will remain low during the current year.

8.9.2 International prices of sugar

147. The international prices of sugar i.e. fob (Caribbean ports) for raw and fob (London) for white sugar, from 1990-91 to 2002-03 are given in Annex-XVI and their movements depicted in Figure-14. The prices of sugar during the period under review have fluctuated widely. During 1990-91, the fob prices of raw sugar (Caribbean ports) averaging at US $ 203 per tonne, declined to $ 201.94 in 1991-92, but recovered in the next three years to reach $ 302 per tonne in 1994-95 - the highest level during the period reviewed. The prices afterwards went on declining and averaged at $ 146 per tonne in 1998-99. During 2000-01 the prices staged a recovery and averaged at US$ 205.91 per tonne. But this proved to be temporary phase as during 2001-02 prices declined again and averaged $ 151.01. During October to December 2002, prices of raw sugar averaged at $ 172 per tonne.

148. The prices of white sugar have followed a pattern similar to that of raw sugar described above. Fob (London) prices averaging at $ 303.13 per tonne in 1990-91, decreased to $ 273 in 1992-93. Following the upward trend in the next couple of years, price of white sugar rose to $ 396 in 1994-95. In the next five years, however, prices trended downward and averaged at $ 202 per tonne in 1999-00. During 2000-01 prices recovered to $ 250 per tonne but again plunged downward in 2001-02, averaging at $ 232.48 per tonne. During October to December 2002 prices of white sugar however, declined to $ 221.42 per tonne.

149. The differential between the average annual prices of raw and white sugar during the last 10 years has ranged between $ 43 (in 1999-2000) and $ 114 per tonne (in 1995-96). During the October to December 2002, the differential stood at $ 49.23.

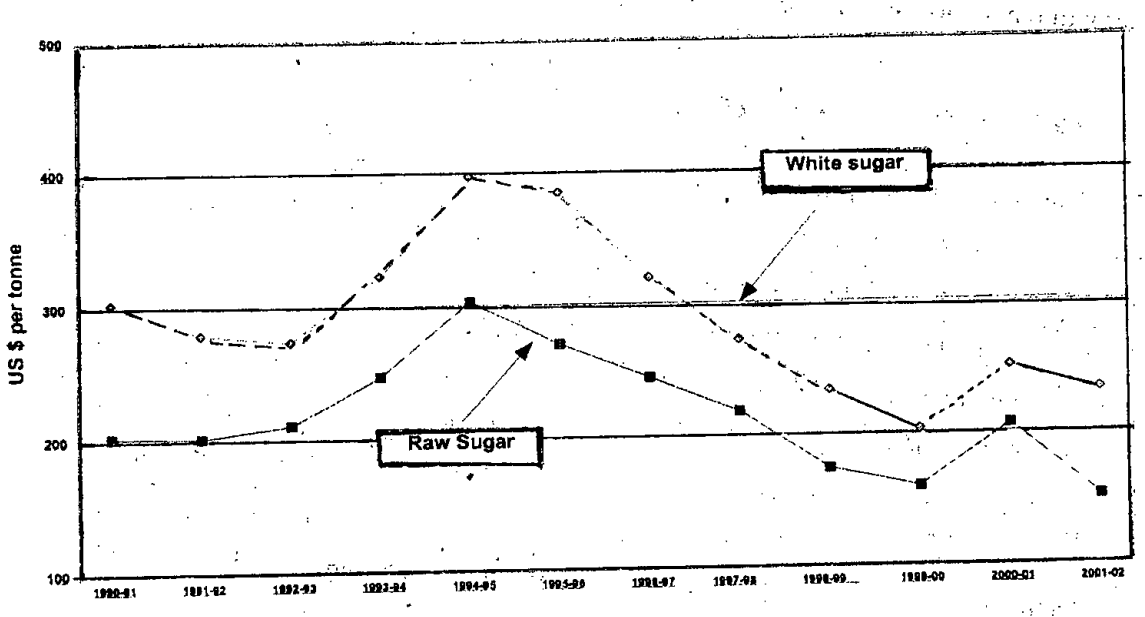

Fig. 14 :: INTERNATIONAL PRICES OF SUGAR:1990-91 TO 2001-02

8.10 Import and Export Parity Prices

150. 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 trade. Since Pakistan has been importer in some years and exporter in others, both the import and export parity prices of sugarcane have been estimated for analysing support price policy options for the next crop season.

151. Based on the fob (London) quoted prices of white sugar, financial as well as economic import parity prices of sugarcane were calculated. Export parity prices are based on economic analysis only because there is no duty or surcharge on the export of sugar. For calculating the parity prices, inter-bank exchange rate has been used.

8.10.1 Import parity prices:

8.10.1.1 Economic import parity prices:

- During 1997-98 to 2001-02

152. The fob (London) prices of white sugar during 1997-98 to 2001-02 averaged at US $ 235 per tonne. Adding freight charge @ US $ 30 up to Karachi, the c&f (Karachi) price of sugar comes to US $ 265. At the existing inter bank selling exchange rate of one US $ = 58.50 Pak rupees, the import price works out to Rs 15,503 per tonne. Adding import related incidentals of Rs 2,788 per tonne including: marine insurance @ Rs 56 per tonne, L/C opening charges @ 0.5% on c&f cost (Rs 78 per tonne), foreign bank charges @ Re 1, mark up on retirement of documents @ 12% per annum (1.97% for sixty days) of c&f cost (Rs 306), wharfage, handling and stevedoring @ Rs 610 per tonne, allowance for unforeseen expenses @ 1% of c&f cost (Rs 155), inspection service charges @ 0.5% of cif value (Rs 78), importer's commission @ 1% of c&f cost (Rs 155), transport charges including loading/unloading @ Rs 1,350 per tonne; the cost of imported sugar at Lahore, adopted as mid point for major consumption centres, would come to Rs 18,291 per tonne. At the ratio of 66:34 between the cost of cane and its processing, the mill-gate economic prices of sugarcane calculate to Rs 41.06 per 40 kgs

for Punjab and NWFP, and Rs 42.03 for Sindh, respectively. Details may be seen in Annex-XVII while a summary is presented in Table-17:

- **During 2002-03 (Oct-Dec)**

153. The average fob (London) prices of white sugar during 2002-03 (Oct-Dec) averaged at US $ 221 per tonne. Adding the freight charges @ US $ 30 per tonne, the c&f (Karachi) price comes to US $ 251. At the existing inter bank selling exchange rate of one US $ = 58.50 Pak rupees, the import price works out to Rs 14,740 per tonne. Accounting for various import incidentals and following the procedure outlined earlier, the import parity prices of sugarcane have been worked back in Annex-XVII. As per these results mill-gate economic prices of sugarcane come to Rs 39.13 per 40 kgs for Punjab and NWFP, and Rs 40.05 for Sindh, (Table-17).

8.10.1.2 Financial import parity prices:

- **During 1997-98 to 2001-01**

154. The average fob (London) prices of white sugar during 1997-98 to 2001-02 averaged at US $ 235 per tonne. Adding the freight charge of US $ 30 up to Karachi, the c&f (Karachi) price of sugar comes to US $ 265. At the existing inter bank selling exchange rate of one US $ = 58.50 Pak rupees, the import price works out to Rs 15,503 per tonne. Accounting for various duties, taxes, financial charges and other incidentals involved in imports of sugar including: custom duties @ 25% of import value (3,890), sales tax @ 15% of import value + custom duty (2,917), custom duty, sales tax & wharfage on empty bags Rs 165 per tonne of sugar, income tax @ 6% of duty paid value (DPV) at import stage(Rs 1,352), income tax on empty bags (fixed) Rs 40 per tonne of sugar, and 3.5% at sale stage of landed cost (Rs 969) and adding the other incidental charges as discussed in Annex-XVIII, the landed costs of imported sugar at Lahore, would be Rs 27,691 per tonne. Accounting for 15% sales tax (Rs 4,154) on local sugar production, ex-mill cost of sugar calculates to Rs 23,538 per tonne. At the ratio of 66:34 between the cost of cane and its processing, the mill-gate financial prices of sugarcane should come to Rs 52.84 per 40 kgs for Punjab and NWFP, and Rs 54.08 for Sindh,. Details may be seen in Annex-XVIII, while a summary is presented in Table-17.

- During 2002-03 (Oct-Dec)

155. The average fob (London) prices of white sugar 2002-03 (Oct-Dec) averaged at US $ 221 per tonne. Adding the freight charges of US $ 30 per tonne, the c&f (Karachi) price comes to US $ 251. At the existing inter bank selling exchange rate of one US $ = 58.50 Pak rupees, the import price works out to Rs 14,740 per tonne. Accounting for various taxes and duties, financial costs and other import incidentals and following the procedure outlined in the previous section, the import parity price (financial) of sugarcane as per details given in Annex-XVIII, comes to Rs 50.28 per 40 kgs for the Punjab and the NWFP, and Rs 51.47 for Sindh. A summary of the various import parity prices, financial and economic is given in Table-17.

Table-17 Economic and financial import 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	Financial	Economic	Financial
	US$/tonne	Rupees per 40 kgs			
1. During 1997-98 to 2001-02	235	41.06	52.84	42.03	54.08
2. During 2002-03 (Oct-Dec)	221	39.13	50.28	40.05	51.47

Source: Annexes XVII to XVIII.

8.10.2 Export parity prices (economic)

- During 1997-98 to 2001-02

156. The fob (London) prices of white sugar during 1997-98 to 2001-02 as reported in the section on import parity prices have averaged at US $ 235. Assuming the quality of Pakistani white sugar at par with the one quoted at London, this price can be adopted in calculating export parity price of sugar. Using the current buying exchange rate of one US $ = 58.30 Pak Rupees, the average export price of sugar in Pakistani currency should work out to Rs 13,701. After accounting for various exports incidentals and related costs

from the mill-gate to export point, i.e the transport charges from interior Sindh to port @ Rs 750 per tonne, special packing @ Rs 90, inspection/survey cost @ Rs 40, transit insurance @ Rs 40, loading & unloading charges @ Rs 60, clearing and forwarding charges @ Rs 25, wharfage, handling and stevedoring charges @ Rs 180,agents commission @Rs 44 and miscellaneous expenses @Rs 50, totaling to Rs 1,279 per tonne, the ex-mill economic price of white sugar (without export duties, subsidies, local taxes and sales tax) comes to Rs 12,422 per tonne. Apportioning this amount between the sugarcane and its processing in the ratio of 66:34 as their respective shares, the mill-gate prices of sugarcane should work back to Rs 27.89 per 40 kgs in the Punjab and NWFP and Rs 28.54 in Sindh. Details of these calculations are given in Annex-XIX, while a summary of the results is given in Table- 18.

- **During 2002-03 (Oct-Dec)**

157. During 2002-03, the fob (London) prices of sugar averaged at US $ 221 or Rs 12,884 per tonne. Accounting for export incidentals as discussed above, the ex-mill economic price of sugar is estimated at Rs 11,605 per tonne. Using the ratio of 66:34 to work out the respective shares of sugarcane and its processing into white sugar, the mill gate economic price of sugarcane works back to Rs 26.05 per 40 kgs for Punjab and NWFP and Rs 26.66 per 40 kgs for Sindh. Details can be seen in Annex-XIX and summary in Table-18.

Table-18: Economic Export Parity Prices of Sugarcane as Worked Back from Average fob (London) Prices of Sugar

Period	Base price	Mill-gate prices of sugarcane	
		Punjab and NWFP	Sindh
	US$/tonne	Rupees per 40 kgs	
1. During 1997-98 to 2001-02	235	27.89	28.54
2. During 2002-03 (Oct-Dec)	221	26.05	26.66

Source: Annex XIX.

8.11 Economic Efficiency in Sugarcane Production

158. In view of the economic importance of sugarcane for the farm and industrial sectors, the Commission has attempted to ascertain the efficiency of resource use in sugarcane production 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. The numerics of these coefficients are summarised in Table – 19 while details of estimation are given in Annexs – XX and XXI.

8.11.1 Nominal Protection Coefficient (NPC),

159. NPC is estimated by dividing domestic prices with border prices (import / export parity prices) and measures the impact of output pricing policies without taking into consideration the distortions in input markets. The NPC if greater than one indicates that domestic producers are getting higher than the economic price for their produce which should encourage domestic production of the commodity. In case the NPC is less than one, domestic producers are getting less than the economic prices implying implicit taxation of the domestic production / producers.

8.11.2 Effective Protection Coefficient (EPC)

160. 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.

161. EPC of greater than one means that private profit in production is higher than it would be without government interventions in input - output markets. The coefficient of less than one indicates the opposite i.e. net effect of Government policies is to reduce private profits which discourages domestic production.

8.11.3 Domestic Resource Cost (DRC)

162. Domestic resource cost (DRC) indicates the opportunity cost of domestic resources used per unit of the value added 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 DRC would vary with the changes in the opportunity cost of non tradable inputs as well as the border prices of outputs and inputs.

163. 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 collected through a field survey of the 1999-2000 crop. To ascertain the impact of overtime changes in input-output prices on the economic efficiency of cane production, the analysis has been carried out at the input-output prices relevant for the 1999-00 to 2002-03 crops.

164. Nominal protection coefficients (NPCs), effective protection coefficients (EPC), and domestic resource cost coefficient (DRCs), for the 1999-00 to 2002-03 sugarcane crops, calculated separately for the Punjab and Sindh, major sugarcane growing provinces, are given in Table 19.

165. As per results of the analysis (Table 19), the NPCs for the Punjab have been less than one except in 2000-02. Thus, sugarcane growers, generally received prices less than the corresponding import parity prices worked back from the international prices of sugar. Accordingly, the sugarcane farmers in the Punjab were implicitly taxed. Naturally the benefit of lower sugarcane prices went to the sugar mills which may have shared some of the gains with the consumers. However, in the 2000-01 crushing season prices received by the farmers for sugarcane were 4 per cent higher than the corresponding border prices.

166. The NPCs estimated for Sindh province reveal that except in the current year, (2002-03) the market prices of sugarcane have been higher than the corresponding import parity prices of sugarcane during the period under analysis. In the current crushing

season, however, prices paid by the mills for sugarcane are 13 to 14 per cent less than the corresponding border prices.

167. It is worth noting that prices of sugarcane received by the growers in Sindh have been higher as compared to the producer prices in Punjab.

168. The results of the EPC calculations, both in the Punjab and Sindh corroborate the conclusions drawn from the estimation of NPCs. However the results suggest incidence of implicit taxation has increased over time both in the Punjab and Sindh as the international prices of sugar have been on the decline while the input prices have risen.

169. 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 results of domestic resource cost analysis suggest that domestic production of sugarcane for import substitution is an economic proposition. The inter - provincial comparison of the DRCs suggest that Sindh has marginally higher comparative advantage than Punjab. 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, do not support the commonly held perception of comparative disadvantage in sugarcane cultivation in Pakistan.

8.11.4 Export parity prices

170. Under exporting scenario the DRCs of sugarcane production though still less than one during 1999-2000 to 2001-2002, but their magnitude was much higher as compared to those estimated at import parity prices. As a result of the developments in the inputs and output markets, prices of inputs on the rise and that of sugar falling during the current year (2002-03), DRCs have become more than one. Thus, production of sugarcane for exporting sugar is not a viable proposition at the prevailing input - output relationships and the prices thereof. The estimates of NPCs and EPCs calculated by using the corresponding export parity prices of sugarcane are substantially greater than one. Accordingly, production of sugarcane beyond domestic requirements of sugar for exports would necessitate high degree of protection/subsidy to the sugar industry / sugarcane production in the country.

171. Except in few years Pakistan has been a net importer of sugar. Thus major concern remained on increasing its production which did occur but more through horizontal expansion in area and in the milling capacity. At the moment country seems to have some surplus stocks of sugar. But in view of the past experience and historical data on production and consumption of sugar this may be a temporary situation and a marginal change in production may lead to imports again. Thus, major concern should be efficient production of sugarcane and sugar for domestic requirements and consolidation of the gains in the sector.

Table – 19 Economic Efficiency Coefficients for Sugarcane

Province/Year	Based on					
	Import Parity Prices			Export Parity Prices		
	NPCs	EPCs	DRCs	NPCs	EPCs	DRCs
PUNJAB						
1999-00	0.96	0.92	0.57	1.540	1.560	0.960
2000-01	1.04	1.02	0.46	1.610	1.630	0.740
2001-02	0.93	0.85	0.63	1.400	1.330	0.990
2002-03	0.93	0.85	0.72	1.510	1.450	1.230
2002-03 (Average Prices)	0.97	0.89	0.66	1.520	1.460	1.080
SINDH						
1999-00	1.15	1.14	0.56	1.830	1.940	0.940
2000-01	1.14	1.13	0.46	1.760	1.820	0.740
2001-02	1.18	1.14	0.57	1.770	1.770	0.870
2002-03	0.94	0.87	0.69	1.520	1.480	1.150
2002-03 (Average Prices)	1.10	1.11	0.66	1.720	1.800	1.050

Source: Annexes – XX to XXI.

9. THE SUPPORT PRICE

172. The analysis of the various domestic and international factors impacting on prices of sugarcane, as detailed in earlier sections of this Report, has provided various price policy options for the pricing of 2003-04 crop. These options are summarized in Table - 20 and briefly discussed in succeeding paragraphs.

Table - 20 : Price Policy Options for Sugarcane : 2003-04 Crop

S.No	Basis	Mill gate prices of sugarcane		
		Punjab	NWPF	Sindh
		Rupees per 40 Kgs		
1.	Cost of production of sugarcane (Annexes IV to VI)	39	36	38
2.	Market price realized by growers (2002-03)	35	42	36
3.	Domestic parity prices worked back from :			
	i) Average wholesale price of "gur" during November – December, 2002 (Annex-VII)	41	44	42
	ii) Average wholesale prices of sugar during 2002-03 crushing season (Annex-VIII)	35	35	36
4.	If real value of support price for 2002-03 crop were to be equated with the level of 1990-91	38	38	40
5.	Import parity prices (economic) as worked back form the average fob (London) price of white sugar (Annex-XVI):			
	i) During 1997-98 to 2001-02	41	41	42
	ii) During October - December, 2002	39	39	40
6.	Import parity prices (financial) as worked back from the average fob (London) price of white sugar (Annex- XVII):			
	i) During 1997-98 to 2001-02	53	53	54
	ii) During October – December, 2002	50	50	52
7.	Export parity price (economic) as worked back from the average fob (London) price of white sugar (Annex- XVIII):			
	i) During 1997-98 to 2001-02	28	28	29
	ii) During October – December, 2002	26	26	27
8.	Cost of domestic resources involved in saving/earning foreign exchange (Table – 19) :	Rupees per US $		
	i) Producing cane for sugar import substitution			
	- Based on 2002-03 prices of sugar	42	-	40
	- Based on average prices of sugar 1999-2002	38	-	38
	ii) Producing cane for exports of sugar			
	- Based on 2002-03 prices of sugar	71	-	67
	- Based on average prices of sugar 1999-2002	63	-	61

Note: Figures have been rounded off.

173. The mill gate cost of production of sugarcane for the 2003-2004 crop at prevailing inputs' prices is estimated at Rs 39 per 40 kg in the Punjab, Rs 36 in the NWFP and Rs 38 in Sindh. These costs reflect increases of 4 to 7 percent over the corresponding costs in 2002-2003. The market prices of sugarcane accruing to the farmers at the mill gate in the current season are reported at Rs 35 per 40 kgs in the Punjab, Rs 42 in the NWFP and Rs 36 in Sindh. Based on the average wholesale prices of 'gur' during the current crushing season (November-December 2002) mill gate prices of sugarcane are estimated at Rs 41 per 40 kgs in the Punjab, Rs 44 in NWFP and Rs 42 in Sindh. The mill gate prices of sugarcane worked back from the wholesale prices of sugar in the domestic market come to Rs 35 - 36 per 40 kgs.

174. The economic import parity prices of sugarcane estimated from the average of fob (London) price of white sugar, (medium term i.e. 1997-1998 to 2001-2002) are Rs 41 - 42 per 40 kgs and Rs 39 - 40 (October - December 2002 price). The financial import parity prices of sugarcane as estimated from the above mentioned medium and short term prices, but inclusive of import duties, sales tax, etc. come to Rs 53 - 54 and Rs 50 to 51 per 40 kgs respectively. Since financial parity prices do not reflect the true opportunity cost of producing sugarcane, reliance on these in setting the level of domestic prices is not advisable as it should result in distorted allocation of resources among competing enterprises.

175. 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 28 - 29 per 40 kgs and Rs 26 – 27, respectively. These prices are much below the current prices of sugarcane; both as fixed by the Government and as paid by the sugar industry. The domestic resource cost of one dollar's worth of sugar exports, through sugarcane cultivation, is estimated at Rs 67 to 71. However, for import substitution, costs of the domestic resources used in sugarcane production work out to Rs 40 - 42 per one dollar against the current exchange rate of Rs 58 per US dollar. These estimates indicate comparative advantage, at the economic prices of inputs and outputs, in production of sugarcane for meeting the domestic requirements but strong disadvantage in sugarcane cultivation beyond domestic requirements for exports.

176. 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. Accordingly, the situation next year in terms of cane supply is not likely to be much different than this year's, barring exceptional changes in the climate.

177. 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 no scope for increasing the purchase price of sugarcane. In the given situation of : (i) low market prices of sugar and sugarcane, (ii) poor prospects for economic 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. Accordingly, Agricultural Prices Commission recommend that the minimum purchase price of sugarcane be fixed at Rs 40 per 40 kgs, at the mill gate, for the Punjab and the NWFP and Rs 41 in Sindh and Balochistan. Nevertheless, the farmers 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 prices announced by the Government need to be assured to the growers. 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.

178. There is no point in announcing minimum purchase prices, if the same cannot be ensured to the growers. In this context addressing the problems faced by the sugar industry such as the availability of cash credit, regulating the imports of cheap sugar assume critical importance. 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 through state buying of surplus stock of sugar, if so warranted by the situation.

179. 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.

10. LINKING PRICES OF SUGARCANE TO ITS QUALITY

180. Presently, sugarcane price is paid to growers in relation to its weight without consideration of quality and sucrose contents of the cane delivered by an individual grower. However, at the end of crushing season, a few mills pay quality premium at different rates. Thus, system neither encourages the farmers to improve the quality of their produce nor to grow the varieties with high sucrose contents, as for them weight is the only consideration. In order to improve the situation, APCom in the past has been recommending certain measures to link sugarcane price with quality as reflected by its sucrose contents. Unfortunately, the implementation of these measures not withstanding the realisation of the importance of this subject has not received the due attention of the sugar industry and policy makers. Some of the mills are also reported to have started some quality related payments to attract cane supplies. But their system of payments is adhoc. In view of the recurring crisis in the sugar industry and the importance of improving the efficiency of various sectors i.e. sugarcane farming and sugar processing some of the measures are reviewed here.

10.1 Payment of Quality Premium on Collective Basis

181. The support prices of sugarcane in different provinces have been fixed by Federal Government for the average recovery of 8.7 per cent in Sindh and 8.5 per cent in the Punjab and NWFP. In case a sugarmill's overall recovery is higher than the provincial recovery levels mentioned above the mill is supposed to share with the farmers, the extra revenue earned by the mill due to higher recovery. Therefore, the government, while announcing the support prices, also decides about the rate of quality premium on sugarcane. The Economic Coordination Committee (ECC) of the Cabinet in its meeting held on 17-9-2001 while fixing support prices of sugarcane for 2001-02 crop decided that quality premium will remain at last year's level of paisas 50 per 40 kgs, on each 0.1 per cent additional sugar recovery over the respective provincial base levels. For 2002-03 sugarcane crop, instead of the Federal Government, the provincial Governments fixed the

minimum purchase prices of cane at mill-gates for their respective provinces. The government of Sindh has also fixed the quality premium at the rate of fifty paisas per 40 kgs of cane for each 0.1 per cent of excess sucrose recovery above 8.7 per cent determined on overall sucrose recovery basis of each mills while the Government of Punjab has not fixed any quality premium. For the 2003-04 crop, quality premium estimated on the basis of purchase prices of sugarcane announced by the Provincial Government is detailed below :

S.No.	Particulars	Unit	Amount
1.	Average support price (average of Rs 40, 42 and 43)*	Rs per 40 kgs	41.67
2.	Average base recovery level (average of 8.5 and 8.7)	Per cent	8.60
3.	Quality premium per 0.1 percentage point additional recovery over base level (item 1/item 2 x 0.1)	Rs per 40 kgs or Ps per 40 kgs	0.4845 48.45
4.	Saving in processing cost assuming 66:34 ratio between raw material and processing cost (34 x 48.45/66)	Ps per 40 kgs	24.96
5.	Grower's share from the saving obtained at item 4 (66% of item 4)	Ps per 40 kgs	16.47
6.	Quality premium payable to growers (item 3 + item 5)		64.92

* Rs 40 per 40 kgs for the Punjab, Rs 42 per 40 kgs for NWFP and Rs 43 per 40 kgs for Sindh.

182. The quality premium payable to the growers for 2003-04 season works out to be paisas 64.92 or say paisas 65 per 40 kgs of cane, for each 0.1 percentage point increase in sugar recovery over and above the respective provincial base levels. But this system is not working smoothly because of following developments:

i) The sugarmills in the Punjab challenged the quality premium in the Lahore High Court which issued a stay order in the favour of petitioners. After a number of years the LHC gave a decision against the payment of quality premium. Reportedly, the appeal against this decision is pending in the Supreme Court.

ii) The above concept of quality premium was workable and practiced when the mills were buying the sugarcane from the growers at the support prices. In the wake of de-zoning, the mills have been buying sugarcane at prices increasingly determined by supply situation. When the mills are purchasing cane at higher than support price (especially in NWFP), the payment of quality premium is considered to be made/included in the price.

iii) The growers who sell their cane through middleman, automatically lose their right of quality premium and this intermediary has increased overtime.

183. In view of the considerations as mentioned above, no change in quality premium is recommended.

10.2 Ratio Proportion System

184. Under the ratio proportion system both quality of cane and price of sugar are considered while making payments for cane. Cane price to the growers is not fully paid at the time of delivery. The sale proceeds of sugar and by-products are shared after their disposal in some pre-determined ratio between growers and the mills. This ratio is determined keeping in view the processing cost, price of sugar and the cost of raw material. The growers not only get the benefit of higher sucrose recovery of their cane but also benefit from the increase in the market price of sugar. This system is being practiced in Australia, Philippines, Indonesia, Thailand, Mauritius and USA with some variation. The ratio in which the growers and the mills share the revenue in these countries range from 65:35 to 78:22.

185. Farmers in Pakistan have been demanding the adoption of ratio proportion system for determination of the cane prices. No doubt this system is reasonably good for making payments to the growers on quality basis but still it is difficult to implement because a lot of mistrust prevails between the sugarmills and the growers. It is understood that a number of issues with regard to the sharing of the proceeds between the growers and the industry have also cropped up in those countries where ratio proportion system was run successfully in the earlier stages and are now finding it difficult to work with this

system. Moreover, the system does not encourage the efficiency in the processing or cultivation of sugarcane as the ratio of sharing the proceeds get fixed. Thus, these countries now are moving to the payment of price according to the individual consignments.

10.3 Payment According to Individual Consignments

186. Historically the system of payments for sugarcane even in the advanced countries has evolved from the "flat rate system" where price of cane was based on its weight, without much consideration for the quality of the produce. Gradually, overtime the countries have shifted from "flat rate system" towards the system which also takes into account sucrose contents of the cane alongwith its weight. The system considered the most appropriate in this context is the one which links the payments of cane to each consignment as per its quality. The sucrose contents of the cane consignment are determined through random sampling and payments to growers are made accordingly. This system is helpful in increasing the efficiency of the sugar sectors both at farm and mill level.

187. For estimation of sucrose contents in individual consignments, the Cabinet had approved the installation of core samplers in the sugar mills in 1986. However, only the Thatta Sugarmills in the public sector installed the core sampler. The exercise at Thatta Sugar Mills proved that determination of sucrose contents of individual consignments was practicable and useful. However, the system of payments linked to sucrose contents of cane could not be developed and implemented at one mill in isolation. The growers were ready to receive the premium in case of higher than benchmark recovery, but were not willing to accept the discounted price, in case of lower sucrose. In order to resolve the issue of cane payments on quality basis, it is necessary that core samplers and testing devices are installed at all the sugar mills and the growers of sugarcane with higher sucrose contents are paid higher prices while the sugarcane with low sucrose contents be paid discounted price. However, in an era of high mistrust between growers and the millers, the determination of sucrose contents requires some neutral set-up.

188. To introduce the system for payment of cane price by the sugar mills according to the quality of individual consignments, it is recommended that 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 in this regard.

11. IMPROVING PRODUCTIVITY AND MARKETING

11.1 Improving Productivity

189. 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.

190. 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 crop 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.

11.1.1 Varietal development

191. 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.

192. 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.

11.1.2 Improper land preparation

193. 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.

11.1.3 Provision of seed of approved varieties

194. 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 range from 100 to 150 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.

195. 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. The periodic sugar recovery from some of the commercial cane varieties is given in Annex-XXII.

196. 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.

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

iv) 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.

11.1.4 Low plant population

197. 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.

11.1.5 Inadequate weed control/plant protection

198. Proper interculture and hoeing to control weeds after 60-80 days of crop sowing, helps in obtaining high yield. Use of weedicides to eradicate weeds is therefore strongly advised. 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 2 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.

11.1.6 Unbalanced use of fertilizer

199. 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.

200. 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.

201. 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.

11.1.7 Biological control of sugarcane pests

202. 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.

203. 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 programme of the 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.

11.1.8 Use of press mud/organic matter

204. 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.

11.2 Value-addition and Vertical Integration in Sugar Industry

205. 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.

11.3 Marketing of Sugarcane : Problems

206. Sugarcane as a perishable produce 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. Of the total cane produced in the country, it is estimated that about 60-78 per cent of the cane is crushed by sugarmills. Although it is the main cash crop for growers and a source of raw material for sugar industry, yet the farmers are facing a number of marketing problems. In order to ascertain the situation regarding marketing of sugarcane, APCom conducted a field survey in the main sugarcane growing areas of Punjab, Sindh and NWFP, during the last week of December, 2002. On the basis of results obtained from this survey and the discussions in the meeting of APCom's Standing Committee on Sugarcane held at Islamabad on 6-1-2003, the main issues in the marketing of sugarcane are described in the following paragraphs:

11.3.1 Under weighment and deductions

207 The under weighment and undue deductions on the part of mills and their agents at purchase centres have been widely reported. The middlemen are very notorious in this respect. The weigh bridges/scales installed at the procurement centres do not record the correct weight of the produce. The under weighment varies from center to center and mill to mill. Under weighment to the extent of 10-15 per cent of cane weight or 30-45 maunds per trolley load of 300-400 maunds have been alleged by the growers. In some instances, the under weighment was reported even more than 50 maunds per consignment. The mills have complained about poor preparation of sugarcane being delivered by the growers. Accordingly, the deductions from the sale proceeds are on account of high trash contents, binding material or poor quality of cane. High trash contents with cane causes sugar loss. It is therefore necessary that growers should properly clean the trash before supply to mills. The supervisory committees are required to check the weigh bridges/scales and ensure their correct functioning at the purchase centres to the satisfaction of growers and the defaulters should be penalized according to provisions of the law. In addition the un-authorised weigh bridges installed by the middlemen should be banned and only the weigh bridges/scales installed by the sugarmills may be allowed to function in the field.

11.3.2 Sugarcane supply situation

208. According to Sugar Factories Control Act, the crushing season commences in October but this year the mills started crushing in November in the Punjab and in December in the Sindh province. Cane supply to the mills was not smooth and regular. Although, due to late start of season there was abundant supply to certain mills yet because of lower cane prices, generally the mills were running below their capacity. However, due to competition with 'gur' making, there was short supply of cane to sugar mills in NWFP. The mills had not entered into cane supply agreements with growers in any province. The most common varieties supplied to the mills were COJ-84, CO-1148, CP-77/400, SPSG-26 and SPSG-29 and SPSG-394 in the Punjab, CP-44, CP-48, CP-65/357, and Mardan 92/93 in NWFP, and BL-4, BF-129, CP-4333, CO-67412 and Thatta-10 in Sindh.

NWFP

209. In the NWFP the mills compete with cane crushers engaged in 'gur' making for the supply of cane. As cane crushers do not pay any tax, their operators are in a better position to offer higher prices to the growers as compared to the mills who pay various taxes to the Government. Due to diversion of cane to cane crushers for gur making, the mills were facing acute shortage of cane. The 'gur' making industry in NWFP is popular among growers due to the following reasons:

i) The use of gur is important part of food culture in the NWFP and fetches attractive prices. Thus, 'gur' making is profitable due to attractive gur prices ranging from Rs 500 to 775 per 40 kgs. With the introduction of power crushing using peter engine/generators, gur making has become easier.

ii) Cane marketing to mills is complicated and time consuming than supply to cane crushers. Weigh bridges installed by sugar mills are defective and show less weight

iii) The supply of cane to sugar mills invariably entails illegal gratifications to truck/trolley drivers ranging Rs 200 to 300 per trip from the growers.

Punjab

210. As a result of uncertainty about the level of sugarcane prices and delayed payment of sale proceeds, the supply of cane to sugarmills was not regular in the Punjab. The supply of cane was generally available in abundance to most of mills while in a few cases it was not satisfactory. Due to various malpractices i.e. underweighment, delayed payments of the proceeds and other tactics there is a wide gulf of mistrust between the farmers and the mills. Resultantly, the cane supply to certain mills was stopped for a certain period and the mills were closed. The growers in the Punjab are facing difficulties in disposing of their produce to sugar mills i.e. long waiting time at mill gate (4-5 days), receipt of less price, delayed payment or even no payment since the commencement of current crushing season, underweighment of the produce, etc. Some of the mills were alleged not to have paid the dues of even last year. The growers problems need urgent attention of the Government. As mentioned earlier, the sugar mills were paying on an

average, net price around Rs 35 per 40 kgs of cane to growers. An indication of the chronic marketing problems is the increasing trend of gur making in the province.

Sindh

211. Cane supply to sugar mills in Sindh was not satisfactory at all. In central and upper Sindh, growers were not willing to sell their cane to mills at Rs 36 per 40 kgs offered by the mills, against the Government fixed price of Rs 43 per 40 kgs. The sugar mills in Sindh were compelling the farmers to use transportation of the mills for haulage of cane as they unloaded their trucks immediately while the growers' trollies were forced to wait for 2 to 3 days for unloading. There were growers agitations against the mills and supply remained interrupted for some period. Common complaints were about less cane price, non payment of quality premium, delayed payment of cane proceeds, underweighment and the negative role of middlemen. The growers' trend towards 'gur' making has also increased. The situation relating to marketing of sugarcane in Sindh has deteriorated over time. Unlike previous years, there was a lot of hue and cry from cane growers during the current season.

11.3.3 Role of middlemen and purchases from distant areas

212. During the last few years, middlemen have emerged on the scene in cane marketing. In the wake of delay in the payments by mills, the middlemen have assumed importance. These middlemen setup their purchase centers in far flung rural areas. They offer cash payments to farmers, though at a discount of Rs 4 - 5 per 40 kgs than the mill gate price. Majority of farmers, especially small one's who are under debt and in need for immediate money, prefer to sell cane to middlemen. It is common belief among the growers that middlemen are paid agents of the sugarmills, who manage to get cane supplies for the mills at reduced prices. The mills have also established their purchase centers in the far off areas. At these purchase centers farmers are paid sale proceeds after deducting the transportation charges varying from paisas 8-16 per kilometer per 40 kgs. Purchases from far off areas through middlemen and the purchase centers of mills encourage cross transportation resulting in pressure and damage to roads and reduction in sucrose recovery due to late crushing. It is, thus, wasting national resources. To

improve the situation and reduce the role of middleman, it is necessary to assure prompt payments to growers by the mills.

213. For safeguarding the interest of both growers and the industry, following steps are suggested:

i) The Federal Government should continue fixing the support price of sugarcane to be ensured by the Provincial Governments.

ii) The Provincial Governments should properly check the weighbridges and scales installed at mill gates and the purchase centers. The private weigh bridges/scales installed by the middlemen at various places may be banned. The defaulters should be penalized under the law.

iii) 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.

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

v) Sugarmills should purchase cane from the nearby areas and the distant buying may be discouraged to minimize cross transportation and improve sucrose recovery by reducing time lag between harvesting and crushing of cane.

11.3.4 Use of sugarcane cess fund

214. Sugarcane cess is collected and maintained by the provincial governments. The cess is deducted by the sugarmills from growers from their sale proceeds at varying rates in each province. An equal amount is deposited by the respective sugar mills in this fund. For the current season, the province wise cess rates are as under:

Punjab	Rs	0.50 per 40 kgs
Sindh	Rs	0.64 per 40 kgs
NWFP	Rs	0.54 per 40 kgs

215. The cess fund is to be used for the development of roads, other infrastructure in the mill area and for research and development of sugarcane crop. Huge amounts of cess fund remained un-utilized with the provincial governments, due to lack of coordination and planning amongst the concerned agencies. For the judicious use of this fund, APCom had been suggesting as follows in the previous support price policy papers.

216. The procedure should be notified for the utilization and release of cess fund alongwith availability and allocation to different areas, disciplines and the agencies responsible for scrutinizing, processing and according approval of the schemes/projects to be financed from cess fund collections.

217. This recommendation is reiterated to be implemented during 2003-04 crop season.

11.3.5 Sugar price

218. Sugar price is related to the price of sugarcane (the raw material for sugar). So any change in sugarcane price would ultimately lead to change in sugar prices in the market. At times when sugar prices do not increase in line with sugarcane prices, sugarmills are reluctant or unable to pay government fixed price of cane to growers. So the farmers do not receive due price for their produce. For instance, presently in case of ex-mill price of sugar at Rs 18.50 or 18.75 per kg, the mills are in a difficult position to pay the cane price @ Rs 40 and above per 40 kgs of cane to the growers, especially if sugar recovery is below 7.5 per cent. In such circumstances, the mills in order to make up their losses, either pay lower prices to the cane growers or underweigh and make deductions in the name of quality. The payments are also held up for a quite long time. The mills have been demanding if government fixed price is to be paid to growers, reasonable sugar price also needs to be assured to them keeping in view the price of sugarcane and other processing costs. For resolving the issue APCom had recommended as follows in its support price policy for sugarcane 2002-03 crop :

"Ex-mill average price of sugar may be worked out by Ministry of Industry, 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 price".

219. This recommendation is reiterated.

11.3.6 Amendments in Sugar Factories Control Act, 1950

220. The sugarmills under the Sugar Factories Control Act, 1950 work as the implementing agencies for the support price of sugarcane. After dezoning many changes have occurred in the sugar industry and the said Act has become obsolete.

221. Sugar Factories Control Act, 1950 may be amended to meet the requirements of the sugar sector in line with the needs of the future. Amendments in this Act are needed to provide for the provision of promotion of contract system between growers and mill owners, removal of provisions regarding prohibition of 'gur' making, zoning etc.

12. ACKNOWLEDGEMENT

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ANNEX-I

AREA,YIELD AND PRODUCTION OF SUGARCANE:1992-93 TO 2002-03

YEARS	PUNJAB	SINDH	NWFP	BALOCH	PAKISTAN
AREA			***000 HECTARES***		
1992-93	536.1	248.0	99.9	0.6	884.6
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	746.2	247.5	102.8	0.6	1097.1
YIELD			***TONNES PER HECTARE***		
1992-93	37.4	54.7	44.3	48.2	43.0
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	47.4	46.0	47.1	55.2	47.1
PRODUCTION			***000 TONNES***		
1992-93	20044.8	13556.8	4428.4	28.9	38058.9
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	35397.2	11383.0	4844.8	33.1	51658.1

Sources:

1. From 1992-93 to 2000-01: Agricultural Statistics of Pakistan 2000-01, MINFAL,Islamabad.
2. For 2001-2002: Final estimates Provided by Provincial Agriculture Departments.
3. For 2002-2003: Second estimates of Punjab, Sindh, NWFP and Balochistan Provided by Agriculture Departments.

ANNEX-II

DISTRICT-WISE AREA AND PRODUCTION OF SUGARCANE: AVERAGE OF 2000-01 TO 2002-03

Area = 000 hectares
Production = 000 tonnes

S.No	District/Province	Area	Per cent	Production	Per cent
	PUNJAB				
1	Faisalabad	111.07	10.90	5428.83	11.36
2	Jhang	82.10	8.06	4045.17	8.47
3	Sargodha	78.93	7.74	3487.00	7.30
4	Kasur	63.70	6.27	2819.87	5.48
5	T.T.Singh	41.13	4.04	2072.00	4.34
6	R.Y.Khan	34.03	3.34	1634.83	3.42
7	M.B.Din	34.30	3.37	1528.50	3.20
8	Okara	28.03	2.75	1456.63	3.05
9	Bahawalnagar	24.77	2.43	1015.63	2.13
10	Bhakkar	21.53	2.11	916.20	1.92
11	Sheikhupura	21.67	2.13	874.07	1.83
12	M.Garh	20.37	2.00	863.63	1.81
13	Vehari	16.07	1.58	758.40	1.59
14	Sahiwal	14.23	1.40	692.73	1.45
15	Pakpatan	13.33	1.31	652.43	1.37
16	Layyah	14.17	1.39	526.57	1.10
17	Khanewal	8.30	0.91	436.70	0.91
18	Bahawalpur	9.10	0.89	435.13	0.91
19	Khushab	9.23	0.91	418.50	0.88
20	Hafizabad	7.03	0.69	291.93	0.61
21	Mianwali	4.23	0.42	173.50	0.36
22	Narowal	4.47	0.44	159.63	0.33
23	Gujrat	3.57	0.35	145.27	0.30
24	Multan	3.37	0.33	141.20	0.30
25	Rajanpur	3.50	0.34	135.40	0.28
26	Gujranwala	2.93	0.29	119.70	0.25
27	Sialkot	2.10	0.21	93.50	0.20
28	D.G.Khan	1.83	0.18	75.67	0.16
29	Lodhran	1.37	0.13	62.90	0.13
30	Lahore	0.97	0.09	36.70	0.08
31	Attock	0.20	0.02	7.73	0.02
32	Jhelum	0.20	0.02	7.57	0.02
33	Rawalpindi	0.00	0.00	0.00	0.00
34	Islamabad	0.00	0.00	0.00	0.00
35	Chakwal	0.00	0.00	0.00	0.00
	Sub-total	672.83	66.01	31313.43	65.55
	SINDH				
1	Hyderabad	54.34	5.33	2665.25	5.58
2	Badin	47.65	4.68	2068.35	4.33
3	Nawab shah	31.03	3.04	1783.21	3.73
4	Khairpur	24.14	2.37	1243.19	2.60
5	Thatta	26.22	2.57	1086.75	2.28
6	N.Feroze	19.51	1.91	1025.39	2.15
7	Sanghar	11.35	1.11	569.26	1.19
8	Mirpurkhas	13.61	1.34	546.54	1.14
9	Ghotki	4.57	0.45	214.20	0.45
10	Sukkur	4.14	0.41	194.84	0.41
11	Dadu	3.31	0.32	128.64	0.27
12	Tharparkar	1.64	0.16	63.25	0.13
13	Larkana	0.65	0.06	21.74	0.05
14	Shikarpur	0.16	0.02	4.51	0.01
15	Jacobabad	0.03	0.00	1.41	0.00
16	Umar Kot	0.00	0.00	0.00	0.00
17	Karachi	0.00	0.00	0.00	0.00
	Sub-total	242.34	23.76	11616.34	24.32

S.No	District/Province	Area	Per cent	Production	Per cent
	NWFP				
1	Charsada	32.08	3.15	1620.79	3.39
2	Mardan	31.05	3.05	1414.91	2.96
3	Peshawar	12.46	1.22	651.17	1.36
4	D.I.Khan	7.95	0.78	329.92	0.69
5	Nowshera	8.85	0.87	288.74	0.60
6	Malakand	4.82	0.47	200.94	0.42
7	Swabi	4.24	0.42	151.13	0.32
8	Mohmand Agency	1.79	0.18	48.27	0.10
9	Bannu	0.92	0.09	35.61	0.07
10	Khyber Agency	0.60	0.06	14.82	0.03
11	Tank	0.50	0.05	12.34	0.03
12	Bunner	0.27	0.03	8.80	0.02
13	Kohat	0.21	0.02	7.36	0.02
14	Lakki	0.11	0.01	4.94	0.01
15	Haripur	0.11	0.01	3.45	0.01
16	F.R. Bannu	0.09	0.01	2.62	0.01
17	Bajour "	0.10	0.01	2.46	0.01
18	Dir	0.08	0.01	2.38	0.00
19	F.R.D.I.Khan	0.08	0.01	1.83	0.00
20	N/Waziristan	0.08	0.01	1.73	0.00
21	F.R.Peshawar	0.01	0.00	0.69	0.00
22	Karak	0.01	0.00	0.23	0.00
23	Manshera	0.00	0.00	0.18	0.00
24	Shangiapar	0.01	0.00	0.16	0.00
25	Swat	0.00	0.00	0.02	0.00
26	S/Waziristan	0.00	0.00	0.00	0.00
27	Orakzai "	0.00	0.00	0.00	0.00
28	Kurram Agency	0.00	0.00	0.00	0.00
29	Kohistan	0.00	0.00	0.00	0.00
30	F.R.Kohat	0.00	0.00	0.00	0.00
31	Chitral	0.00	0.00	0.00	0.00
32	Battagram	0.00	0.00	0.00	0.00
33	Abbottabad	0.00	0.00	0.00	0.00
	Sub-total	103.40	10.15	4805.47	10.08
	BALOCHISTAN				
1	Lasbela	0.21	0.02	13.74	0.03
2	Sibi	0.28	0.03	13.02	0.03
3	Naslrabad	0.09	0.01	5.10	0.01
4	Bolan	0.02	0.00	1.35	0.00
5	Jafarabad	0.03	0.00	0.23	0.00
	Sub-total	0.64	0.06	33.44	0.07
	Total (PAKISTAN)	1019.22	100.00	47768.68	100.00

Notes:
1. Data have been arranged in descending order of production.
2. Percentage share calculated on the basis of country total.
3. Districts in which sugarcane is not grown or for which the data are not available, are excluded.

Source:
Ministry of Food, Agriculture and Livestock, Islamabad.

ANNEX-III

LOCATION OF SUGARMILLS, CRUSHING CAPACITY AND DATE OF COMMENCEMENT OF OPERATION IN 2002-2003, BY PROVINCE.

S.No	SUGARMILLS	LOCATION AND DISTRICT	YEAR OF INSTAL-LATION	CRUSHING CAPACITY (Tonnes/Day)	DATE OF START 2001-02
	PUNJAB				
1	Abdullah	17 KM Chunia, Hujra Road, Depalpur, Okara	1996	6500	22-11-2002
2	Adam	Chak No.4/ Ford, Tehsil, Chishtian, B/nagar	1967-68	3500	03-11-2002
3	Ashraf	P/O Ashrafabad, Bahawalpur	1982	4000	18-11-2002
4	Baba Farid	Gojra-Faisalabad Road, Okara	1980	3000	21-11-2002
5	Brothers	2-KM Chunian, Kasur	1989	6500	25-11-2002
6	Chanar	Chak 407 GB, Tandlianwala, Samundri, Distt: Faisalabad.	1992	4000	20-11-2002
7	Chaudhry	14-KM Pensara Road, Gojra, T.T.Singh	1992	6000	22-11-2002
8	Chishtia	Sllanwali, Distt, Sargodha	1989-90	2000	16-11-2002
9	Crescent	New Lahore Road, Nishatabad, Faisalabad	1980-81	1500	04-11-2002
10	Fatima	G.T. Road Near Railway Crossing Sinwan, Tehsil Kot Abdu, Muzaffargarh	1992	4000	22-11-2002
11	Fauji	Sangla Hill, Sheikhupura	1972	3800	11-11-2002
12	Fecto	Darya Khan Bhakkar	1966-67	5000	18-11-2002
13	G.Samundri	Chak 226, Tehsil Samundri, GoJra Samundri Road, Faisalabad.	1977-78	2500	26-11-2002
14	Hamza	Jetha Bhutta, 43 Khanpur, Rahim Yar Khan	1983-84	3000	15-11-2002
15	Hasib Waqas	Mirajabad, Nankana Sahib, Sheikhupura	1992	6000	22-11-2002
16	Hussain	Lahore Road, Jaranwala, Faisalabad	1966	4500	19-11-2002
17	Indus	Kot Bahadur, Rajanpur	1992	4000	15-11-2002
18	Ittefaq	P.O. Box No.125, Sahiwal	1982-83	4000	25-11-2002
19	JDW	Mauza Sharin, Jamal Din Wali, Rahim Yar Khan	1993	4000	15-11-2002
20	Kamalia	Kamalia, T.T Singh	1980	4000	25-11-2002
21	Kashmir	6 KM Shore Kot City to Cantt.Jhang	1997	6000	25-11-2002
22	Kohinoor	Jauharabad, Khushab	1955	2700	29-10-2002
23	Layyah	Layyah Sugarmills, Layyah	1953	3000	22-11-2002
24	National	Village Jan Muhammad Wala Near Talib Wala Pattan Bhalwal,Sargodha	1992	5000	11-11-2002
25	Noon	Bhalwal, District, Sargodha	1948	2500	11-11-2002
26	Pharianwali	Lalian, Jhang	1992	4000	12-11-2002
27	Pattoki	Pattoki, Kasur	1978-79	3000	18-11-2002
28	Phalia	Karmanwala, Mano Chok, Phalia, Gujrat	1966	5000	16-11-2002
29	Punjab	Chak 64/16-L,Mian Channu,P.O.Box 66,Khanewal	1986	3000	10-11-2002
30	Ramzan	Chiniot, Jhang	1991-92	6000	22-11-2002
31	Shahtaj	Mandi Bahauddin	1966	6000	21-11-2002
32	Shakarganj	Toba Tek Singh Road, Jhang	1974	6000	07-10-2002
33	Shekhoo	Anwarabad Patti NAICH,Near Sanwan, Kotaddu, Muzaffargargh.	1993	6000	22-11-2002
34	Tandlianwala	Chak No. 542/G-B Kangwani, Samundri, Faisalabad.	1992	6000	18-11-2002
35	United	Bakhshabad, Sadiqabad, R.Y. Khan.	1971	3000	17-11-2002
36	Yousaf	Mirajabad, Shahpur, Distt, Sargodha	1995	6500	19-11-2002
37	G.B (Pasrur)	Pasrur, Sialkot	1977-78	1500	25-11-2002
38	Qand garh	Chak No. 66 RB, Shah Kot Chak Jumra Road, P.O. Box 922, Faisalabad	1994	4000	Non-Member
39	Mian Muhammad	Azad Kashmir.	1998	2000	Not operating
		Total crushing capacity in the Punjab		169000	

continued

	Sindh				
1	Al-Abbas	Mirwah Gorchani, Mirpurkhas	1992-93	4000	20-12-2002
2	Al-Asif	Asifabad, Village Jararkot, P.O. Gharo, Taluka Ghorabari, Thatta.	1987	4000	N.A
3	Al-Noor	Noorpur Jahania, Moro Nawabshah	1970-71	8000	N.A
4	Ansari	Deh Jagsiyani,Tando Mohd Khan, Hyderabad	1991	6500	10-12-2002
5	Army Welfare	Badin, Badin	1983	4000	23-12-2002
6	Bawany	Ahmadnagar P.O.Talhar, Tand Bago Road, Badin	1965	6000	22-12-2002
7	Dewan	Jianiabad, Budho Talpur, Sujawal, Thatta	1987	9000	N.A
8	Digri	Digri		4000	23-12-2002
9	Faran	Tando Ibrahim, Sheikh Bhirkio, Hyderabad	1983	7500	N.A
10	Fauji (Khoski)	Khoski, Badin	1971	4500	N.A
11	Fauji	Tando Muhammad Khan, Hyderabad	1960	4000	20-12-2002
12	Habib	P.O.Box No. 25, Nawabshah	1962	7500	13-12-2002
13	Khairpur	Naroo Dhoro Taluka, Kot Digi District Khairpur	1992-93	4000	24-11-2002
14	Larr	Deh Kinjhir Takyja Sujawa , Thatta	1995	4000	N.A
15	Matiari	Nasarpur Road, Deh Pannu, Matiari, Hyderabad	1989-90	4000	11-12-2002
16	Mehran	Tando Adam Road, Tando Allah Yar, Hyderabad	1965	7000	18-12-2002
17	Mirpurkhas	Umar Kot Road, P.O.Sugarmills, Mirpurkhas	1964	4000	20-12-2002
18	Mirza	Deh Charo, Tapo Lowori Sharif, Kudhan Badin	1992-93	4000	20-12-2002
19	Pangrio	Deh Rajouri-2, Tando Bago, Badin	1984-85	3500	21-12-2002
20	Ranipur	Kot Diji, Ranipur, Khairpur	1976-77	3000	N.A
21	Sakrand	Deh Tharo Unar, Qazi Ahmed, Sakrand, Nawabshah	1990	6000	13-12-2002
22	Sanghar	13 Km, Sindhri-Sanghar Road P.O.Box No.2, Sanghar	1988	4500	N.A
23	Seri	Seri Deh Norai Jagir.		6000	N.A
24	Shahmurad	Jhok Sharif, Mirpur Bathoro, Thatta	1980-81	8000	N.A
25	Sindh Abadgar's	Deenpur, Tando Muhammad Khan, Hyderabad	1985	4500	20-12-2002
26	Larkana	Naudero, Larkana	1974-75	1500	N.A
27	Tharparkar	Tharparkar		4000	N.A
28	Dadu	P.O. Piarogoth, Dadu	1977-78	2800	Not Operating
29	Kiran	Noman Goth, Dubar Road, Taluka Rohri Sukkur	1992-93	8000	Not Operating
30	Thatta	Deh Bijora, Thatta - Sujawal Road, Thatta	1979	2800	Not Operating
31	Bachani	Tando Allahyar, Distt. Hyderabad.		4000	Not Commissionned
32	(Najma) Thar	Tharparkar			Not Commissionned
		Total crushing capacity in Sindh		154600	
	NWFP				
1	Bannu	Serai-Naurang, Bannu	1965	1500	23-11-2002
2	Chasma	University Road, Dera Ismail Khan	1991	3000	N.A
3	Frontier	Takht-i-Bhai, Mardan	1938	3500	20-11-2002
4	Khazana	P.O. Box No.88, Charsada Road, Peshawar	1976	5500	14-11-2002
5	Premier	Mardan, Mardan	1949-50	1500	14-11-2002
6	Saleem	Charsada, Charsada	1956-57	4700	N.A
		Total crushing capacity in the NWFP		19700	
		Total crushing capacity in Pakistan		343300	

Notes: 1. C stands for cane crushing capacity.
2. B Stands for beet crushing capacity

Source: PSMA, Islamabad.

ANNEX-IV

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN THE PUNJAB: 2002-03 AND 2003-04 CROPS

Sr. No.	Operations / Inputs	Avg No. of oprs/units/ acre	2002 - 03 crop		2003 - 04 crop		Change in 2003-04 over 2002-03
			Cost pe unit	Cost per acre	Cost pe unit	Cost per acre	
1	2	3	4	5=3*4	6	7=3*6	8=7-5
				----------Rupees----------			
1.	Land preparation:						
	1.1 Deep ploughing	0.476	380.00	180.88	395.00	188.02	7.14
	1.2 Rotavator	0.152	420.00	63.84	435.00	66.12	2.28
	1.3 Ploughing	7.847	140.00	1098.58	145.00	1137.82	39.23
	1.4 Planking	3.309	70.00	231.63	75.00	248.18	16.54
	1.5 Levelling	0.561	185.00	103.79	190.00	106.59	2.81
2.	Seed bed preparation:						
	2.1 Ploughing/Furrow making	0.467	140.00	26.81	145.00	33.86	7.05
	2.2 Planking	0.193	70.00	5.54	75.00	7.24	1.70
	2.3 Trench/Ridge making						
	2.3.1 Manual (m.days)	0.106	95.00	4.13	95.00	5.04	0.91
	2.3.2 Tractor	0.700	140.00	40.18	145.00	50.75	10.57
	2.4 Bund making						
	2.4.1 Manual (m.days)	1.655	95.00	64.46	95.00	78.61	14.15
	2.4.2 Tractor	0.158	140.00	9.07	145.00	11.46	2.39
3.	Seed and Sowing operations:						
	3.1 40 kg units	6.578	45.00	121.36	45.00	148.01	26.64
	3.2 Marlas	10.640	225.00	981.54	225.00	1197.00	215.46
	3.3 Harvesting, stripping (m.days) and making of sets	4.796	95.00	186.80	95.00	227.81	41.01
	3.4 Transport	-	-	100.00	-	105.00	5.00
	3.5 Sowing of sets (m.days)	0.781	95.00	30.42	95.00	37.10	6.68
	3.6 Contract sowing	-	-	115.00	-	115.00	0.00
4.	Interculture and Earthing up:						
	4.1 Manual/binding of plants	0.609	375.00	228.38	375.00	228.38	0.00
	4.2 Bullock/tractor	2.008	140.00	281.12	145.00	291.16	10.04
5.	Plant Protection:						
	5.1 Weedicides	0.124	216.00	26.78	217.00	26.91	0.12
	5.2 Granules	0.070	210.00	14.70	211.00	14.77	0.07
	5.3 Sparys	0.331	193.00	63.88	194.00	64.21	0.33
	5.4 Others	0.161	446.00	71.81	448.00	72.13	0.32
6.	Irrigation:						
	6.1 Canal	8.900	-	177.16	-	177.16	0.00
	6.2 Private tubewell	4.440	228.00	1012.32	325.00	1443.00	430.68
	6.3 Mixed	2.160	54.00	116.64	77.00	166.32	49.68
7.	Labour for irrigation and water course cleaning (m.days)	4.860	95.00	461.70	95.00	461.70	0.00
8.	Farm Yard Manure:						
	8.1 Material	-	-	475.00	-	490.00	15.00
	8.2 Transport & application	-	-	350.00	-	365.00	15.00
9.	Fertilizers: (bags)						
	9.1 DAP	1.280	738.00	944.64	750.00	960.00	15.36
	9.2 Urea	1.730	392.00	678.16	411.00	711.03	32.87
	9.3 Nitrophos	0.350	545.00	190.75	535.00	187.25	-3.50
	9.4 SSP	0.010	238.00	2.38	259.00	2.59	0.21
	9.5 CAN	0.010	328.00	3.28	277.00	2.77	-0.51
	9.6 SOP	0.070	792.00	55.44	799.00	55.93	0.49
	9.7 Gypsum	0.440	40.00	17.60	40.00	17.60	0.00
10.	Fert. transport and application	3.890	21.00	81.69	22.00	85.58	3.89
11.	Mark up @ 14.0 % per annum for 13 months on item 1 to 10 minus item 6.1	-	-	1280.39	-	1427.48	147.09
12.	Land rent for 13 months	-	4250.00	4604.17	4500.00	4875.00	270.83
13.	Management charges for 13 months	-	-	471.00	-	471.00	0.00
14.	Harvesting & stripping (40 kg units)	565.150	4.25	2377.87	4.50	2517.74	139.87
15.	Expected escalation in cost of selected items	-	-	571.00	-	671.00	100.00
16.	Total cost (items 1 to 15)	-	-	17921.88	-	19549.29	1627.41
17.	Yield (40 kg units)	-	-	565.15	-	565.15	0.00
18.	Cost of production at farm level: (Rs/40 kgs)						
	18.1 including land rent	-	-	31.71	-	34.59	2.88
	18.2 excluding land rent	-	-	23.56	-	25.97	2.40
19.	Marketing expenses: (Rs/40 kgs)						
	19.1 Transport, etc.	-	-	4.50	-	4.50	0.00
	19.2 Development cess	-	-	0.50	-	0.25	-0.25
20.	Cost of production at mill-gate: (Rs/40 kgs)						
	20.1 including land rent	-	-	36.71	-	39.34	2.63
	20.2 excluding land rent	-	-	28.56	-	30.72	2.15
21.	Cost of production at mill-gate with weighted average land tax @ Rs 120/acre/annum: (Rs/40 kgs)						
	21.1 including land rent	-	-	-	-	39.57	-
	21.2 excluding land rent	-	-	-	-	30.95	-

ANNEX-V

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN SINDH: 2002-03 AND 2003-04 CROPS

Sr. No.	Operations / Inputs	Avg No. of oprs/units/ acre	2002 - 03 crop		2003 - 04 crop		Change in 2003-04 over 2002-03
			Cost pe unit	Cost per acre	Cost pe unit	Cost per acre	
1	2	3	4	5=3*4	6	7=3*6	8=7-5
				Rupees			
1.	Land preparation :						
	1.1 Deep ploughing	0.523	370.00	193.51	390.00	203.97	10.46
	1.2 Ploughing	5.808	200.00	1121.20	210.00	1177.26	56.06
	1.3 Planking	1.577	100.00	157.70	105.00	165.59	7.88
	1.4 Levelling	0.972	200.00	194.40	210.00	204.12	9.72
2.	Seed bed preparation:						
	2.1 Ploughing/Furrow making	1.136	200.00	156.77	210.00	164.61	7.84
	2.2 Planking	1.340	100.00	92.46	105.00	97.08	4.62
	2.3 Trench/ridge making						
	2.3.1 manual (m.days)	0.074	95.00	4.85	95.00	4.85	0.00
	2.3.2 tractor (hrs)	0.174	160.00	19.21	170.00	20.41	1.20
	2.4 Bund making (m.days)						
	2.4.1 manual (m.days)	0.403	95.00	26.42	95.00	26.42	0.00
	2.4.2 tractor (hrs)	0.812	160.00	89.64	170.00	95.25	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 (m.days) and making of sets	4.420	95.00	289.73	95.00	289.73	0.00
	3.4 Transportation	-	-	190.00	-	200.00	10.00
	3.5 Sowing of sets (m.days)	0.588	95.00	38.54	95.00	38.54	0.00
	3.6 Contract sowing	-	-	185.00	-	185.00	0.00
4.	Interculture and Earthing up:						
	4.1 Manual	1.762	360.00	634.32	360.00	634.32	0.00
	4.2 Bullock/tractor	1.725	200.00	345.00	210.00	362.25	17.25
5.	Plant Protection :						
	5.1 Weedicides	0.344	294.00	101.14	295.00	101.48	0.34
	5.2 Granules	0.342	203.00	69.43	204.00	69.77	0.34
	5.3 Sprays	0.398	209.00	83.18	210.00	83.58	0.40
6.	Irrigation						
	6.1 Canal	20.880	-	181.87	-	181.87	0.00
	6.2 Private tubewell	2.460	137.00	335.65	178.00	436.10	100.45
7.	Labour for irrigation and water course cleaning (m.days)	5.859	95.00	556.61	95.00	556.61	0.00
8.	Farm Yard Manure:						
	8.1 Material	-	-	710.00	-	730.00	20.00
	8.2 Transport & application	-	-	335.00	-	350.00	15.00
9.	Fertilizers: (bags)						
	9.1 DAP	1.512	722.00	1091.86	739.00	1117.37	25.70
	9.2 Urea	3.625	389.00	1410.13	410.00	1486.25	76.13
	9.3 Nitrophos	0.376	566.00	212.82	563.00	211.69	-1.13
	9.4 CAN	0.185	328.00	60.68	288.00	53.28	-7.40
	9.5 AS	0.046	303.00	13.94	300.00	13.80	-0.14
	9.6 SOP	0.085	792.00	67.32	800.00	68.00	0.68
10.	Fert. transport and application	5.829	21.00	122.41	22.00	128.24	5.83
11.	Mark up @ 14.0 % per annum for 16 months on item 1 to 10 minus item 6.1	-	-	2269.75	-	2338.24	68.49
12.	Land rent for 16 months	-	2150.00	2868.67	2500.00	3333.33	466.67
13.	Drainage cess	-	-	54.000	-	24.00	-30.00
14.	Management charges for 16 months	-		579.00		579.00	0.00
15.	Harvesting & stripping (40 kg units)	676.020	4.25	2873.09	4.50	3042.09	169.01
16.	Expected escalation in the cost of selected items	-	-	445.00	-	692.00	247.00
17.	Total cost (items 1 to 16)	-	-	21244.71	-	22532.71	1288.01
18.	Yield (40 kg units)	-	-	676.02	-	676.02	0.00
19.	Cost of production at farm level: (Rs/40 kgs)						
	19.1 Including land rent	-	-	31.43	-	33.33	1.90
	19.2 excluding land rent	-	-	27.19	-	28.40	1.21
20.	Marketing expenses: (Rs/40 kgs)						
	20.1 Transport, etc.	-	-	4.50	-	4.50	0.00
	20.2 Development cess	-	-	0.32	-	0.32	0.00
21.	Cost of production at mill-gate: (Rs/40 kgs)						
	21.1 Including land rent	-	-	36.25	-	38.15	1.90
	21.2 excluding land rent	-	-	32.01	-	33.22	1.21
22.	Cost of production at mill-gate with land tax @ Rs 200/acre/annum: (Rs/40kgs)						
	22.1 Including land rent	-	-	-	-	38.54	-
	22.2 excluding land rent	-	-	-	-	33.62	-

ANNEX-VI

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN NWFP: 2002-03 AND 2003-04 CROPS

Sr No	Operations / inputs	Avg No. of oprs/units/ acre	2002 - 03 crop		2003 - 04 crop		Change in 2003-04 over 2002-03
			Cost per unit	Cost per acre	Cost per unit	Cost per acre	
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	405.00	269.33	420.00	279.30	9.98
	1.2 Ploughing	2.776	160.00	444.16	165.00	458.04	13.88
	1.3 Planking	0.435	80.00	34.80	85.00	36.98	2.17
	1.4 Levelling	0.344	160.00	55.04	165.00	56.76	1.72
2.	Seed bed preparation:						
	2.1 Ploughing/Furrow making	0.982	160.00	81.70	165.00	84.26	2.55
	2.2 Planking	0.027	80.00	1.12	85.00	1.19	0.07
	2.3 Trech/Ridge making (tractor hrs)	0.039	160.00	3.24	165.00	3.35	0.10
	2.4 Bund making (m.days)	1.274	90.00	59.62	90.00	59.62	0.00
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 (m.days) and making of sets	3.671	90.00	171.80	90.00	171.80	0.00
	3.3 Transport	-	-	160.00	-	170.00	10.00
	3.4 Sowing of sets (m.days)	4.097	90.00	191.74	90.00	191.74	0.00
4.	Interculture and Earthing up :						
	4.1 Manual/binding of plants	1.642	415.00	681.43	415.00	681.43	0.00
	4.2 Bullock/tractor	1.859	160.00	297.44	165.00	306.74	9.29
5.	Plant Protection:						
	5.1 Weedicides	0.336	296.00	99.46	297.00	99.79	0.34
	5.2 Granules	0.094	260.00	24.44	261.00	24.53	0.09
	5.3 Sprays	0.306	185.00	56.61	186.00	56.92	0.31
	5.4 Others	0.261	250.00	65.25	251.00	65.51	0.26
6.	Irrigation:						
	6.1 Canal	15.19	-	399.20	-	499.20	100.00
	6.2 Private tubewell	2.61	181.00	472.41	220.00	574.20	101.79
	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	90.00	715.77	0.00
8.	Farm Yard Manure:						
	8.1 Material	-	-	750.00	-	780.00	30.00
	8.2 Transport & application	-	-	470.00	-	490.00	20.00
9.	Fertilizers: (bags)						
	9.1 DAP	0.830	721.00	598.43	765.00	634.95	36.52
	9.2 Urea	1.970	387.00	762.39	409.00	805.73	43.34
	9.3 Nitrophos	0.330	512.00	168.96	565.00	186.45	17.49
	9.4 CAN	0.130	290.00	37.70	290.00	37.70	0.00
10.	Fert. transport and application	3.260	21.00	68.46	22.00	71.72	3.26
11.	Mark up @ 14.0 % per annum for 15 months on item 1 to 10 minus item 6.1	-	-	1554.07	-	1606.55	52.48
12.	Land rent for 15 months	-	4250.00	5312.50	4500.00	5625.00	312.50
13.	Management charges for 15 months	-	-	543.00	-	543.00	0.00
14.	Harvesting & stripping (40 kg units)	585.460	4.25	572.29	4.50	605.95	33.66
15.	Expected escalation in cost of selected items	-	-	404.00	-	435.00	31.00
16.	Total cost (items 1 to 15)	-	-	17733.90	-	18566.71	832.81
17.	Yield (40 kg units)	-	-	585.46	-	585.46	0.00
18.	Cost of productionat farm level: (Rs/40 kgs)						
	18.1 including land rent	-	-	30.29	-	31.71	1.42
	18.2 excluding land rent	-	-	21.22	-	22.11	0.89
19.	Marketing expenses: (Rs/40 kgs)						
	19.1 Transport, etc.	-	-	3.70	-	3.70	0.00
	19.2 Development cess	-	-	0.27	-	0.27	0.00
20.	Cost of production at mill-gate: (Rs/40 kgs)						
	20.1 including land rent	-	-	34.26	-	35.68	1.42
	20.2 excluding land rent	-	-	25.19	-	26.08	0.89
21.	Cost of production at mill-gate with weighted average land tax @ Rs 75/acre/annum (Rs/40 kgs)						
	21.1 including land rent	-	-	-	-	35.84	-
	21.2 excluding land rent	-	-	-	-	26.24	-

Notes for Annex-IV to VI.

1. The physical input-output parameters for estimating cost of production for sugarcane 2003-04 crop have been adopted from the Support Price Policy for sugarcane 2002-03 crop, APCom's Series No 198.

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, 2002 in the major sugarcane growing regions of the Punjab, Sindh and NWFP and discussions in the meeting of the Standing Committee on sugarcane, held on 6th January, 2003 at Islamabad.

4. The prices of seed have maintained at the last year's level in view of the no change in purchase price of sugarcane as fixed by the Provincial Governments.

5. The cost of weedicides/pesticides has not been revised in view of the information that the rising trend in the prices of pesticides/weedicides has been arrested on account of the availability of new generic and low cost pesticides/weedicides.

6. The canal water rates have been revised in view the rates received from respective provincial governments.

7. The cost of supplementary irrigation has been updated in view of rises @ about 47 per cent in the prices of diesel and power tariff rates for agriculture tube-wells @ 16 per cent for the Punjab and Sindh and 17 per cent for NWFP during February, 2002 and January, 2003. Reduction of Rs 0.12 per unit in power tariff as relief given by the Prime Minister has been accounted for in these calculations. Based on the ratios of electric and diesel tube-wells of 15 : 85 in the Punjab, 54 : 46 in Sindh and 85 : 15 in NWFP, reported in the Agriculture Statistics of Pakistan, 2000-01, MINFAL (Economic Wing), Islamabad, the magnitude of increases has been estimated as 43 per cent in the Punjab, 30 per cent in Sindh and 22 per cent in the NWFP.

8. 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 2nd January, 2003 and supplemented with the data obtained through the field survey as mentioned above.

9. 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 3620 per month for a Field Assistant at the 10th stages in BPS-6, including special additional allowance @ 25 per cent in view of the revised pay scale 2001.

10. Land tax and drainage cess in Sindh have been adopted in view of the data received from the government of Sindh. In the Punjab, land tax is the weighted average, computed from the varying rates of land tax as reported by the farmers in the meeting of the Standing Committee and in the NWFP as provided by D. G. Agriculture.

11. 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.

12. The likely escalation in the cost of operations like interculture, plant protection, supplementary irrigation, nitrogenous fertilizer, harvesting/stripping and marketing during 2003-04 crop year has been estimated as 9 per cent in the Punjab, 8 per cent in Sindh and 8 per cent in the NWFP on the basis of weighted average annual increase in their costs for the last 4 years.

13. Land rents vary across various regions and such that a great variations were reported during the mini field survey conducted by the APCom in the Punjab, Sindh and NWFP. The situation was discussed at length with the knowledgeable growers, crop experts and members of the Standing Committee on sugarcane and the rent has been adjusted accordingly.

ANNEX-VII

ECONOMICS OF FERTILIZER USE ON SUGARCANE IN PAKISTAN AT THE 2002-2003 SUPPORT PRICE

S.No	Item	Cane Nutrient Ratio			
		50:1	70:1	90:1	110:1
		----------Kgs----------			
1.	Yield increase due to use of additional 10 nutrient kgs of fertilizers per acre	500.00	700.00	900.00	1100.00
		----------Rupees----------			
2.	Direct cost of 10 kgs of NPK fertilizer at the weighted average price of Rs. 22.63 i.e. Rs. 16.93, 24.98 and 31.68 per nutrient kgs of N, P and K respectively in the ratio of 2:1:1	226.30	226.30	226.30	226.30
3.	Indirect cost due to the application of 10 nutrient kgs of fertilizer	158.09	202.43	247.09	291.13
	3.1 Transportation and application charges of 20 kgs of fertilizer @ Rs. 21.00 per 50 kgs bag of fertilizer	8.40	8.40	8.40	8.40
	3.2 Harvesting, stripping, transport, development cess etc on the additional produce @ Rs. 8.87 per 40 kgs	110.88	155.22	199.88	243.92
	3.3 Mark up on direct cost of fertilizer for 14.7 months @ 14.00 per cent per annum	38.81	38.81	38.81	38.81
4.	Total additional cost (item 2+3)	384.39	428.73	473.39	517.43
5.	Value of additional produce @ Rs. 42.50 per 40 kgs.	531.25	743.75	956.25	1168.75
6.	Benefit cost ratio (item 5 divided by item 4)	1.38	1.73	2.02	2.26

Notes: 1. The prices of N, P and K are the average of nutrient prices of Urea, DAP and SOP used in the COP estimates of the Punjab, Sindh and the NWFP for 2002-03 crop.

2. The rates of indirect cost items are the average of the rates used in the COP estimates of the Punjab, Sindh and the NWFP for 2002-03 crop.

3. Additional produce has been valued at the average support prices fixed for 2002-03 crop of the Punjab, Sindh and NWFP.

ANNEX-VIII

PER CAPITA AVAILABILITY (CONSUMPTION) OF SUGAR: 1992-93 TO 2001-02 (October - September)

S.No.	Item	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
		Thousand tonnes									
1	Opening stocks as on 1st October	218	224	309	265	104	245	513	371	27	621
2	Production	2394	2922	3001	2470	2393	3555	3542	2429	3016	3249
3	Imports	80	8	4	166	604	11	4	421	633	27
4	Exports	----	139	328	29	----	477	648	22	----	8
5	Closing stocks as on 30 September	224	309	285	104	245	513	371	27	621	637
6	Net availability (item 1+2+3-4-5)	2468	2706	2721	2768	2856	2821	3040	3172	3055	3252
		Million									
7	Population on first April (a)	121.08	124.04	127.00	130.04	132.96	136.19	139.07	142.34	145.64	149.16
		Kgs per annum									
8	Per capita availability (consumption)	20.39	21.82	21.43	21.29	21.48	20.71	21.86	22.28	20.98	21.80
9	Average per capita availability										
	i) Average (1992-93 to 2001-02)				21.40						
	ii) Forecast for 2002-03				21.06						

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, 2001-02.
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-IX

RELATIONSHIP BETWEEN SUGAR AND SUGARCANE PRODUCTION: 1992-93 TO 2001-02 AND ESTIMATE OF SUGAR AND SUGARCANE PRODUCTION DURING 2002-03

Year	Cane production	Sugar production from cane	Additional sugar production per 100 tonnes of additional cane production
	Thousand tonnes		Tonnes
1992-93	38059	2375	7.37
1993-94	44427	2920	7.71
1994-95	47168	2983	7.84
1995-96	45230	2450	7.75
1996-97	41998	2379	7.58
1997-98	53104	3549	8.11
1998-99	55191	3531	8.20
1999-00	46697	2415	7.82
2000-01	43606	2466	7.67
2001-02	48446	3198	7.90
2002-03 (Estimated)	51658	3458	8.05

1. Sugar production = additional sugar production + actual sugar production of previous year

2. Add. sugar production = $0.003539 \text{ (cane production)}^{0.2879}$

3. Correlation between sugar production and sugarcane production = 0.72
4. Coefficient of determination = 0.52

Note: The coefficients in equation 2 has been estimated through Ordinary Least Square Method from the data given above on production of sugar and sugarcane.

ANNEX-X

MONTHLY AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 2001 AND 2002

Year/Month	Lahore	Faisalabad	Karachi	Hyderabad	Peshawar	Average
	---------- Rupees per 100 kgs ----------					
2001						
January	2541	2536	2407	2336	2560	2476
February	2552	2432	2400	2269	2490	2429
March	2496	2469	2447	2256	2467	2427
April	2500	2518	2502	2272	2562	2471
May	2509	2497	2439	2250	2538	2447
June	2548	2566	2542	2300	2586	2508
July	2535	2523	2520	2288	2558	2485
August	2500	2438	2440	2275	2478	2426
September	2398	2295	2265	2225	2325	2302
October	2238	2103	2130	2088	2098	2131
November	2053	2075	2018	1960	2100	2041
December	1922	1928	1992	1900	2013	1951
Average	**2399**	**2365**	**2342**	**2202**	**2398**	**2341**
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**

Source: ALMA, Karachi.

ANNEX-XI

ANNUAL AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 1992-93 TO 2002-03
(October - September)

Year (October - September)	Lahore	Faisalabad	Karachi	Hyderabad	Peshawar	Average	Increase (+) decrease (-) in average price over previous year
	Rupees per 100 kgs						Percent
1992-93	1198	1200	1143	1158	1200	1180	----
1993-94	1200	1185	1188	1173	1233	1196	1.36
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 *	1954	1937	1983	1911	1999	1957	-4.73

Note: Average price upto January 3, 2003.

Source: ALMA, Karachi.

ANNEX-XII

COMPARISON OF AVERAGE WHOLESALE MARKET PRICES OF SUGAR AND SUGARCANE VS SUPPORT PRICE OF SUGARCANE: 1992-93 TO 2002-03

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					
1992-93	1180	17.50	17.50	17.75	17.50	17.50	17.75
1993-94	1196	18.00	18.00	18.25	18.00	18.00	18.25
1994-95	1350	20.50	20.50	20.75	20.50	20.50	20.75
1995-96	1679	21.50	21.50	21.75	21.50	21.50	21.75
1996-97	2003	24.00	24.00	24.50	42.00	24.00	58.00
1997-98	1731	35.00	35.00	36.00	35.00	44.00	40.00
1998-99	1828	35.00	35.00	36.00	30.00	35.00	36.00
1999-00	2140	35.00	35.00	36.00	36.00	37.00	48.00
2000-01	2478	35.00	35.00	36.00	44.00	45.00	50.00
2001-02	2054	42.00	42.00	43.00	37.00	47.33	51.00
2002-03 *	1957	40.00	40.00	43.00	35.00	42.00	36.00
Average increase per annum (Percent)	5.19	8.62	8.62	9.25	7.18	9.15	7.33

Notes:

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

b) Upto 1995-96, the market prices of sugarcane were almost same as the support price.

* Prices are upto January 3, 2003.

Sources:

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

ANNEX-XIII

ECONOMICS OF SUGARCANE AND COMPETING CROPS AT PRICES REALIZED BY GROWERS: 2002-03 CROPS

Province/crops/ crop combinations	Crop duration	Water used	Gross cost	Cost of purcha-sed inputs	Gross revenue	Gross margin	Net income	Output-input ratio	Revenue per		
									rupee of purchased inputs cost	crop day	acre inch of water used
1	2	3	4	5	6	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	17678	5707	16955	11248	-723	0.96	2.97	43.03	353.23
2. Cotton	240	22	13161	5724	15026	9302	1865	1.14	2.63	62.61	683.00
3. Basmati paddy	180	58	10185	5805	11483	5678	1298	1.13	1.98	63.79	197.98
4. IRRI paddy	180	62	8787	4882	7910	3028	-877	0.90	1.62	43.94	127.58
5. Wheat	180	17	9213	4159	8232	4073	-981	0.89	1.98	45.73	484.24
6. Sunflower (spring)	144	22	7237	2261	9256	6994	2018	1.28	4.09	64.27	420.68
7. Cotton + wheat	420	39	22374	9883	23258	13375	884	1.04	2.35	55.38	596.36
8. Cotton + sunflower	384	44	20398	7985	24281	16296	3883	1.19	3.04	63.23	551.84
9. Basmati paddy + wheat	360	75	19398	9964	19715	9751	317	1.02	1.98	54.76	262.87
10. Basmati paddy + sunflowe	324	80	17422	8066	20738	12672	3316	1.19	2.57	64.01	259.23
11. IRRI paddy + wheat	360	79	18000	9041	16142	7101	-1858	0.90	1.79	44.84	204.33
12. IRRI paddy + sunflower	324	84	16024	7143	17165	10022	1141	1.07	2.40	52.98	204.35
Sindh											
1. Sugarcane	488	71	20883	8154	21024	12870	141	1.01	2.58	43.08	296.11
2. Cotton	240	18	10698	4285	12755	8470	2057	1.19	2.98	53.15	708.61
3. IRRI paddy	180	56	7281	3331	7440	4109	159	1.02	2.23	41.33	132.86
4. Wheat	180	15	7682	3232	7541	4309	-141	0.98	2.33	41.89	502.73
5. Sunflower (spring)	144	22	7237	2261	9255	6994	2018	1.28	4.09	64.27	420.68
6. Cotton + wheat	420	33	18380	7517	20296	12779	1916	1.10	2.70	48.32	615.03
7. Cotton + sunflower	384	40	17935	6546	22010	15464	4075	1.23	3.36	57.32	550.25
8. IRRI paddy + wheat	360	71	14963	6563	14981	8418	18	1.00	2.28	41.61	211.00
9. IRRI paddy + sunflower	324	78	14518	5592	16695	11103	2177	1.15	2.99	51.53	214.04

Notes for Annex-XIII

1. The economic analysis presented in the above exercise is based on the input-output prices for 2002-03 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, 2002-03 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 2002-03 crop. To incorporate the escalations in input prices which occurred during the growing period of 2002-03 crops, some marginal revisions have been made as under:

   2.1 The cost of supplementary irrigation for sugarcane has been adjusted in view of 21 per cent rise in power tariff and 26 per cent increase in diesel prices, for cotton in view of 20 percent increase in power tariff and 23 percent in diesel, for rice in view of 20 per cent in electric power and 22 per cent rise in diesel prices by June 2002 and for wheat in view of 14 per cent increase in power tariff and 6 percent rise in diesel prices by December 2002. The ratio of diesel and electric tubewells in the Punjab is 85 and 15 percent and in Sindh 28 and 72 percent. Based on these ratios, the expenses on supplementary irrigation have been revised by applying the weighted average increase in energy charges at 25 percent in Punjab and 22 percent in Sindh for sugarcane, at 23 percent in Punjab and 21 per cent in Sindh for cotton, at 22 percent in Punjab and 21 per cent in Sindh for rice and at 7 percent rise in Punjab and 12 percent in Sindh for wheat.

   2.2 The cost of fertilizers has been revised in view of their prices prevailed at the time of their application for the respective crops in 2002-03 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 2002-03 wheat crop is yet to be harvested. Therefore the support price of wheat at Rs 300 per 40 kgs for 2002-03 crop has been adopted for the current analysis.

   4.2 The rice paddy is primarily transacted by the private sector at open market prices and no price was fixed by the Government. 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 15 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-Dec 2002 in the major producer area markets calculate to Rs 495 per 40 kgs. The wholesale prices for IRRI paddy averaged at Rs 236 per 40 kgs

during Oct-Dec 2002 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 202 per 40 kgs in the APCom's field survey.

4.3 The wholesale market prices of seed cotton during the post-harvest months of Oct, 2002 to Jan, 2003 in the main producer area markets have averaged at Rs 899 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 842 per 40 kgs by the PCCC, Karachi.

4.4 The 2002-03 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 that the Solvent Extraction Plants would purchase sunflower at Rs 630 per 40 kgs and canola at Rs 560 per 40 kgs from the growers.

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 35 per 40 kgs in the Punjab and Rs 36 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 5.00 per 40 kgs in Punjab and Rs 4.90 in Sindh for sugarcane, Rs 14 for seed cotton, Rs 12 for rice paddy and Rs 13 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-XIV

MILL - GATE PRICES OF SUGARCANE WORKED BACK FROM THE AVERAGE WHOLESALE PRICES OF GUR DURING 2002-03 CRUSHING SEASON (NOVEMBER - DECEMBER)

S.No	Item	Unit	N.W.F.P	Punjab	Sindh
1	Gur produced from 400 kgs of cane	Kgs	(a) 40.00	(a) 40.00	(a) 44.00
2	Market price of gur	Rs/40 kgs	650.00	550.00	550.00
3	Sale value of gur produced	Rupees	650.00	550.00	605.00
4	Marketing cost of gur including transport, commission, etc.	Rupees	45.00	33.50	44.00
5	**Net value of gur at farm level (item 3 minus item 4)**	**Rupees**	**605.00**	**516.50**	**561.00**
6	Processing cost including cane crushing and labour used for gur making	Rupees	180.00	125.00	165.00
7	Cost of chemicals.	Rupees	25.00	25.00	27.50
8	Net value of 400 kgs of cane (item 5 minus 6 minus 7)	Rupees	400.00	366.50	368.50
9	Value of 40 kgs of sugarcane	Rupees	40.00	36.65	36.85
10	Marketing cost of cane, i.e., transport and development cess.	Rupees	3.97	4.75	4.82
11	Mill-gate price per 40 kgs of cane (item 9 plus 10)	Rupees	43.97	41.40	41.67

Notes: Based on the information collected during Agricultural Prices Commission field survey, December, 2002.

(a) 10 percent recovery has been taken for NWFP and Punjab and 11 percent for Sindh.

ANNEX-XV

MILL- GATE PRICES OF SUGARCANE WORKED BACK FROM THE AVERAGE WHOLESALE MARKET PRICES OF SUGAR DURING 2002-03 CRUSHING SEASON (NOVEMBER-JANUARY)

S.No	Item	Rupees per tonne	
1	Average wholesale market price of sugar (a)	18860	
2	Wholesale dealer margin @ 5 % on net price	786	
3	Sales tax @ 15 per cent on net price	2358	
4	Net price (item 1 minus 2 minus 3)	15717	
		Punjab & N.W.F.P	Sindh
5	Processing cost of sugar (b)	5344	5344
6	Value of cane to produce one tonne of sugar (item 4 minus 5)	10373	10373
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)	881.71	902.45
10	Mill - gate price of sugarcane (Rs per 40 kgs)	35.27	36.10

Notes:

a) Average price of Lahore, Faisalabad and Hyderabad market during current crushing season i.e., November to January 3, 2003.

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.,

Sources:

1. For average market price of sugar: ALMA, Karachi.
2. For sales tax: Central Board of Revenue (CBR), Islamabad

ANNEX-XVI

AVERAGE OF INTERNATIONAL DAILY PRICES OF SUGAR: 1990-91 TO 2002-03
(OCTOBER - SEPTEMBER)

Years	Raw sugar Fob and stowed Caribbean ports in bulk		White sugar fob and stowed London port		Difference between white and raw sugar price		
Oct - Sep	Cents/ lb	U$/ per tonne	Cents/ lb	U$/ per tonne	Cents/ lb	U$/ per tonne	Per cent
1990-91	9.20	202.82	13.75	303.13	4.55	100.31	49.46
1991-92	9.16	201.94	12.68	279.54	3.52	77.60	38.43
1992-93	9.57	210.98	12.42	273.81	2.85	62.83	29.78
1993-94	11.24	247.80	14.63	322.53	3.39	74.73	30.16
1994-95	13.72	302.47	17.99	396.61	4.27	94.14	31.12
1995-96	12.25	270.06	17.41	383.82	5.16	113.76	42.12
1996-97	11.10	244.71	14.48	319.23	3.38	74.52	30.45
1997-98	9.89	218.03	12.33	271.83	2.44	53.80	24.67
1998-99	6.63	146.20	9.79	215.83	3.16	69.63	47.63
1999-00	7.23	159.30	9.18	202.38	1.95	43.08	27.04
2000-01	9.34	205.91	11.35	250.29	2.01	44.38	21.55
2001-02	6.85	151.01	10.59	232.48	3.74	81.47	53.95
2002-03	7.81	172.19	10.04	221.42	2.23	49.23	28.59
(Oct-Dec)							
October	7.51	165.56	9.74	214.76	2.23	49.20	29.71
November	7.89*	174.00*	10.16	224.00	2.27	50.00	28.74
December	8.03*	177.00*	10.23	225.50	2.20	48.50	27.40

Note * Actual data not available, thus figures have been estimated on the basis of increase in the prices of white sugar.

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

ANNEX-XVII

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

Item		1997-98 to 2001-02		2002- 03 (Oct-Dec)	
		..... US $ per tonne			
1. Average fob (London) price		235.00		221.00	
2. Freight charges upto Karachi		30.00		30.00	
3. C & f cost at Karachi port		265.00		251.00	
		OR ... Rs. per tonne (a)...			
		15503		14684	
4. Marine insurance (actual)		56		56	
5. **Import value (items 3+4)**		**15559**		**14740**	
6. L/C opening charges @ 0.5% of c&f cost		78		73	
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		306		290	
9. Wharfage, handling and stevedoring charges		610		610	
10. Allowance for shortage and unforeseen expenses @ 1% of c&f cost		155		147	
11. Service charges of inspection @ 0.5% (cif) value		78		74	
12. Importer's commission @ 1% of c&f cost		155		147	
13. Transport charges from Karachi to Lahore including loading/unloading		1350		1350	
14. **Landed cost at Lahore (items 6 to 13)**		18291		17431	
		Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
15. Processing cost of sugar (b)	Rs/ tonne	6218.88	6218.88	5926.58	5926.58
16. Value of cane to produce one tonne of sugar (item 14 minus item 15)	Rs	12071.95	12071.95	11504.53	11504.53
17. Provincial base recovery level	(%)	8.50	8.70	8.50	8.70
18. Quantity of cane required to produce one tonne of sugar (100 / item 17)	Tonnes	11.76	11.49	11.76	11.49
19. Price of one tonne of sugarcane (Item 16 / Item 18)	Rs	1026.53	1050.65	978.28	1001.26
20. Price of 40 kgs of cane (item 19/25)	Rs	41.06	42.03	39.13	40.05

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

Notes: (a) Selling exchange rate of one US $ = 58.50 Pak rupees, annouced by National Bank of Pakistan as on January, 2, 2003.
(b) Ratio of cost of cane to processing cost has been estimated at 66:33 in publication " Cost of Production of Sugar " jointly prepared by APCom and Business & Consultancy Services in 1996.

ANNEX-XVIII

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

Item		1997-98 to 2001-02		2002-03 (Oct-Dec)	
		.... US $ per tonne			
1. Average fob (London) price		235.00		221.00	
2. Freight charges upto Karachi		30.00		30.00	
3. C & f cost at Karachi port		265.00		251.00	
		OR --------Rs per tonne----------			
		15503		14684	
4. Marine insurance (actual)		56		56	
5. Import value (Items 3+4)		**15559**		**14740**	
6. Custom duty @25 % of import value		3890		3685	
7. Sales tax @ 15% of (Import value + Custom duty)		2917		2764	
8. Custom duty, Sales tax & Wharfage on empty bages		165		165	
9. Duty paid value (DPV)(Items 5+6+7+8)		**22531**		**21353**	
10. Income tax @6% at import stage of DPV		1352		1281	
11. Income tax on empty bags(fixed)		40		40	
12. Income tax @3.5 at sale stage		969		922	
13. L/C opening charges @ 0.5% of c&f cost		78		73	
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		306		290	
16. Wharfage, handling and stevedoring charges		610		610	
17. Allowance for shortage and unforeseen expenses @ 1% of c&f cost		155		147	
18. Sindh Govt excise duty @ 0.3% of DPV		68		64	
19. Service charges of inspection @ 0.5% (cif) value		78		74	
20. Importer's commission @ 1% of c&f cost		155		147	
21. Transport charges from Karachi to Lahore including loading/unloading		1350		1350	
22. Landed cost at Lahore (Item 9+items 10 to 21)		**27691**		**26352**	
23. Sales tax @ 15% of landed cost at Lahore		4154		3953	
24. Cost of one tonne of imported sugar after deducting sale tax @ 15% of landed cost at Lahore		**23538**		**22399**	
		Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
25. Processing cost of sugar (b)	Rs/ tonne	8002.80	8002.80	7615.81	7615.81
26. Value of cane to produce one tonne of sugar (item 24 minus item 25)	Rs	15534.85	15534.85	14783.63	14783.63
27. Provincial base recovery level	(%)	8.50	8.70	8.50	8.70
28. Quantity of cane required to produce one tonne of sugar (100 / item 27)	tonnes	11.76	11.49	11.76	11.49
29. Price of one tonne of sugarcane (item 26 / item 28)	Rs	1320.99	1352.03	1257.11	1286.65
30. Price of 40 kgs of cane (item 29/25)	Rs	52.84	54.08	50.28	51.47

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

Notes: (a) Selling exchange rate of one US $ = 58.50 Pak rupees, annouced by National Bank of Pakistan as on January, 2, 2003.
(b) Ratio of cost of cane to processing cost has been estimated at 66:34 in publication " Cost of Production of Sugar " jointly prepared by APCom and Business & Consultancy Services in 1996.

ANNEX-XIX

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

Item		1997-98 to 2001-02		2002- 03 (Oct-Dec)	
		.... US $ per tonne			
1. Average fob (London) price		235.00		221.00	
		OR ... Rs. per tonne (a)...			
2. Average fob Karachi price (assuming equivalent to fob London price)		13701		12884	
3. Transport charges from interior Sindh to port		750		750	
4. Special packing for export		90		90	
5. Inspection/ suvey		40		40	
6. Transit Insurance		40		40	
7. Loading and unloading		60		60	
8. Clearing and forwarding charges		25		25	
9. Wharfage, handling and stevedoring charges		180		180	
10. Agents commission		44		44	
11. Miscellaneous expenses		50		50	
12 Ex-mill price of sugar (item 2- items 3 to 11)		12422		11605	
		Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
13. Processing cost of sugar (b)	Rs	4223.31	4223.31	3945.80	3945.80
14. Value of cane to produce one tonne of sugar (item 13 minus item 14)	Rs	8198.19	8198.19	7659.50	7659.50
15. Provincial base recovery level	(%)	8.50	8.70	8.50	8.70
16. Quantity of cane required to to produce one tonne of sugar (100 / item 16)	Tonne	11.76	11.49	11.76	11.49
17. Price of one tonne of sugarcane (item 15 / item 17)	Rs	697.13	713.51	651.32	666.62
18. Price of 40 kgs of cane (Item 17/25)	Rs	27.89	28.54	26.05	26.66

Sources: i) For average fob (London) price: Annex **XVI**
ii) For incidentals and dutles: Trading Corporation of Pakistan, Karachi.

Notes: (a) Buying exchange rate of one US $ = 58.30 Pak rupees, annouced by National Bank of Pakistan as on January, 2, 2003.
(b) Ratio of cost of cane to processing cost has been estimated at 66:34 in the publication " Cost of Production of Sugar " jointly prepared by APCom and Business & Consultancy Services in 1996.

ANNEX- XX

ECONOMIC EFFICIENCY OF RESOURCE USE IN SUGARCANE
POLICY ANALYSIS MATRIX (PAM)BASED ON IMPORT PARITY PRICES

Description	Revenues	Traded cost	Domestic Factors Cost	Profits
	--------- Rupees per acre ---------			
PUNJAB				
1999-2000				
Private Prices	19413	5146	9013	5253
Social Prices	20152	4642	8865	6645
Transfers	-739	504	148	-1392
2000-01				
Private Prices	25330	5192	9381	10757
Social Prices	24378	4552	9207	10619
Transfers	952	640	175	137
2001-02				
Private Prices	20261	6090	10861	3310
Social Prices	21714	4945	10609	6159
Transfers	-1453	1144	253	-2850
2002-03				
Private Prices	19215	6131	11457	1627
Social Prices	20434	4971	11205	4258
Transfers	-1219	1161	252	-2631
2002-03 (Average prices)				
Private Prices	21196	6131	11457	3607
Social Prices	21811	4918	11197	5696
Transfers	-615	1214	260	-2089
SINDH				
1999-2000				
Private Prices	28122	7001	10401	10720
Social Prices	24852	6322	10400	8129
Transfers	3270	679	0	2591
2000-01				
Private Prices	33699	7059	10950	15690
Social Prices	29869	6356	10912	12601
Transfers	3830	704	38	3089
2001-02				
Private Prices	31502	8312	11765	11424
Social Prices	27109	6768	11578	8763
Transfers	4393	1544	187	2662
2002-03				
Private Prices	23897	8348	12362	3188
Social Prices	25270	7464	12311	5496
Transfers	-1373	884	51	-2308
2002-03 (Average prices)				
Private Prices	29559	7269	13450	8850
Social Prices	27029	6973	13188	6868
Transfers	2530	286	262	1982

ANNEX- XXI

ECONOMIC EFFICIENCY OF RESOURCE USE IN SUGARCANE
POLICY ANALYSIS MATRIX (PAM)BASED ON EXPORT PARITY PRICES

Description	Revenues	Traded cost	Domestic Factors Cost	Profits
	--------- Rupees per acre ---------			
PUNJAB				
1999-2000				
Private Prices	19413	5146	9013	5253
Social Prices	13290	4172	8794	325
Transfers	6122	975	219	4928
2000-01				
Private Prices	25330	5192	9381	10757
Social Prices	16531	4148	9145	3238
Transfers	8799	1044	236	7518
2001-02				
Private Prices	20261	6090	10861	3310
Social Prices	15073	4453	10534	86
Transfers	5187	1636	327	3224
2002-03				
Private Prices	19215	6131	11457	1627
Social Prices	13455	4417	11121	-2083
Transfers	5760	1714	336	3710
2002-03 (Average prices)				
Private Prices	21196	6131	11457	3607
Social Prices	14729	4415	11121	-806
Transfers	6467	1717	337	4414
SINDH				
1999-2000				
Private Prices	28122	7001	10401	10720
Social Prices	16451	5576	10261	613
Transfers	11671	1425	139	10107
2000-01				
Private Prices	33699	7059	10950	15690
Social Prices	20262	5634	10777	3851
Transfers	13436	1426	172	11838
2001-02				
Private Prices	31502	8312	11765	11424
Social Prices	18979	5902	11417	1660
Transfers	12522	2410	349	9764
2002-03				
Private Prices	23897	8348	12362	3188
Social Prices	16726	6217	12078	-1570
Transfers	7172	2130	284	4758
2002-03 (Average prices)				
Private Prices	29559	7259	13450	8850
Social Prices	18358	5976	13002	-620
Transfers	11201	1283	448	9470

Notes for Annex-XX and XXI

Private Prices
These prices refer to those received by the producers for their commodities during the post-harvest period.
Source:APCom's Support Price Policy for respective year

Social Prices of outputs
These refer to export/import parity prices as worked out in the APCom's Support Price Policies for various crops and years.

Social Prices of intputs
Social costs of all traded inputs like fertilizer, pesticides/weedcides, tubewells and tractors are net of sales tax of 15 per cent. The remaining apportionment of the cost of various inuts/operations is detailed as below :

Seed:
Cost of seed adjusted with the ratio between private and social prices of output has been apportioned into fresh and ratoon crops in the ratio of 50 : 50 in the Punjab and 69 : 31 in Sindh. Cost of sowing operations has also been apportioned in the same proportion.

Plant Protection:
It has two components, pesticides/chemical (90 per cent) and labour (10 percent)

Land Preparation Cost:
It involves use of tractor. The cost is apportioned into machinery(60 percent), fuel (20 per cent) and , fuel (20 per cent) and driver (20 per cent). Social cost of machinery and fuel have been taken as 80 and 50 per cent of their actual level. The 20 per cent labour component being skilled has been valued at part with the wages paid in the market.

Tubewells:
Due to shortage of canal water, irrigation requirements have to be partially met from tubewell water. The machinery cost (tubewell) is apportioned into three components i.e. machinery (50 per cent) fuel (40 peer cent and labour (10 percent). The opportun social cost of electric and dieselk tubewells are different.Keeping in view share of electric and diesel tubewell average social cost of tubewell has been estimated as 75 per cent of their private cost.

Thresher:
It is driven by tractor and involves more labour than other operations.Tractor and thresher machines are assumed as 30 per cent each and remaining 40 percent is assigned to labour. However from the year 2000-01 onward labour cost became available as separate entity in the cost of production estimate. Therefore two machines are assumed 50 percent each.

Labour:
Unskilled labour employed in most of the farming operations has been assumed to earn from alternatives only 75 per cent of the wages paid in agriculture sector
Farm yard manure:
This input has been apportioned into material (30 per cent), transport (30 percent) and labour (40 per cent).

Canal Water:
Social cost cost of canal water has been taken from JMA's report and esclalated @ 5 per cent p.a. An uncertainity of in canal irrigation supplies has been assumed as 20 per cent in Punjab and 50 per cent in Sindh.

Cost of Capital
A markup of 14 per cent has been added on the investment (working capital) of the

ANNEX-XXII

YIELD AND QUALITY PERFORMANCE OF SUGARCANE VARIETIES IN PUNJAB

Varieties	Cane Yield	Sugar Recovery %			Sugar Yield	Status
	Tonnes/ha	Nov.	March	Average	Tonnes/ha	
BL-4	85	9.10	10.7	10.06	8.55	Early
L-116	75	10.20	11.68	11.20	8.40	"
BF-162	90	8.56	10.95	10.05	9.04	"
CP-43-33	80	9.24	10.91	10.28	8.22	"
CP-72-2086	80	9.26	10.70	10.30	8.24	"
CP-77-400	80	9.45	10.98	10.35	8.28	"
SPSG-26	90	8.58	10.88	10.09	9.08	"
CoL-54	75	8.64	9.76	9.48	7.11	Mid
Triton	85	8.73	9.84	9.89	8.41	Mid
CO-975	75	8.11	9.55	9.18	6.88	Mid
L-118	83	6.86	9.16	8.28	7.70	Late
CO-1148	88	6.84	10.35	8.84	7.78	Late

Source: Proceedings of Workshop on Agriculture 1999, organized by Pakistan Society of Sugar Technologists, Karachi.