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SUPPORT PRICE POLICY FOR SUGARCANE, 2002-2003 CROP

AGRICULTURAL PRICES COMMISSION
GOVERNMENT OF PAKISTAN
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ABBREVIATIONS

AARI	:	Ayub Agricultural Research Institute
AJ&K	:	Azad Jummu & Kashmir
ALMA	:	Agricultural and Livestock Marketing Adviser
APCom	:	Agricultural Prices Commission
BCR	:	Benefit Cost Ratio
CBR	:	Central Board of Revenue
CIF	:	Cost Insurance and Freight
COP	:	Cost of Production
CPI	:	Consumer Price Index
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
FID	:	Fertilizer Imports Directorate
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
LSD	:	Light Speed Diesel
MINFAL	:	Ministry of Food, Agriculture and Livestock
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, 2002-03 CROP

INTRODUCTION

The ideal conditions for cultivation of sugarcane, a perennial tropical grass, are abundant sunshine with day temperature around 30°c, plenty of water, and cool dry weather with temperature 10 - 20°c at the time of maturity and harvesting. It can be grown on soils varying in texture from light sands to heavy clays but with access to major plant nutrients : nitrogen, phosphorus and potassium. Sugarcane is also tolerant to wide variations in soil acidity and alkalinity. Thus, commercial sugarcane can be grown under widely ranging soil and climatic conditions.

2. Sugarcane cultivation, well integrated with the cropping patterns of the central & southern Punjab, upper and lower Sindh and the Peshawar - Mardan valley of the NWFP has played a vital role in the development of agriculture and industrial sectors in the country. Its share in value added by major crops has varied between 14 - 18 per cent during the last 5 years. The cultivation of sugarcane, 4th largest crop in terms of area, has expanded at the average annual rate of 2.58 per cent during the last 20 years or so. The growth rate has been dominated by the development of sugarcane cultivation in Sindh, estimated to have expanded @ 5.37 per cent per year since 1979-80. 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, 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.

3. 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. The industry, because of the seasonal production cycle, has been periodically saddled with large stocks of unsold sugar in the recent past. The relationship between the farmers and the industry, often marred with mutual mistrust, has been seldom friction free.

4. In view of its importance, sugar sector has been the focus of many policies and Government interventions. As the sugar industry has advanced and matured overtime, and liberalization of the economy increased, the Government intervention in the sector has declined and presently confined to the levying of regulatory import duty and the announcement of support/indicative prices of sugarcane.

5. In the presentation on the recommendations of the Support Price Committee by the Adviser to the Chief Executive on Food, Agriculture and Livestock held on 7th May 2001, the Chief Executive had, inter alia, decided that support price system will continue for four major crops viz. wheat, rice, cotton and sugarcane. The ECC of the Cabinet in its meeting held on 17.9.2001 decided to fix the support price of sugarcane at Rs. 43 per 40 kgs for Sindh, and at Rs. 42 for the Punjab and the NWFP.

6. The current season had an inauspicious start, beginning with the row between the farmers and the industry about the date of commencement of crushing operations. The farmers were demanding early start of the crushing campaign while the mills in view of their large un-sold stocks and low market prices insisted on delaying the season. The farmers also asked for prices higher than those announced by the Government, while the industry was not willing to pay even the prices fixed by the Government. The controversy about minimum vs. indicative prices also adding to the confusion and problems was resolved by the Government of Punjab on December 29th, 2001 when it fixed the minimum price of sugarcane in the province at Rs. 40 per 40 kgs. The prices in Sindh, however, have been generally much higher.

7. To ascertain the input-output prices paid and received by the farmers, and the position of raw material supply to the industry and related issues, the annual meeting of the APCom's Standing committee on Sugarcane was convened at Hyderabad on January 7, 2002. The meeting was attended by the representatives of the sugarcane farmers, farmers' organiztions, sugar industry and crop experts. The farmers highlighted the issues faced by them 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. The representatives of the sugar industry were concerned about the liberal imports of sugar, large unsold stocks and the liquidity crunch. They were specially concerned about the low prices of sugar obtaining in the country. At the prevailing low output prices industry was unable to pay the prices of sugarcane demanded by the growers. The participant in the meeting nevertheless emphasized that reliance on unbridled market forces to determine the prices of sugarcane and sugar did not bode well for the sector. The consensus in the meeting was for fixation of minimum prices of sugarcane and regulating sugar imports after careful assessment of the demand and supply situation.

8. The Commission's teams also undertook surveys and field visits with the farmers and sugar mills to discuss the issues faced by the growers and the industry. The marketing of the produce, of the raw material as well as end product, has emerged a key issue requiring serious attention of the Government. The recurring water shortage is posing a serious challenge to the large scale cultivation of sugarcane as the crop requires large amounts of irrigation water. In view of the increasing 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 curtail 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 material requirements.

9. There is also an urgent need for the vertical integration of the sugar industry which so far has concentrated on horizontal expansion. There is vast scope for manufacturing of spirits, yeast, acetic acid, citric acid, glucose etc. from the molasses - a valuable by-product of sugar industry. The development of these products 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.

10. The uncertainty surrounding the prices of sugarcane, minimum versus indicative prices, has not helped the cause of healthy relationship among the growers and industry, and needs to be resolved. Fixation of the minimum support price is not meant to replace the market determined price but to act as a minimum and guaranteed price for the growers and to correct the shortcomings of imperfect markets and of collusion among the sugar mills, especially in years of good harvest. Judiciously fixed support price of sugarcane supplemented with a realistic trade policy can play an important role in arresting the cob-web cycle which has characterized the sugarcane/sugar sectors in recent years.

11. The emergence of the middlemen in the marketing of sugarcane, complaints about under weighment at procurement centres, linking the price of sugarcane to its quality, judicious use of the cess funds for the development of sugarcane and supporting infrastructure are some of the issues which require the attention of policy makers.

(Dr. Abdul Salam)
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February 9, 2002

2. SUMMARY OF FINDINGS AND RECOMMENDATIONS

2.1 Findings

Provincial Shares in Area and Production

12. Punjab, Sindh and NWFP respectively account for 66, 24 and 10 per cent of the area under sugarcane and 60, 30, and 10 per cent in its production. Their respective shares in the production of sugar are estimated at 57, 39 and 4 per cent.

Important Sugarcane Producing Districts

13. The most important districts for sugarcane cultivation are Faisalabad, Jhang, Sargodha, Kasur, T.T.Singh in Punjab,, Hyderabad and Badin in Sindh and Charsadda in the NWFP. Collectively they contribute 50 per cent of the total sugarcane produced in the country, and 32 mills are located in these districts.

Long-term changes

14 During the period 1992-2002, sugarcane production is estimated to have increased @ 2.1 per cent per annum, attributable to 1.4 per cent annual expansion in area and 0.7 per cent improvement in yield.

15. Sugarcane production in the Punjab has increased @ 4.1 per cent per annum, on account of 2.4 per cent expansion in area and 1.6 per cent improvement in yield. In Sindh sugarcane production is estimated to have decreased by 1.1 per cent per year during the period under review due to decreases of 0.6 and 0.5 per cent in area and yield respectively. In the NWFP production has been rising @ 1.0 per cent owing to increase of 0.5 per cent per year both in area and yield.

Short-term changes 2001-02 vs 2000-01 crop.

16. According to the Second estimate, sugarcane production from the 2001-02 crop is reported at 49.1 million tonnes which is 12.6 per cent more than the harvest of 43.6 million tonnes in 2000-01.The rise in production is due to 7.8 per cent expansion in area and 4.5 per cent improvement in yield as compared to last year.

17. Sugarcane production in the Punjab is up by 21.4 per cent attributable to 12.1 per cent expansion in area and 8.3 per cent improvement in yield.

18. In Sindh production is down by 3.0 per cent on account of 3.8 per cent fall in yield although area has increased by 0.8 per cent. In the NWFP production has increased by 2.9 per cent entirely due to 4.2 per cent improvement in yield as the area contracted by 1.3 per cent.

Targets Vs Achievements 2001-02 Crop

19. FCA had fixed sugarcane production target for 2001-02 crop at 38.1 million tonnes. The production from the 2001-02 crop, reported at 49.1 million tonnes, has exceeded the target by 28.8 per cent as both the area and yield targets were exceeded.

Domestic demand, supply, stocks and prices of sugar

- **Domestic demand supply and stocks**

20. On the basis of trend forecast, average per capita availability of sugar calculates to 21.76 kgs per annum. Using this estimate, domestic requirements of sugar during the year 2001-02 work out to 3,241 thousand tonnes. Keeping the end year stocks at last year level's of 621 thousand tonnes, total domestic requirements should work out to 3,862 thousand tonnes against the availability of 3,615 to 3,721 thousand tonnes.

Behaviour of sugar prices in domestic markets

- **Short term 2000-01**

21. During 2000, monthly averge wholesale prices of sugar ranged between Rs 1,646 per 100 kgs in Karachi market in January and Rs 2,838 per 100 kgs in Karachi and Peshawar markets during the month of November. The lowest average price is 2001 was reported at Rs 1,900 per 100 kgs in Hyderabad market during December whereas the highest was reported at Rs 2,586 in Peshawar market during June 2001.

- **Long term behaviour: 1991-92 through 2000-01**

22. Annual average wholesale prices of sugar during the period of 1991-92 to 2000-01 have increased from Rs 1,123 per 100 kgs to Rs 2,551 in Lahore market, from Rs 1,125 to Rs

2,524 in Faisalabad, from Rs 1,075 to Rs 2,482 in Karachi, from Rs 1,078 to Rs 2,353 in Hyderbad and from Rs 1,103 to Rs 2,566 in Peshawar market.

23. The support price of sugarcane during the corresponding period has increased from Rs 16.75 to Rs 42.00* per 40 kgs for Punjab and NWFP or @ 9.63 per cent per annum. For Sindh province it has increased from Rs 17 to Rs 43 per 40 kgs showing an annual increase of 9.72 per cent during the period under review.

- **Seasonal variations: 1991-92 to 2000-01**

24. With the start of crushing season in October/November, downward trend in prices of sugar sets in which continues upto March. At the end of the crushing coinciding with the start of summer season, the prices of sugar in April start rising and continue to do so upto the months of August and September.

Cost of Production

Punjab

25. The farm level cost of production of sugarcane during 2002-03 in the Punjab works out to Rs 31.71 per 40 kgs. Adding the marketing cost of Rs 5.00 per 40 kgs, the ex-mill gate cost of the produce comes to Rs 36.71 per 40 kgs.

Sindh

26. The ex-farm cost of production of sugarcane during 2002-03 in Sindh is expected at Rs 31.35 per 40 kgs. Taking into account the marketing charges @ Rs 4.90 per 40 kgs, the cost of producing and delivering 40 kgs of sugarcane at mill-gate works out to Rs 36.25.

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* Punjab government fixed minimum purchase price of Rs 40 per 40 kgs at mill gate/purchase centre

NWFP

27. The farm level cost of production of sugarcane in the NWFP during 2002-03 is estimated at Rs 30.29 per 40 kgs. Accounting for marketing charges @ Rs 3.97 per 40 kgs, the COP at mill-gate comes to Rs 34.26 per 40 kgs.

Prices of sugarcane on the basis of wholesale market prices of sugar

28. During current season (November-December 2001) ex-factory price of sugar averaged at Rs 2,000 per tonne. After taking into account the wholesaler's margin and sales tax, net revenue to the sugarmills calculates to Rs 16,667 per tonne. On the basis of this net price of sugar mill-gate prices of sugarcane work out to Rs 37.40 per 40 kgs for Punjab and NWFP and Rs 38.28 per 40 kgs for Sindh.

Prices of sugarcane on the basis of "Gur" prices

29. Mill gate prices of sugarcane as worked back from the average price of gur during the current crushing season come to Rs 46.40 and 47.75 per 40 kgs depending upon the payment or otherwise of the license fee by the crushers in NWFP.

30. In case of Punjab the price of sugarcane estimated on the basis of gur price works out to Rs 34.35 per 40 kgs.

Nominal and Real Prices of Sugarcane

- **Real Support Prices**

31. The nominal support prices of sugarcane in the Punjab have increased from Rs 15.25 per 40 kgs in 1990-91 to Rs 40.00 (fixed by the Punjab Government) in 2001-02, an overall increase of 162 per cent. During the same period, the cumulative inflation in terms of CPI, has been 144 per cent. Consequently, the real value of the support price of sugarcane for 2001-02 crop, estimated at Rs 16.40 per 40 kgs in terms of 1990-91 prices shows an increase of 8 per cent in relation to the corresponding price of Rs. 15.25 for 1990-91 crop.

32. In Sindh, the nominal support price of sugarcane has increased from Rs 15.75 per 40 kgs in 1990-91 crop year to Rs 43 per 40 kgs in 2001-02, an overall increase of 173 per cent. During the same period, cumulative inflation in terms of CPI, has been 144 per cent. Consequently, the real value of the support price of sugarcane for 2001-02 crop, estimated at Rs 17.63 per 40 kgs in terms of 1990-91 prices reflects an increase of 12 per cent in relation to the corresponding price of Rs 15.75 for 1990-91 crop.

- **Real Market Prices**

33. In the Punjab, the nominal market (mill-gate) prices of sugarcane averaging at Rs 15.25 per 40 kgs in main producing areas of the Punjab province during 1990-91, have risen to Rs 37.00 per 40 kgs in 2001-02, showing an overall increase of 143 per cent. During the same period, the cumulative inflation in terms of CPI has been estimated at 144 per cent. Consequently, the real value of market (mill-gate) price of sugarcane in the Punjab estimated at Rs 15.17 per 40 kgs (in terms of 1990-91 prices) during 2001-02 reflects a decline of 0.52 per cent as compared to that of 1990-91.

34. The nominal market (mill-gate) prices of sugarcane averaged at Rs 15.75 per 40 kgs in major producing areas of Sindh during the period 1990-91 and estimated at Rs 47.00 per 40 kgs during 2001-02, reflect an overall increase of 203 per cent. During the same period, the cumulative inflation in terms of CPI has been estimated at 144 per cent. Consequently, the real value of market prices of sugarcane in Sindh in terms of 1990-91 prices, has risen from Rs 15.75 per 40 kgs in 1990-91 to Rs 19.27 in 2001-02, showing an overall increase of 22 per cent.

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

35. The world production of sugar (raw equivalent) in 2001-02, forecast at 131.94 million tonnes, will be 0.93 million tonnes more than that of the last year. The global consumption projected at 133.60 million tonnes in 2001-02 would exceed the production by 1.66 million tonnes. Resultantly, end year stocks in 2001-02 would be drawn down to 58.42 million tonnes from 60.07 million tonnes of last year.

International prices

36. The world prices of raw and white sugar in 1990-91 averaged at US $ 203 and 303 per tonne. These slightly declined to US $ 202 in 1991-92 and to 274 per tonne during 1992-93. However later on the prices started rising and reached at US $ 302 and 397 per tonne in 1994-95, the highest level during the period under review. During 1995-96, a decline set in the prices which continued upto 1998-99 when price of raw sugar dropped to it lowest level of US $ 146. However, price of white sugar continued declining upto 1999-00 when lowest price was recorded at US $ 202 per tonne. The prices have since recovered and averaged at US $ 206 and 250 per tonne respectively during 2000-01.

Import and export parity prices

37. The import and export parity prices of sugarcane as calculated from the average fob (London) price of white sugar, are summarized below:

Economic and Financial Import Parity Prices of Sugarcane as Worked Back From Average fob (London) Prices of White Sugar

Period	Base price	Mill-gate prices of sugarcane in			
		Punjab and NWFP		Sindh	
		Economic price	Financial price	Economic price	Financial price
	US $/tonne	---------- Rs per 40 kgs ---------			
1. During 1996-97 to 2000-01	252.00	44.81	59.55	45.86	60.95
2. During 2001-02 (Oct-Dec)	242.41	43.44	57.67	44.46	59.03

Sources: Annexes XVI & XVII

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	------ Rs per tonne ----	
1. During 1996-97 to 2000-01	252.00	26.46	27.08
2. During 2001-02 (Oct-Dec)	242.41	25.36	25.96

Source: Annex-XVIII.

Comparative Economics of Sugarcane and Competing Crops

- **Punjab**

38. Sugarcane farming has done fairly well against competing crops during 2001-02 crop year. The returns to overall investment as reflected in output-input ratio are reasonably good for sugarcane. This crop yields the highest returns to purchased inputs. In case of returns to irrigation water, sugarcane has an edge over the rice combinations but lags behind those of cotton. In respect of revenue per day of crop duration, the competing crop combinations enjoy upper hand.

- **Sindh**

39. In Sindh, sugarcane has fetched attractive prices during the current crushing season. High prices received by the growers have strengthened the economic position of sugarcane viz-a-viz competing crops. Sugarcane out-competes all the crop combinations in terms of returns to overall investment. It also edges out competing crops in terms of revenue per rupee of purchased inputs and per day of crop duration. In case of revenue per unit of irrigation, sugarcane out-competes rice combinations but lags behind cotton combinations.

Economics of Fertilizer Use on Sugarcane

- **Benefit Cost Ratio**

40. BCRs of fertilizer use in sugarcane farming computed on the basis of support as well as market prices of sugarcane show that fertilizer use on sugarcane has remained profitable albeit

profitability level varying with the variations in sugarcane nutrient response ratios. However, the desired BCR of more than 2, has been obtained at cane nutrient response ratios of 90:1 and 110:1. Using prices of sugarcane received by the growers in the Punjab and Sindh in evaluating the economics of fertilizer use on sugarcane, the profitability was higher in Sindh as the farmers in this province received higher prices.

- **Parity Between Prices of Fertilizers and Sugarcane**

41. The purchasing power of sugarcane crop estimated on the basis of market prices of fertilizer and sugarcane in the Punjab and Sindh has reflected a mixed trend during the period 1991-92 to 2001-02. The most favourable parity ratios between the prices of N and sugarcane was observed during the year 2000-01 in the Punjab. In case of P fertilizer purchasing power of cane has been much less than that of N. In Sindh, where prices of cane were higher purchasing power of cane has been greater as well.

2.2 Recommendations

The Support Price

42. According to the analysis of the relevant factors summarized in paras 151 to 162 of this Report, no increase in the mill gate support prices of sugarcane is recommended. The support prices as fixed for the 2001-02 crop and also to be applicable for the 2002-03 crop are given below:

Province	**2001-02 crop actual**	**2002-03 crop proposed**
	Rupees per 40 kgs at mill gate	
Punjab and NWFP	42.00	42.00
Sindh and Balochistan	43.00	43.00

43. The dichotomy between the support price of sugarcane as fixed by the ECC of the Cabinet for the Punjab at Rs 42 per 40 kgs and the minimum price of sugarcane fixed by the Government of Punjab for the 2001-02 season at Rs 40 per 40 kgs needs to be removed.

44. The nomenclature of support price, meant to act as a minimum price of the produce, and well understood in the context of pricing policy, may be preferred in policy announcements over other terms to avoid confusion among the various stakeholders.

Payment of Quality Premium

45. In view of the position explained at para 178 of the Report, status quo in this respect may be maintained.

Payment of quality prices for sugarcane

46. Pakistan needs to shift to the payment of cane price according to the quality of produce determined in a scientific manner and having the confidence of growers. Installation of core samplers in this context as decided by the Cabinet in 1986 can be helpful.

Improving Productivity

- **Breeding Research**

47. The research for development/breeding new varieties of sugarcane at the federal and provincial research institutes needs to be strengthened by utilizing the cess funds as per decision of the Sugarcane Board in its 39th meeting held on 17th August, 1992.

- **Land Preparation**

48. The field surveys undertaken by the APCom have indicated that a large number of growers have not yet adopted recommended practices of deep tillage for land preparation in sugarcane cultivation resulting in low yield. Provincial Agriculture Departments should launch an aggressive educational campaign to apprise the farmers about the benefits of recommended practices of land preparation.

- **Cultivation of High Yielding Varieties**

49.

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

ii) The sugar industry should encourage the cultivation of high sucrose varieties by providing seed and paying of quality premium for the cane of such varieties.

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, the sugar mills should establish their Cane Development Centres either individually or collectively. These centres in collaboration with the progressive growers and sugarcane researchers should undertake the multiplication and distribution of certified cane seed.

iv) The 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.

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

- **Coping with Shortage of Water**

50. In view of the recurring water shortages it has become imperative to curtail the cultivation of sugarcane to the most suitable areas and to make judicious use of inputs including water to increase land productivity. At the same time the practices for improving water use efficiency need to be promoted.

- **Plant Population**

51. The farmers also need to be apprised by the Agriculture Departments about the optimum plant population and the methods to achieve this.

- **Weed Control/Plant Protection**

52. The Provincial Agriculture Extension Departments should mobilize their field staff to induce the growers to adopt practices of:

i) Use of weedicides

ii) Seed treatment with fungicides and hot water.
iii) Earthing up of the sugarcane crop

- **Balanced Use of Fertilizer**

53. The survey reports on use of fertilizers have reported that only a small fraction of the growers have adopted balanced use of fertilizer. The provincial governments should launch campaigns to educate growers about the importance of the use of balanced doses of various fertilizers based on soil analysis.

- **Biological Control of Sugarcane Pests**

54. The government should encourage the PSMA to establish laboratories and programmes for artificial rearing of predators of various sugarcane pests for their distribution amongst growers.

- **Use of Press Mud/Organic Matter**

55. Provincial governments and PSMA should persuade sugar mills to discourage the burning of press mud as fuel and promote its use as organic matter/manure by the farmers. Facilitating its availability to growers free of cost will help in increasing the crop production and also arrest environmental pollution in the area.

Improving Marketing

- **Use of sugarcane cess fund**

56. The procedure should be notified for the utilisation and release of cess fund alongwith availability and allocation to different areas, disciplines and the agencies responsible for scrutinising, procuring and according approval of the schemes/projects to be financed from cess fund collections.

- **Support price for sugar**

57. APCom reiterates its earlier recommendation to work out the ex-mill price of sugar by Ministry of Industries, keeping in view the cost of cane, processing cost of sugar, recoveries of

by-products and other related costs involved. In case of depressed sugar prices in domestic market, government should make necessary arrangements to purchase sugar at the pre-determined price.

- **Amendments in Sugar Factories Control Act, 1950**

58. Sugar Factories Control Act, 1950 needs to 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.

Marketing of sugarcane -

59.

- The Federal Government should persuade the Provincial Governments for adopting a strict system of checking the accuracy of weigh bridges and scales at the sugarmills and cane purchase centres, so that wide spread menace of underweighment of sugarcane is eliminated.

- The Government of Punjab should bind the sugarmills to pay the difference of price i.e. Rs 40 - 35 = Rs 5 per 40 kgs for all the quantities procured by them from farmers during the months of November and December, 2001.

- Non-clearance of trash from sugarcane causes huge losses of sugar at national level which calls for a campaign to be launched to save these losses by properly removing the trash by the growers/cane suppliers to mills.

The provincial Cane Commissioners should strictly implement the provisions of Sugar Factories Control Act, 1950 to stop excessive deductions and late payments of cane proceeds.

3. SUGARCANE PLANTING AND HARVESTING SEASONS

60. Sugarcane crop requires a moderate temperature, around 20-30°C, for proper germination and growth and about two months of cool dry weather towards the end of growth period for maturity. The climatic conditions in Pakistan generally provide a growing season of 8 to 10 months for sugarcane. The recommended times of planting spring and autumn crops of sugarcane in different provinces are given in Table-1.

Table-1: Planting Times of Sugarcane by Province

Province	Planting Time	
	Spring Crop	Autumn Crop
Punjab	15 Feb to 15 March	1 Sept to 10 October
Sindh	5 Feb to 10 March	1 Sept to 10 October
NWFP	February – March	15 Sept to 15 October

Source: NARC, Islamabad.

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

62. Sugarcane harvesting generally commences in October and may extend upto April depending upon the crop situation.

4. PROVINCIAL SHARES IN AREA AND PRODUCTION

63. During three years period ending 2000-01, area under sugarcane has averaged at 1.04 million hectares (2.6 million acres), production at 48.4 million tonnes, and yield 46.4 tonnes per hectare or 18.8 tonnes per acre (Table-2).

Table-2: Provincial Shares in Area and Production of Sugarcane: Average of 1998-99 to 2000-01

Country/ Province	Area		Production	
	000 ha	**Percent**	**000 tonnes**	**Percent**
Pakistan	**1042** (2575)	**100**	**48377**	**100**
Punjab	689 (1703)	66	29068	60
Sindh	247 (610)	24	14464	30
NWFP	105 (259)	10	4807	10

Notes:- 1. Figures in parentheses are in thousand acres.

2. Country total includes area and production of Balochistan as well.

Source:- Worked out from data in Annex-I.

64. Sugarcane is mainly cultivated in the Punjab, Sindh and the NWFP. Punjab's shares in area and production are estimated at 66 and 60 per cent, those of Sindh at 24 and 30 per cent and of the NWFP at 10 per cent each. Balochistan's share in the area/production of sugarcane is negligible. The provincial shares in area and production of sugarcane detailed in Table-2 are depicted in Figures 1 and 2.

4.1 Provincial Shares in Sugar Production

65. On the basis of three year's i.e. 1998-99 to 2000-01 the average annual production of sugar, processed from sugarcane comes to 2.8 million tonnes (Table-3).

PROVINCIAL SHARES IN AREA & PRODUCTION OF SUGARCANE:AVG OF 1998-99 TO 2000-01

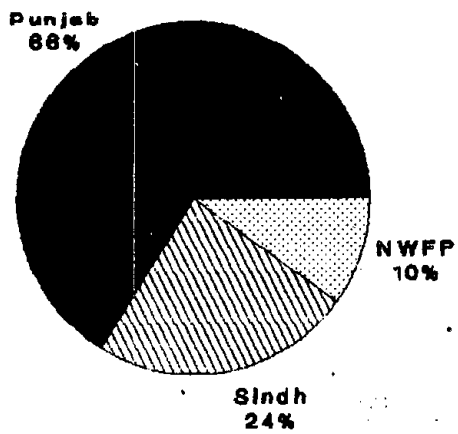

Fig-1: SHARES IN AREA

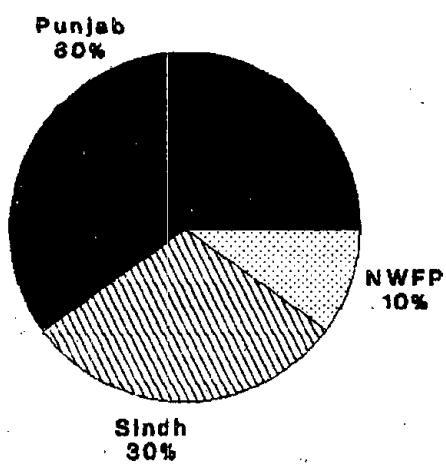

Fig-2: SHARES IN PRODUCTION

Table-3: Provincial Shares in Sugar Production: 1998-99 to 2000-01

Country/ Province	Sugar Production*			Average	Share
	1998-99	1999-00	2000-01		
	---------- 000 tonnes ----------				Percent
Pakistan	**3531.0**	**2414.7**	**2466.8**	**2804.2**	**100.0**
Punjab	2033.4	1315.6	1437.4	1595.5	56.9
Sindh	1353.0	996.3	968.2	1105.8	39.4
NWFP	144.6	102.8	61.2	102.9	3.7

* From sugarcane only.

Source:- PSMA, Islamabad.

66. The shares of the Punjab, Sindh and the NWFP in the production of cane sugar during the last 3 years have been estimated at 56.9, 39.4 and 3.7 per cent, respectively.

5. IMPORTANT SUGARCANE PRODUCING DISTRICTS

67. Because of its high water requirements sugarcane cultivation is confined to irrigated areas. Districts which annually produce more than 500 thousand tonnes of sugarcane are Faisalabad, Jhang, Sargodha, Kasur, T.T.Singh, Okara, Mandi Bahauddin, Rahim Yar Khan, Bahawalnagar, Bhakkar, Sheikhupura, Sahiwal, Vehari, Pakpattan, Layyah and Muzaffargarh from the Punjab; Hyderabad, Badin, Nawab Shah, Noushero Feroze, Thatta, Khairpur, Mirpurkhas and Sanghar from Sindh and Charsadda, Mardan and Peshawar from the NWFP (Annex-II). These 27 districts account for about 88 per cent of area/production of the crop.

68. Districts of Faisalabad, Jhang, Sargodha, Kasur, T.T.Singh; Hyderabad, Badin, and Charsadda, contribute 50 percent of the total sugarcane production and 32 mills are located in these districts (Annex-III). Sugarcane producing districts in descending order of production, are arranged in Annex-II.

6. AREA, YIELD AND PRODUCTION

69. During the decade ending in 2001-02 area under sugarcane in the country has ranged from 885 to 1155 thousand hectares (2187 to 2854 thousand acres) and cane production varied between 38 and 55 million tonnes, with average yield of 43 to 50 tonnes per hectare (17.4 to 20.4 tonnes per acre). The changes in area, yield and production of sugarcane in the long and short terms are described hereunder:

6.1 Long-term Changes: 1991-92 to 2001-2002

70. During the period 1992-2002, sugarcane production is estimated to have increased @ 2.1 per cent per annum, attributable to 1.4 per cent annual expansion in area, 0.7 per cent improvement in yield (Table-4).

Table-4: Average Annual Growth Rates of Area, Yield and Production of Sugarcane: 1991-92 to 2001-2002

Country/ Province	Area	Yield	Production
		Percent per annum	
Pakistan	**(+) 1.4**	**(+) 0.7**	**(+) 2.1**
Punjab	(+) 2.4	(+) 1.6	(+) 4.1
Sindh	(-) 0.6	(-) 0.5	(-) 1.1
NWFP	(+) 0.5	(+) 0.5	(+) 1.0
Balochistan	(+) 2.1	(+) 1.1	(+) 3.2

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.

71. Sugarcane production in the **Punjab** during the period under reference is estimated to have increased @ 4.1 per cent per annum on account of 2.4 per cent enlargement in area and 1.6 per cent rise in yield. During the same period annual production in **Sindh** is estimated to have declined @ 1.1 per cent per year as crop yield fell @ 0.5 per cent and area contracted by 0.6 per cent per year. In

the **NWFP** production rose @ 1.0 per cent per year owing to increases of 0.5 per cent per year both in area and yield.

72. Sugarcane production after reaching record level of 55.2 million tonnes in 1998-99 dropped to 46.3 and 43.6 million tonnes in 1999-2000 and 2000-01. The size of the harvest in the current year at this stage is estimated at 49.1 million tonnes. Long-term growth in sugarcane production which was estimated @ 4.3 per cent per annum (for the 10 year period ending in 1998-99) has reduced to 2.1 per cent for the 10 years period ending in 2001-02, due to falling production of sugarcane in the last three years. As a result of the falling sugarcane production the sugar sector has been in turmoil and 13 mills are reported to be out of production in 2001-02.

6.2 Short-term Changes: 2001-02 VS 2000-01 Crop

73. According to the Second estimates, sugarcane production from the 2001-02 crop is reported at 49.1 million tonnes, 12.6 per cent more than the harvest of 43.6 million in 2000-01. The rise in production is due to 7.8 per cent expansion in area and 4.5 per cent improvement in yield as compared to those of last year (Table-5).

Table-5: Area, Yield and Production of Sugarcane: 2000-01 and 2001-02 Crops

Country/ Province	Area		Change in 2001-02 over 2000-01	Yield		Change in 2001-02 over 2000-01	Production		Change in 2001-02 over 2000-01
	2000-01	2001-02		2000-01	2001-02		2000-01	2001-02	
	000 hectares		Percent	Tonnes/hectares		Percent	000 tonnes		Percent
Pakistan	960.8	1035.6	(+) 7.8	45.4	47.4	(+) 4.5	43606.3	49098.2	(+)12.6
Punjab	615.5	689.8	(+)12.1	43.4	47.0	(+) 8.3	26740.0	32455.0	(+)21.4
Sindh	238.8	240.7	(+) 0.8	50.5	48.6	(-) 3.8	12049.7	11689.9	(-) 3.0
NWFP	105.9	104.5	(-) 1.3	45.2	47.1	(+) 4.2	4784.4	4921.7	(+) 2.9
Balochistan	0.6	0.6	0.0	53.7	52.7	(-) 1.9	32.2	31.6	(-) 1.9

Source:- Annex-I.

74. In the Punjab, sugarcane production reported at 32.5 million tonnes in 2001-02 is 21.4 per cent higher in comparison to 26.7 million tonnes harvested last year. Higher production is attributable to 12.1 per cent expansion in area and 8.3 per cent improvement in yield.

75. In Sindh, sugarcane production estimated at 11.7 million tonnes during the current crop year is 3.0 per cent less as compared to last year's production of 12.1 million tonnes. The fall in production is on account of 3.8 per cent shortfall in yield although area increased by 0.8 per cent.

76. In the NWFP, sugarcane production of 4.92 million tonnes in the current season is up by 2.9 per cent entirely due to 4.2 per cent improvement in yield as the area has contracted by 1.3 per cent as compared to last year.

77. The Agriculture Departments of the Punjab and Sindh Governments have forwarded following reasons for changes in area and production of sugarcane:

- **Punjab**

Area

78. High rates of cane, raw sugar/gur and sugar during last year.

Production

- Increase in area.
- Sufficient rains received during the growth period of the crop.
- Introduction of new varieties.

- **Sindh**

Area

79. Ban on paddy cultivation on the left bank of Indus in certain districts and shortage of water forced the growers to divert area to sugarcane.

80. Delay in the sowing of cotton also diverted the area to sugarcane cultivation.

81. In lower Sindh canal water supply improved during October 2000 and March 2001 which was the sowing period of sugarcane.

82. Growers extended the ratoon crop for one more year.

Production

83. Due to shortage of water and rotation in canals required doses of fertilizers could not be applied which decreased the production.

7. TARGETS VS ACHIEVEMENTS: 2001-02 CROP

84. The Federal Committee on Agriculture (FCA) in its meeting held on 29-10-2001 had fixed sugarcane production target for 2001-02 crop at 38.1 million tonnes. As per Second estimates of the Provincial Agriculture Departments production reported at 49.1 million tonnes has exceeded the target by 28.8 per cent (Table-6).

Table-6: Targets and Estimated Achievements of Area, Yield and Production of Sugarcane: 2001-02 Crop.

Country/ Province	Area		Devia-Tion from target	Yield		Devia-tion from target	Production		Devia-tion from target
	Target	Achieve-Ment		Target	Achieve-ment		Target	Achieve-Ment	
		000 hectare	Per cent	Tonnes/hectare		Per cent	000 Tonnes		Percent
Pakistan	860.0	1035.6	(+)20.4	44.3	47.4	(+) 6.9	38133.0	49098.2	(+)28.8
Punjab	585.0	689.8	(+)17.9	41.6	47.0	(+)131	24333.0	32455.0	(+)33.4
Sindh	175.0	240.7	(+)37.5	51.4	48.6	(-) 5.6	9000.0	11689.9	(+)29.9
NWFP	100.0	104.5	(+) 4.5	48.0	47.1	(-) 1.9	4800.0	4921.7	(+) 2.5

Sources:- 1. For targets: Minutes of the 75th Meeting of FCA held on 29-10-2001 at Islamabad.

2. For achievements: Annex-I.

85. The area and production of sugarcane during 2001-02 crop year have surpassed their targets by substantial margins in the Punjab and Sindh.

8. FACTORS CONSIDERED IN DETERMINING THE SUPPORT PRICE

86. In formulating the price policy proposals for the 2002-03 crop of sugarcane, following factors have been considered and analysed.

8.1 Domestic demand, supply, stocks and prices of sugar
8.2 Cost of production
8.3 Prices of sugarcane on the basis of average wholesale prices of sugar
8.4 Prices of sugarcane on the basis of 'gur' prices
8.5 Nominal and real support/market prices of sugarcane
8.6 World supply, demand, stocks, trade and price of sugar
8.7 Import and export parity prices
8.8 Comparative economics of sugarcane and competing crops
8.9 Economics of fertilizer use on sugarcane

8.1 Domestic demand, supply, stocks and prices of sugar

8.1.1 Domestic demand, supply and stocks

87. The data on sugar production, trade, consumption and stocks during 1990-91 to 2000-01 are given in Annex-IV. Annual per capita availability/consumption of sugar, has averaged at 21.19 kgs during the period, ranging from 19.83 kgs to 22.28 kgs.

88. The sugar year 2000-01 (Oct-Sept) started with opening stocks of 27 thousand tonnes. The production during the year has been reported at 3,016 thousand tonnes (i.e. 2,466 thousand tonnes from cane, 533 thousand tonnes from raw sugar and 17 thousand tonnes from beet), while 628 thousand tonnes of sugar were imported. Thus, supplies during 2000-01 totalled 3,671 thousand tonnes. At the end of the year 621 thousand tonnes of sugar were left in stocks and

carried forward to 2001-02. Thus, 3,050 (3,671 – 621 = 3,050) thousand tonnes of sugar were consumed during 2000-01.

89. Sugarcane production from the 2001-02 crop, as per second estimate, is reported at 49.1 million tonnes i.e. 12.6 per cent above the last year's level. Assuming the proportionate increase in sugar processing from cane, sugar output should increase to over 2.994 million tonnes this year (Annex-V). However, as the sugarcane production rises, the proportion of cane going to sugar mills also increases as farm level uses of sugarcane in gur making and other activities do not increase by the same ratio. Therefore, one should expect sugar production of more than 2,994 million tonnes in 2001-02. In Annex-V, an attempt has been made to estimate the relationship between sugarcane and sugar production through regressing data of sugar production on cane production for the last 10 years. From the analysis it comes out that 75 per cent of the variation in sugar production is explained by the variation in cane production. Based on the analysis of past trend in sugar production in relation to cane, 2.994 million tonnes of sugar may be produced from 49.1 million tonnes of cane during 2001-02. The sugar industry estimates that 3.1 million tonnes (3,100 thousand tonnes) would be produced during 2001-02. Adding opening stocks of 621 thousand tonnes to the production, total availability of sugar during 2001-02 should range from 3.615 to 3.721 million tonnes.

90. Trend forecast for per capita sugar consumption in 2001-02 is estimated at 21.76 kgs. (Annex-IV). Based on this estimates, domestic requirements of sugar during the year 2001-02 for a mid-year population of 148.94 millions (as on 1st April 2002) work out to 3,241 thousand tonnes. Maintaining the end year stocks at last year's level of 621 thousand tonnes, total domestic requirement should work out to 3,862 thousand tonnes against the availability of 3,615 to 3,721 thousand tonnes, subject to the changes in actual production of sugar during the current year.

8.1.2 Behaviour of sugar prices in domestic markets

91. Behaviour of sugar prices in important domestic markets in the short and long runs, is discussed below:

8.1.2.1 Short term: 2000 and 2001

92. The monthly average wholesale prices of sugar prevailing in major domestic markets of Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets during 2000 and 2001 are given in Annex-VI.

93. During 2000, monthly average wholesale prices of sugar ranged between Rs 1,646 per 100 kgs (Karachi) in January and Rs 2,838 (Karachi and Peshawar) during the month of November. The lowest average price of Rs 1,900 per 100 kgs was reported in Hyderabad market during December 2001, whereas the highest price was Rs 2,586 in Peshawar market during June. The overall average market price of sugar during 2000 was Rs 2,336 per 100 kgs which slightly increased to Rs 2,341 per 100 kgs during 2001.

8.1.2.2 Long term: 1991-92 through 2000-01

94. The annual wholesale prices of sugar in Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets from 1991-92 to 2000-01 (October-September) are given in Annex-VII and depicted in Figure-3. It may be observed that annual average wholesale prices during the period under review have increased from Rs 1,123 per 100 kgs to Rs 2,551 in Lahore market, from Rs 1,125 to Rs 2,524 in Faisalabad, from Rs 1,075 to Rs.2,482 in Karachi, from Rs 1,078 to Rs 2,353 in Hyderabad and from Rs 1,103 to Rs 2,566 in Peshawar. The overall average of these wholesale prices which stood at Rs 1,101 per 100 kgs in 1991-92 increased to Rs 2,478 in 2000-01, showing average annual increase of 9 per cent. The year to year increase in average prices of sugar has ranged from 1.4 to 24.4 per cent except in 1997-98 when prices declined by 13.6 per cent as compared to those of previous year.

95. A comparison of domestic wholesale prices of sugar with support prices of sugarcane, for 1991-92 to 2001-02, has also been carried out in Annex-VIII. The support prices of sugarcane (the basic raw material for making sugar) increased from Rs 16.75 to Rs 42.00 per 40 kgs for Punjab and NWFP or @ 9.63 per cent per annum. For Sindh province support price increased

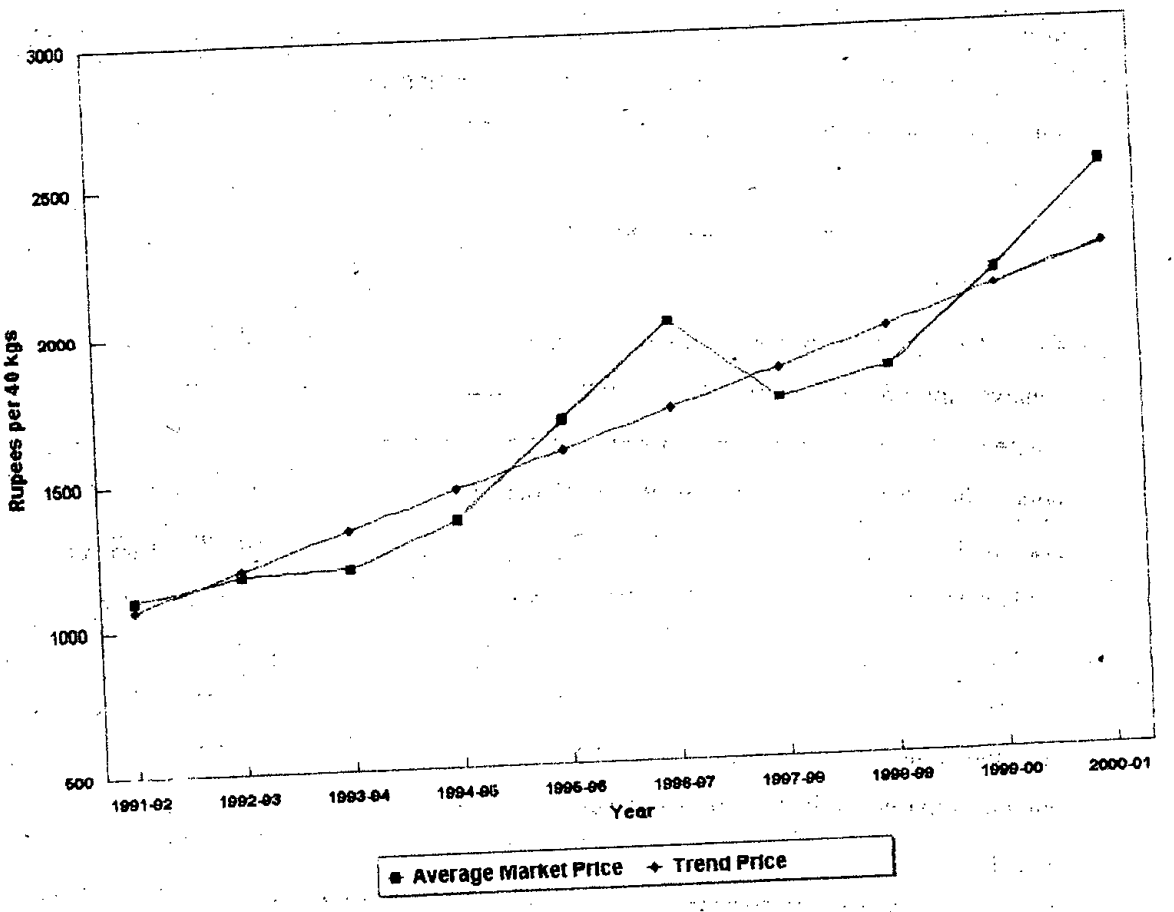

Figure-3: LONG TERM TREND OF WHOLESALE PRICES OF SUGAR: 1991-92 to 2000-01 (OCTOBER - SEPTEMBER)

from Rs 17 to Rs 43 per 40 kgs showing annual average increase of 9.72 per cent during the same period. According to the survey of main producing areas of the Punjab, Sindh and NWFP conducted by APCom in January, 2002, growers in Sindh received higher prices of cane ranging between Rs 43 to Rs 50 per 40 kgs. In the Punjab farmers received Rs 35 per 40 kgs instead of Rs 42 per 40 kgs upto December 2001. During January 2002, sugarmills started procurement of cane at the rate of Rs 40 per 40 kgs at mill gate whereas the NWFP growers received Rs 42 to 45 per 40 kgs for their cane. Market price of sugar showed an annual average increase of 6.52 per cent during the period under reference.

8.1.2.3 Seasonal variations: 1991-92 to 2000-01

96. On the basis of monthly average wholesale prices of sugar during 1991-92 through 2000-01, seasonal indices have been calculated and depicted in Figure-4. With the start of crushing season in October/November a downward trend in prices of sugar sets in and continues upto March. At the end of crushing season around April coinciding with the start of summer season, the prices of sugar start rising and continue to do so upto August/September.

8.2 Cost of Production

97. Cost of production (COP) is one of the most important considerations in pricing of farm commodities. However, precise estimation of a representative cost of production of any commodity is problematic on account of a number of conceptual and practical difficulties involved in the exercise. These problems arise due to variations in agro-climatic conditions, inputs use level, technology adoption and diverse farming systems under which a particular crop is raised. These difficulties are further compounded as farmers seldom maintain records of their inputs use level and various farm operations and researchers have to rely on the data collected through surveys based on recall method.

98. With the collaboration of the Provincial Agriculture Departments, APCom carried out sample surveys in the important sugarcane growing regions of the Punjab, Sindh and NWFP to collect micro data on various aspects of sugarcane farming and marketing. The data were

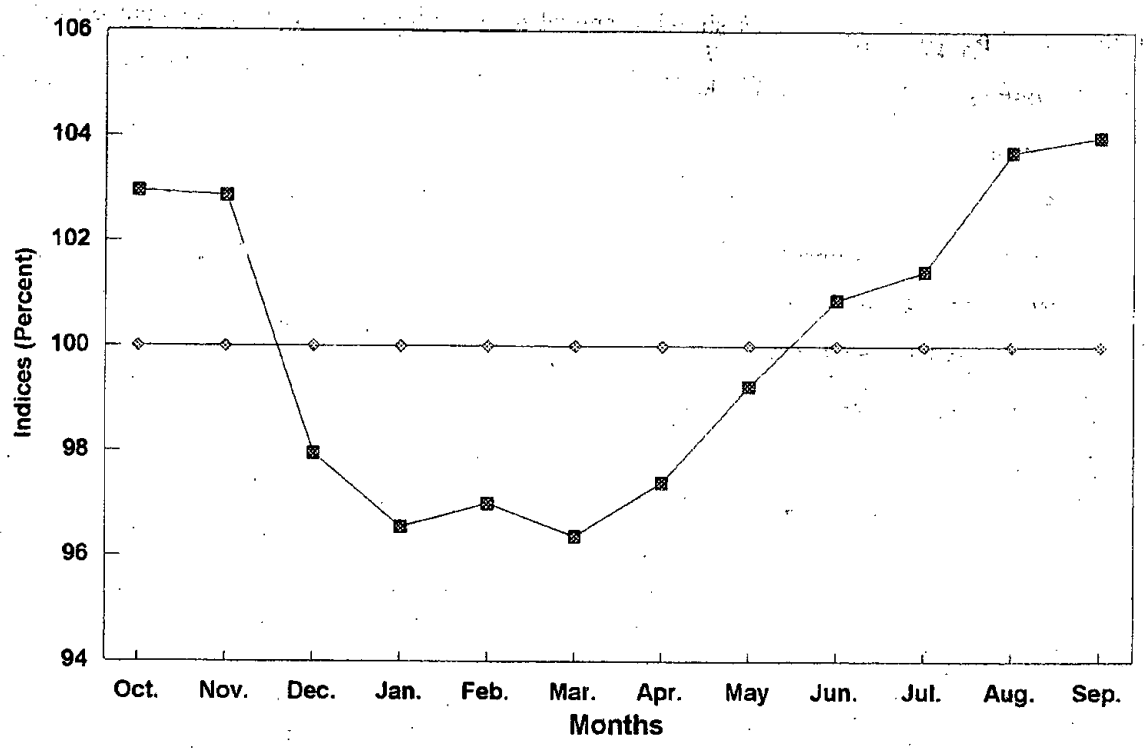

Figure-4: SEASONAL INDICES OF SUGAR PRICES: 1991-92 TO 2000-01

collected from 1248 sugarcane growers in the Punjab, 676 growers from Sindh and 277 growers of the NWFP. Data related to 1999-00 sugarcane crop. The farmers included in the sample were randomly selected from 99 villages and 18 tehsils of the Punjab, 49 dehs of 10 talukas of the Sindh and 18 villages of 5 tehsils of NWFP, included in the samples of Provincial Agriculture's Departments for their crop cutting experiments. Details of the surveys samples are given at Annex -IX.

99. Based on the above mentioned survey data, the input-output parameters of sugarcane cultivation have been estimated for arriving at the cost of production of sugarcane. The COP estimates for the sugarcane 2002-03 crop were synthesized by using these input-output parameters in conjunction with the latest input prices and rates of field operations obtained through mini field surveys conducted by the APCom in the selected sugarcane growing areas of the Punjab, Sindh and NWFP during January 2002. These rates were also supplemented with the information provided by the members in the meeting of the APCom's Standing Committee on Sugarcane, held on 7th January, 2002 at Hyderabad. The details of the survey methods, parameters estimated from the surveys data and the methodology for estimating the cost of production were also discussed at length in the meeting of the APCom's Standing Committee. These estimates are detailed in Annexes-X to Annex-XII and the results summarised in Table-7.

- **Punjab**

100. As per details given in Annex-X and the summary information in the Table-7, the cost of growing one acre of sugarcane during 2002-03 crop year is estimated at Rs 17922, including land rent. With the average yield of 565 maunds (40 kgs) per acre, the farm level cost of production comes to Rs 31.71 per 40 kgs. Adding marketing cost @ Rs 5.00 per 40 kgs, the cost of producing and delivering 40 kgs of sugarcane at market/mill-gate would be Rs 36.71.

101. Land rent accounts for 26 per cent in the overall cost of cultivation of sugarcane in the Punjab. Other important constituents of the cost of cultivation are fertilizers (16 per cent), harvesting and stripping (13 per cent), tillage operations (10 per cent), irrigation (10 per cent) and seed and sowing operations (9 per cent).

Table-7: Average Farmers' Cost of Production of Sugarcane: 2002-03 Crop

Item	Unit	COP estimates
		Punjab
1. Cost of cultivation	Rs/acre	17922
2. Yield	40 kgs/acre	565
3. Cost of production at farm level	Rs/40 kgs	31.71
4. Marketing cost including development cess	"	5.00
5. Cost of production at mill-gate	"	36.71
		Sindh
1. Cost of cultivation	Rs/acre	21191
2. Yield	40 kgs/acre	676
3. Cost of production at farm level	Rs/40 kgs	31.35
4. Marketing cost including development cess	"	4.90
5. Cost of production at mill-gate	"	36.25
		NWFP
1. Cost of cultivation	Rs/acre	17734
2. Yield	40 kgs/acre	585
3. Cost of production at farm level	Rs/40 kgs	30.29
4. Marketing cost including development cess	"	3.97
5. Cost of production at mill-gate	"	34.26

Source: Annexes-X to XII

Note : The cost estimates as reported here are based on the input-output parameters obtained from the 1999-00 sugarcane crop, and at variance with those used in previous policy Report which were based on 1990-91 crop survey.

- Sindh

102. The cost of growing of sugarcane in Sindh during 2002-03 crop season is likely to be around Rs 21191 per acre, inclusive of land rent. Based on average yield of 676 maunds (40 kgs) per acre, cost of production of sugarcane at farm level comes to Rs 31.35 per 40 kgs. Accounting for the marketing charges @ Rs 4.90 per 40 kgs, cost of producing and delivering sugarcane at market/mill-gate would be Rs 36.25 per 40 kgs.

103. Chemical fertilizers and FYM, accounting for 19 per cent, is the principal constituent of the cost of cultivation of sugarcane in Sindh for the 2002-03 crop. The other major components are: seed and sowing operations (18 per cent), land rent (14 per cent), harvesting and stripping (14 per cent), cultural operations (10 per cent) and irrigation (5 per cent).

- **NWFP**

104. The cost of raising one acre of sugarcane in the NWFP during the 2002-03 crop year is expected at Rs 17734, including land rent. Taking the average yield at 585 maunds (40 kgs), the cost of producing sugarcane at farm level works out to Rs 30.29 per 40 kgs. Adding the marketing charges @ Rs 3.97 per 40 kgs, the market/mill-gate level cost of production would be Rs 34.26 per 40 kgs.

105. Land rent accounts for 30 per cent of the overall cost of cultivation of sugarcane in the NWFP. The chemical fertilizers and FYM (16 per cent), seed and sowing operations (15 per cent), irrigation (9 per cent), interculture and earthing up (6 per cent) and land preparation (5 per cent) are the other important constituents of the cost of sugarcane farming in the NWFP.

8.3 Price of sugarcane worked back from ex-factory price of sugar

106. The prices of sugarcane, the principal raw material for producing sugar in Pakistan, has a direct bearing on sugar price, which in turn affects the demand for sugarcane. Accordingly, price of cane has been worked back from the price of sugar. During current season (November-December, 2001) ex-factory price of sugar as reported by different sugarmills, averaged at Rs 800 per 40 kgs or Rs 20,000 per tonne. After taking into account the wholesaler's margin of 5% (Rs 833) per tonne and sales tax @ 15 per cent (Rs 2,500 per tonne) on ex-mill price, net receipts to the sugarmills calculate to Rs 16,667 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 & Consulting Services in 1996. At this ratio processing cost comes to Rs 5,667 per tonne. The base recovery adopted for NWFP and Punjab is 8.50 per cent and for Sindh 8.70 per cent. At these recovery levels, mill-gate prices of sugarcane work out to Rs 37.40 per 40 kgs for Punjab and NWFP and Rs 38.28 per 40 kgs for Sindh. Details of calculations are given in Annex-XIII.

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

107. Sugarcane is also used for 'gur' making. This is an important cottage industry for processing sugarcane into 'gur' which seasonally operates in some sugarcane producing areas of the NWFP and Punjab. The prices of cane worked back from average wholesale prices of gur (after accounting for various costs incurred in its processing and marketing) prevailed during 2001-02 crushing season (October-December) are detailed in Annex-XIV and discussed as under.

- **NWFP**

108. In NWFP, the average wholesale prices of 'gur' during October-December, 2001 averaged at Rs 737 per 40 kgs. After accounting for various expenses involved in gur making i.e. gur marketing, processing and chemicals used in the process, value of 400 kgs of sugarcane required to produce 40 kgs of gur (assuming recovery of 10%) calculates to Rs 464 in NWFP with license fee and Rs 477.50 without license fee. Mill gate price of cane in the NWFP comes to Rs 47.75 per 40 kgs. Last year the government of NWFP imposed a license fee on the cane crushers @ Rs 27,000 per season assuming 20,000 x 40 kgs average cane crushing capacity. Accounting for this fee, mill gate price of cane calculates Rs 46.40 per 40 kgs (Annex-XIV).

- **Punjab**

109. In the Punjab, the average wholesale prices of gur during October-December 2001 averaged at Rs 565 per 40 kgs. After accounting for various expenses involved in gur making i.e. gur marketing, processing and the cost of chemicals used in the process, net value of 400 kgs of cane used in making 40 kgs of gur (assuming recovery of 10 per cent in gur making) comes to Rs 343.50. Thus, mill gate price of cane in the Punjab works out to Rs 34.35 per 40 kgs.

8.5 Nominal and real support and market (mill-gate) prices of sugarcane: 1990-91 to 2001-02 crops

110. The changes in the prices of a commodity in relation to the general price level in the economy influence the purchasing power of the commodity, welfare and real income of its producers. To estimate the overtime changes in the real prices of sugarcane from 1990-91 to 2001-02, its nominal support and market (mill-gate) prices in the Punjab and Sindh 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 Figures 5 -8.

8.5.1 Nominal and real support prices of sugarcane

111. The nominal and real support prices of sugarcane from 1990-91 to 2001-02 are set out in Table-8 and depicted in Figure 5 and 6.

Table-8: Nominal and Real Prices of Sugarcane for Punjab and Sindh at Support Prices: 1990-91 to 2001-02

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
	---- Rs per 40 kgs ----		1990-91=100	------ Rs 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	243.92	16.40	17.63

Source: Economic Survey of Pakistan, 2000-01: Statistical Supplement.

Note: CPI for 2001-02 has been projected in view of the average rise in CPI during the last 3 years.

*Minimum purchase price of sugarcane at mill-gate fixed by the Government of Punjab.

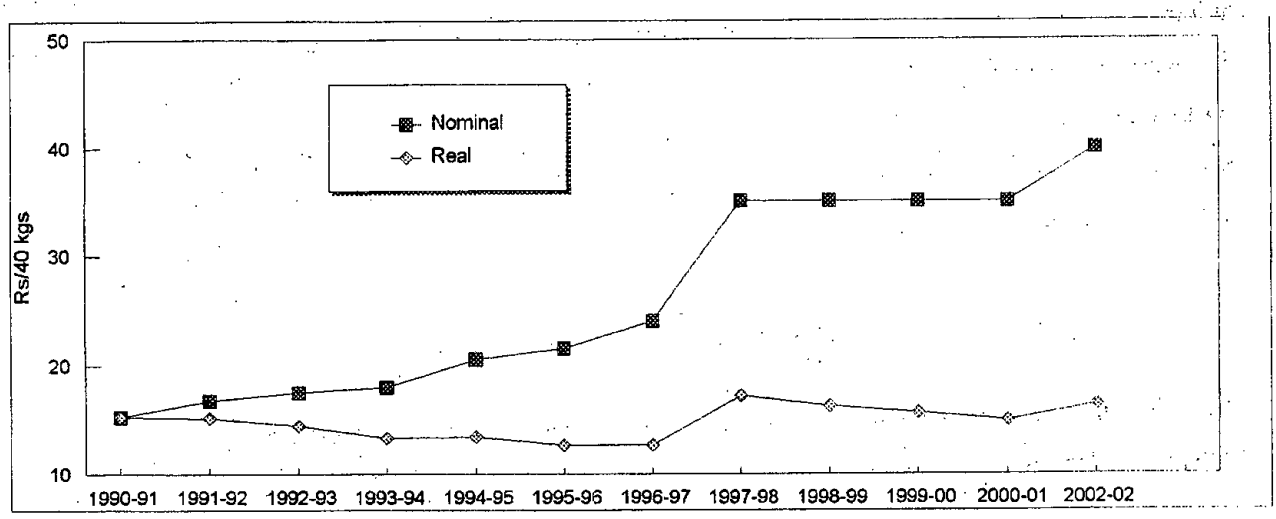

FIG-5: NOMINAL AND REAL SUPPORT PRICES OF SUGARCANE IN THE PUNJAB: 1990-91 TO 2001-02

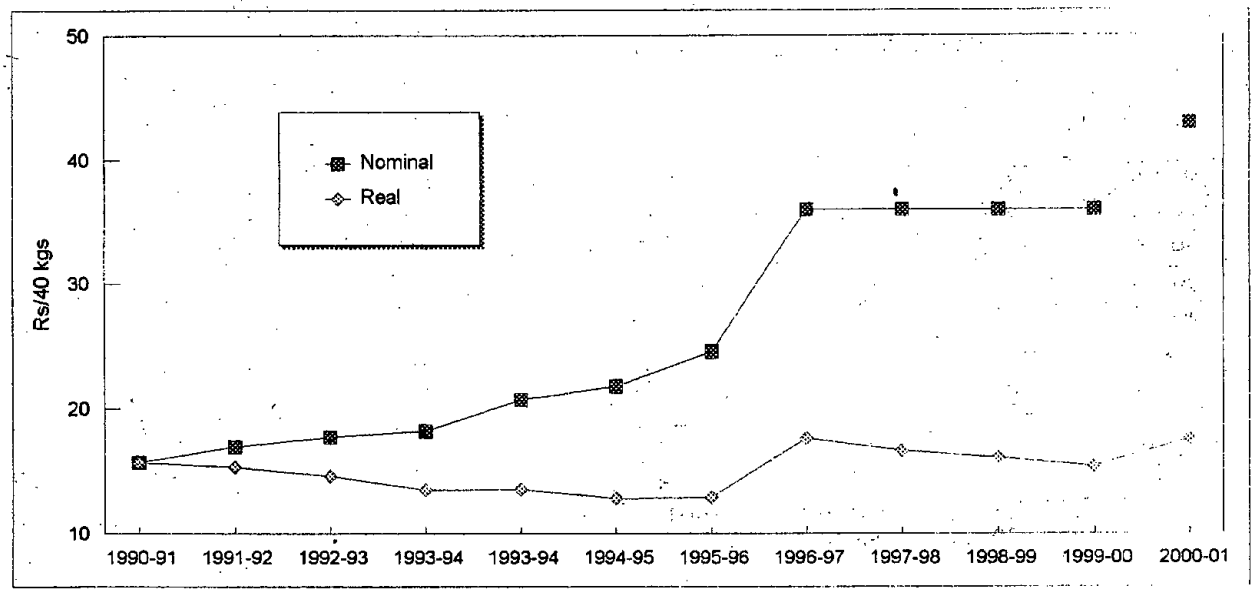

FIG-6: NOMINAL AND REAL SUPPORT PRICES OF SUGARCANE IN SINDH: 1990-91 TO 2001-02

112. Table-8 reveals that the nominal support prices of sugarcane in the Punjab increased from Rs 15.25 per 40 kgs in 1990-91 to Rs 35.00 2000-01, an overall increase of 130 per cent. During the same period, the cumulative inflation in terms of CPI, has been 133 per cent. Consequently, the real value of the support price of sugarcane for 2000-01 crop, estimated at Rs 15.01 per 40 kgs in terms of 1990-91 prices shows a decline of 2 per cent in relation to the corresponding price of Rs 15.25 for 1990-91 crop.

113. During 1990-91 to 1996-97 the support price of sugarcane in the Punjab increased by 57 per cent and CPI rose by 89 per cent. As a result, the real value of the support price of sugarcane declined by 17 per cent. Nevertheless in the wake of 46 per cent increase in the nominal value of support price of sugarcane in the Punjab in 1997-98 its real value jumped by 35 per cent over the last year and 13 per cent against the base year. The support price of sugarcane for the years from 1998-99 to 2000-01 were not revised. However, during this period CPI rose by 8 per cent which lowered the real value of the support price by the same extent. The real value of support price of sugarcane in 2000-01 was 1.6 per cent less than the base year's level.

114. In Sindh similar trend was observed in the pattern of nominal and real values of sugarcane prices. The real value of support price of sugarcane for 2000-01 crop estimated at Rs 15.43 per 40 kgs in terms of 1990-91 prices reflects a decline of 2 per cent over the base year.

115. For 2001-02 crop of sugarcane 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 the nominal support prices and about 9 per cent in the real value. In Sindh the nominal support price of Rs 43 per 40 kgs announced for 2001-02 crop of sugarcane reflects an increase of 19 per cent over the previous year. This has improved the real support price of sugarcane to Rs 17.63 per 40 kgs or 14 per cent in terms of 1990-91 prices.

8.5.2 Nominal and real market (mill-gate) prices of sugarcane

116. The nominal and real market (mill-gate) prices of sugarcane from 1990-91 to 2001-02 are set out in Table-9 and depicted in Figure-7 and 8.

Table-9: Nominal and Real Market (Mill-gate) Prices of Sugarcane: 1990-91 to 2001-02

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
	---- Rs per 40 kgs ----		1990-91=100	------ Rs 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	243.92	15.17	19.27

Sources: i) Economic Survey of Pakistan, 2000-01: Statistical Supplement.
ii) Various issues of the support price policy for sugarcane crop.

Note: CPI for 2001-02 has been projected in view of the average rise in CPI during the last 3 years.

117. It may be seen from Table-9 that the nominal market (mill-gate) price of sugarcane averaging at Rs 15.25 per 40 kgs in the Punjab had risen to Rs 45 in the 2000-01 but has been reported at Rs 37 per 40 kgs in 2001-02, showing an overall increase of 143 per cent. During the same period, the cumulative inflation in terms of CPI has been estimated at 144 per cent. Consequently, the real value of market (mill-gate) price of sugarcane in the Punjab has increased from Rs 15.25 per 40 kgs in 1990-91 to 15.17 in 2001-02 showing a decline of 0.52 per cent over 1990-91 prices.

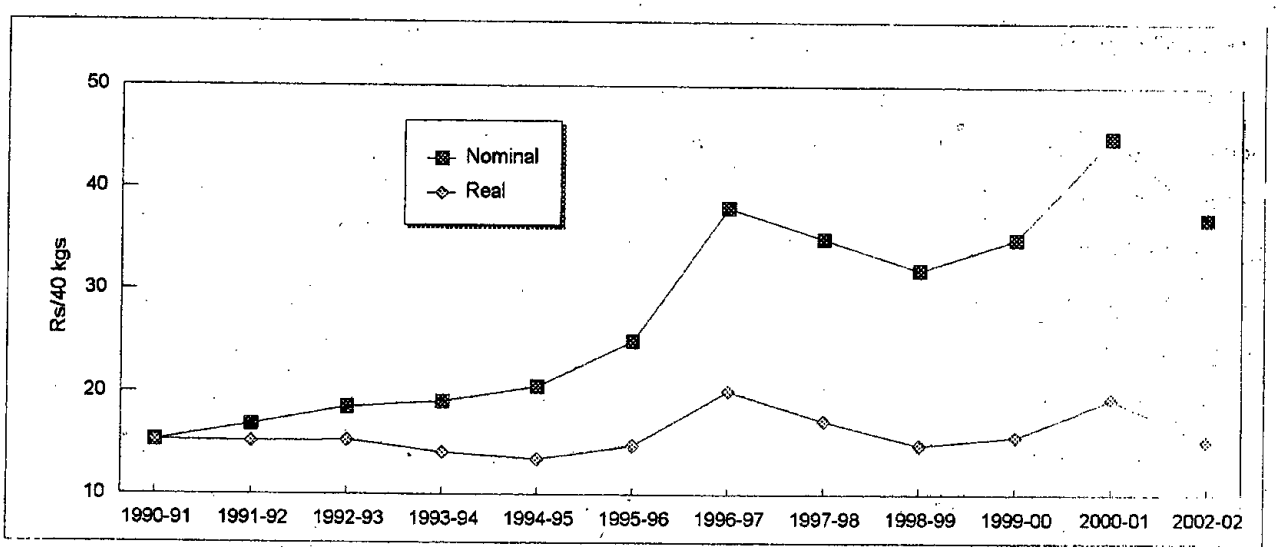

FIG-7: NOMINAL AND REAL MARKET PRICES OF SUGARCANE IN THE PUNJAB: 1990-91 TO 2001-02

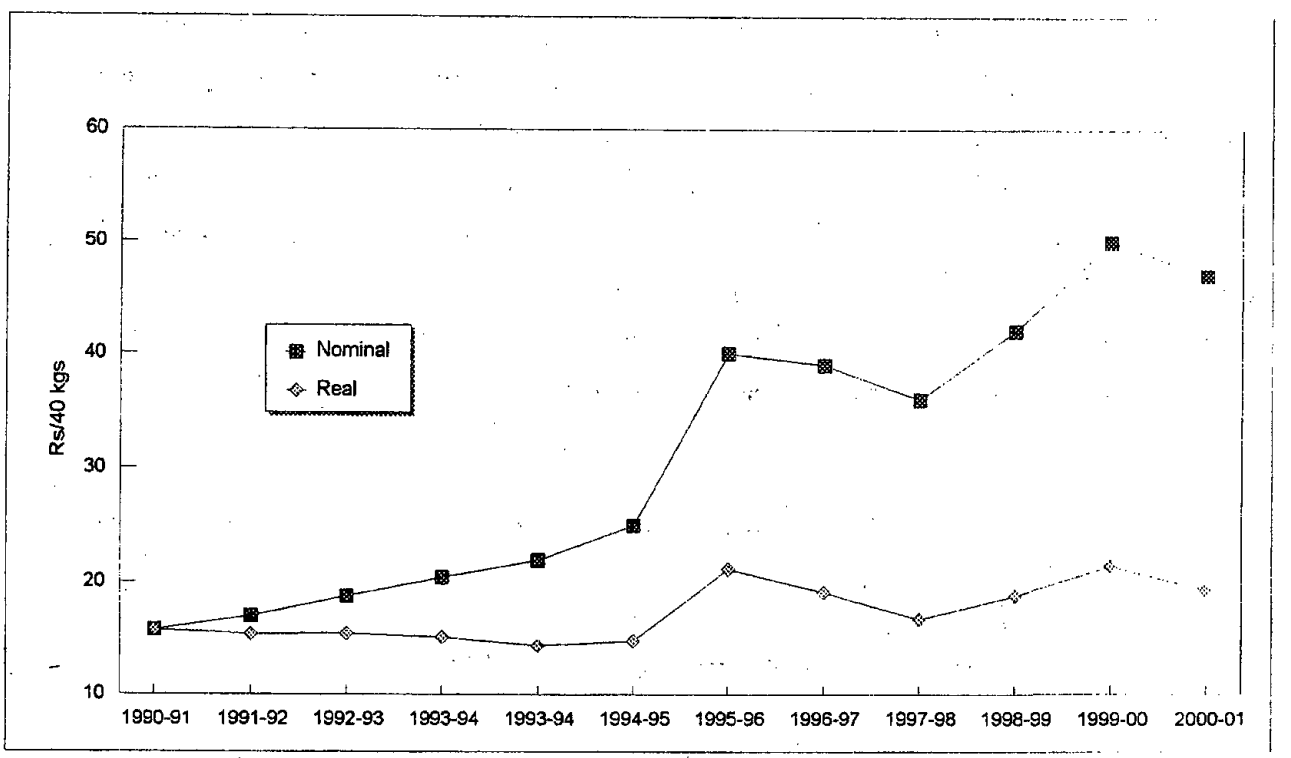

FIG-8: NOMINAL AND REAL MARKET PRICES OF SUGARCANE IN SINDH: 1990-91 TO 2001-02

118. The nominal market prices of sugarcane which averaged at Rs 15.25 per 40 kgs in the Punjab in 1990-91 have experienced considerable year to year fluctuations, reflecting the demand and supply situation in the province during the period under review. The prices experiencing steadily increasing trend up to 1995-96 jumped to Rs 38 per 40 kgs in 1996-97 but had since declined to Rs 35 by 1999-00. In view of the short crop during 2000-01 the market prices in the province rose to Rs 45 per 40 kgs but have declined to around Rs 37 in the current season. In case of Sindh the pattern of market prices, reflecting the demand and supply situation of sugarcane in the province, has been similar to that in the Punjab, but generally the level of prices has been higher. The sugarcane prices which were averaging at Rs 15.75 per 40 kgs in Sindh in 1990-91 had risen to Rs 40 by 1996-97, but had declined at Rs 36 per 40 kgs during 1998-99. Nevertheless, the prices rose to Rs 50 per 40 kgs during 2000-01 and have averaged at about Rs 47 in the current season.

119. The highest real value of market prices of sugarcane, Rs 20.09, per 40 kgs in terms of 1990-91 prices in the Punjab during the period under review was observed in 1996-97. The real value of market prices during 2000-01 was estimated at Rs 19.29 per 40 kgs but has declined to Rs 15.17 in the current season. In case of Sindh the 2nd highest value of real prices was noted during 1996-97 when in terms of 1990-91 prices, the real value of the market prices of sugarcane worked out at Rs 21.14 per 40 kgs. The highest value of Rs 21.44 per 40 kgs was noted during 2000-01. In the current season the real value of market prices of sugarcane in Sindh has been estimated at Rs 19.27, which is the 3rd highest during the period under reference.

8.6 World production, supply, demand, stocks, trade and price situation of sugar

8.6.1 Production, supply, demand, stocks and trade

120. Data on world production of sugar, consumption stocks and trade (raw equivalent) from 1999-00 to 2001-02 are presented in Table-10:

Table-10: World Balance Sheet of Sugar (Raw Equivalent): 1999-00 to 2001-02 (October-September)

S.No.	Item	1999-00	2000-01	200-1-02 (Estimated)	Changes in 2001-02 over 2000-01
		------- million tonnes----			Per cent
1	*Opening stocks**	57.09	60.44	60.07	(-) 0.61
2.	Production	131.80	131.01	131.94	(+) 0.71
3.	Total supply (1+2)	188.89	191.45	192.01	(+) 0.29
4.	Disappearance (consumption)	127.85	131.39	133.60	(+) 1.7
5.	End year stocks*	61.04	60.07	58.42	(-) 2.7
6.	Trade (export)	36.98	36.35	35.21	(-) 3.1

*Opening and closing stock may not equal due to quantities in transit.

Source: International Sugar Organization, Quarterly Market Review, September, 2001 for 1999-00 and November, 2001 for 2000-01 and 2001-02.

121. World production of sugar in 2000-01 is reported at 131.01 million tonnes, 0.79 million tonnes (0.6 per cent) lower than in 1999-00. Adding opening stocks of 60.44 million tonnes, total supply of sugar during 2000-01 was estimated at 191.45 million tonnes, 2.56 million tonnes (1.4 per cent) more than that of previous year. The global sugar consumption during 2000-01 estimated at 131.39 million tonnes was 3.5 million tonnes (2.8 per cent) higher in comparison to that of last year. The end year stocks reported at 60.07 million tonnes were 0.97 million tonnes (1.6 per cent) lower than the corresponding stocks in 1999-00.

122. As per International Sugar Organization, Quarterly Market Report, November, 2001, global sugar production during 2001-02 is forecast at 131.94 million tonnes, 0.93 million tonnes (0.71 per cent) higher than that of 2000-01. Consumption projected at 133.60 million tonnes will reduce the end year stock in 2001-02 to 58.42 million tonnes from 60.07 million tonnes of last year.

8.6.2 International prices of sugar

123. International prices of raw sugar fob (caribbean port) and white sugar fob (London) from 1990-91 to 2001-02 are presented in Annex-XV and graphically shown in Figure-9.

124. Raw sugar price (fob caribbean ports) averaged at US $ 203 per tonne (9.20 US cents per pound) during 1990-91. Next year these slightly declined to US $ 202 per tonne (9.16 US cents per pound). From 1992-93 prices started rising and reached US $ 302 per tonne (13.72 cent per pound) in 1994-95, the highest level during the period under review. During 1995-96, prices had declined to US $ 270 per tonne. The decline continued upto 1998-99 when prices of raw sugar dropped to their lowest level of US $ 146 per tonne. The prices of raw sugar have since been on the rise and averaged at 206 per tonne during 2000-01. However, prices have been on the decline in 2001-02 and dipped to US $ 164 per tonne (7.44 cents per pound) in (Oct-Dec) 2001-02.

125. The fob (London) price of white sugar during period under review has followed a pattern similar to that of raw sugar as discussed above. The prices averaging at US $ 303 per tonne during 1990-91 declined to US $ 274 in 1992-93. During 1993-94 and 1994-95 price of white sugar rose sharply, averaging at US $ 397 in 1994-95,the highest level observed during the period under review. During the next five years i.e. 1995-96 to 1999-00 the price of white sugar continued a declining trend and reached US $ 202 per tonne in 1999-00, the lowest price during last ten years. In 2000-01, prices had recovered and reached US $ 250 per tonne.

8.7 Import and export parity prices

126. Estimation of import and export parity prices of a commodity is helpful in determining the opportunity cost of resources used in its domestic production and also helpful in ascertaining its competitiveness in international markets. Pakistan has been mostly importer of sugar in the past. However, in some years it also produced exportable surplus. Therefore, both import

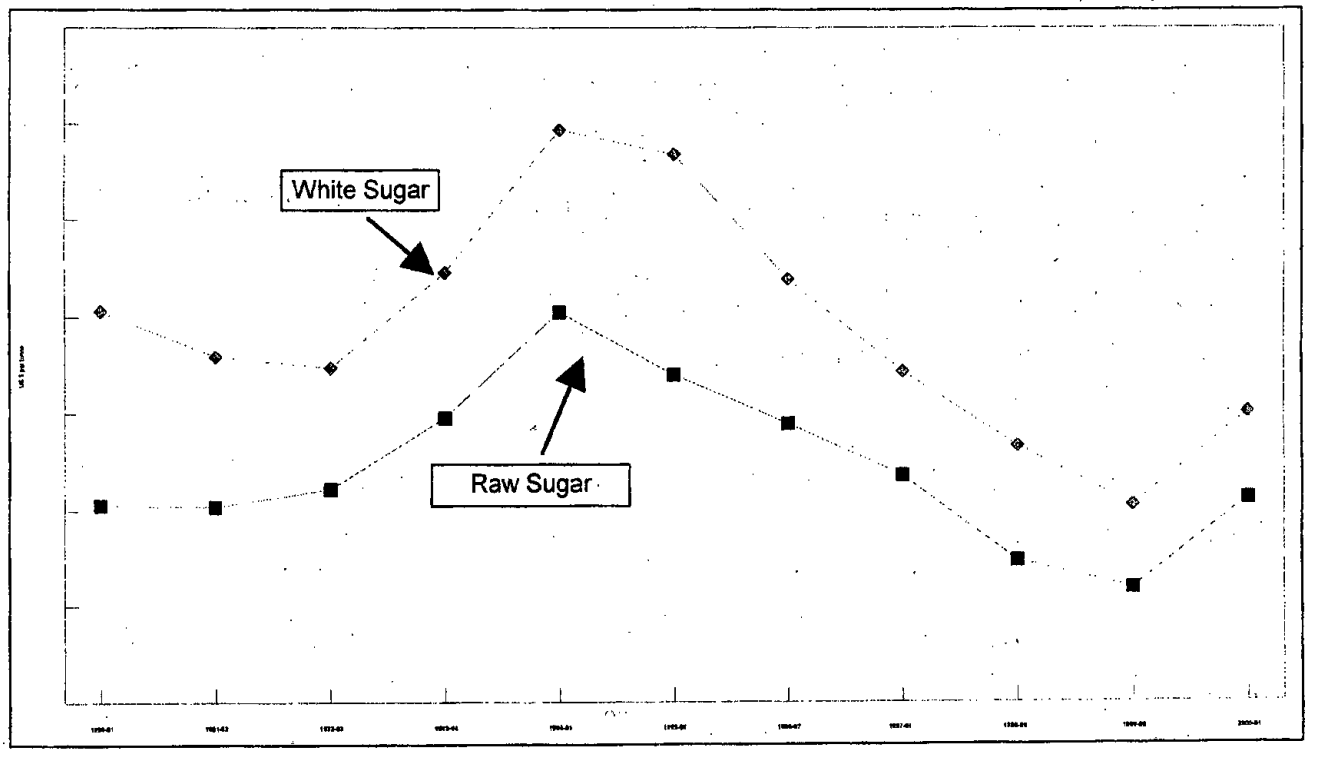

Fig - 9: INTERNATIONAL PRICES OF SUGAR:1990-91 TO 2000-01

and export parity prices have been calculated in this section. These have been worked out on the basis of fob (London) price of white sugar because actual average c&f import and fob (Karachi) export prices did not reflect our true opportunity cost or exports competitiveness because of the following reasons:

i) Average export prices of sugar are not exclusively of commercial sugar.

ii) Import prices are affected by the dumping practices of the sugar exporting countries.

iii) Incentives provided by the government to the exporters also distorted the situation.

127. The import and export parity prices have been calculated on the basis of fob (London) price as under.

i) Economic import parity price during:
   - 1996-97 to 2000-01
   - 2001-02 (October-December)

ii) Financial import parity price during:
   - 1996-97 to 2000-01
   - 2001-02 (October-December)

iii) Economic export parity price during:
   - 1996-97 to 2000-01
   - 2001-02 (October-December)

8.7.1 Import parity prices

8.7.1.1 Economic import parity prices

- **During 1996-97 to 2000-01**

128. The fob (London) prices of white sugar during 1996-97 to 2000-01 averaged at US $ 252 per tonne. After adding the freight charges upto Karachi @ $ 30 per tonne, the c&f Karachi price of white sugar comes to US $ 282 per tonne. Applying the existing selling exchange rate of one

US $ = 60.60 Pak rupees, the cost of imported sugar at Karachi port works out to Rs 17,089 per tonne. Adding various incidental charges i.e. marine insurance @ Rs 56 per tonne, L/C opening charges @ 0.5% of c&f cost (Rs 85 per tonne) foreign bank charges @ Re 1 per tonne, mark up on retirement of documents by bank for 60 days @ 12% per annum of c&f cost (or Rs 342), wharfage, handling and stevedoring charges @ Rs 610 per tonne, allowance for shortage and unforeseen expenses @ 1% of c&f cost (or Rs 171 per tonne), inspection service charges @ 0.5% of cif value (or Rs 86), importers' commission @ 1% of c&f cost (or Rs 171 per tonne), transport charges from Karachi to Lahore and loading and unloading charges @ Rs 1350 per tonne. The landed cost of imported white sugar (without taxes and local duties) at Lahore (mid point for major consumption centre) would be Rs 19,961 per tonne. Adopting the ratio of 66:34 between sugarcane and its processing cost, the millgate economic prices of sugarcane works out to Rs 44.81 per 40 kgs for Punjab and NWFP and Rs 45.86 for Sindh. Details of these calculation sand analysis are given in Annex-XVI.

- **During 2001-02 (Oct-Dec)**

129. The fob (London) prices of white sugar during (Oct.-Dec), 2001-02 averaged at US $ 242.41 per tonne. Adding the freight charges @ US $ 30 per tonne, the c&f Karachi price comes to US $ 272.41. At the existing exchange rate of one US $ = 60.60 Pak rupees, the import price works out to Rs 16508 per tonne. Accounting for the import incidentals and following the procedure outlined earlier, the import parity prices of sugarcane have been analysed in Annex-XVI. The mill-gate economic prices of sugarcane come to Rs 43.44 per 40 kgs for Punjab and NWFP, and Rs 44.46 for Sindh. Detail as given in Annex-XVI are summarized in Table-11.

8.7.1.2 Financial import parity prices:

- **During 1996-97 to 2000-01**

130. The fob (London) prices of sugar during 1996-97 to 2000-01 averaged at US $ 252 per tonne. Adding the freight charge of US $ 30 up to Karachi, the c&f Karachi price of imported white sugar comes to US $ 282 per tonne. Applying the existing selling exchange rate of one US

$ = 60.60 Pak rupees, the c&f (Karachi) price in Pak rupees comes to Rs 17,089 per tonne. Accounting for the financial incidental charges i.e. custom duty @ 30% on import value (Rs 5,144), sales tax @ 15% on import value, (including custom duty i.e. Rs 3,343), sales tax and wharfage on empty bags @ Rs 165, income tax @ 6% on duty paid value (DPV i.e. Rs 1,548), income tax on empty bags @ Rs 40, income tax @ 3.5 at sale stage (Rs 928) and other economic cost as explained under economic import parity prices and also subtracting the sale tax @ 15% (Rs 4,681) on local sugar production, the landed cost of one tonne sugar calculates to Rs 26,526 per tonne at Lahore. Adopting the ratio of 66:34 between sugarcane and its processing cost, the mill gate financial price of sugarcane comes to Rs 59.55 per 40 kgs for Punjab & NWFP and Rs 60.95 for Sindh (Annex-XVII and summary in Table-11).

- **During 2001-02 (Oct-Dec)**

131. The fob (London) prices of white sugar during (Oct-Dec) 2001-02 averged at US $ 242.41 per tonne. Adding the freight charges of US $ 30 per tonne, the c&f Karachi price comes to US $ 272.41. At the selling exchange rate of one US $ = 60.60 Pak rupees, the import price works out to Rs 16508 per tonne. Accounting for the financial incidentals and duties, taxes as detailed earlier and following the procedure outlined in the above paragraphs, the financial import parity prices of sugarcane come to Rs 57.67 per 40 kgs for Punjab and NWFP, and Rs 59.03 for Sindh (Annex-XVII). A summary of the import parity prices is given in Table-11.

Table-11: 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 price	Financial price	Economic price	Financial price
	US $/tonne	---------- Rs per 40 kgs ---------			
1. During 1996-97 to 2000-01	252.00	44.81	59.55	45.86	60.95
2. During 2001-02 (Oct-Dec)	242.41	43.44	57.67	44.46	59.03

Source: Annexes XVI and XVII

8.7.2 Economic export parity prices

- **During 1996-97 to 2000-01**

132. The fob (London) prices of white sugar have averaged at US $ 252 per tonne for the period 1996-97 to 2000-01. Assuming the quality of London quoted sugar at par with Pakistani white sugar and adopting the above price as fob (Karachi) and using the existing buying exchange rate of one US $ = 60.10 Pak rupees, the fob (Karachi) price of white sugar comes to rupees 15,145 per tonne. Subtracting the various incidentals entailed in export of sugar i.e from mill-gate to port i.e. transport charges from interior Sindh to Karachi port @ Rs 750; special packing charges @ Rs 90, inspection/survey @ Rs 40, transit insurance @ Rs 40, loading and unloading @ Rs 60, clearing and forwarding charges @ Rs 25,, wharfage, handling and stevedoring charges @ Rs 180, agents commission @ Rs 44, miscellaneous expenses @ Rs 50, all totalling to 1279 per tonne the ex-mill price of sugar comes to Rs 13,866 per tonne. Subtracting the sale tax @ 15% of ex-mill price (Rs 2,080) on local production, the ex-mill economic price of sugar works out to Rs 11,786 per tonne. Adopting the ratio 66:34 between sugarcane and its processing cost, the mill-gate price of sugarcane works back to Rs 26.46 per 40 kgs for Punjab and NWFP and Rs 27.08 for Sindh (Table 12). Details are given at Annex-XVIII.

- **During 2001-02 (October)**

133. During 2001-02 (Oct-Dec), the fob (London) prices of sugar averaged at US $ 225 per tonne or Rs 14569. Adopting the procedure as mentioned above the ex-mill price of sugar (without taxes and duties) comes to Rs 11,296 per tonne. Adopting the ratio 66:34 in apportioning this amount between the value of sugarcane and its processing cost, the mill-gate price of sugarcane works out to Rs 25.36 per 40 kgs for Punjab and NWFP and Rs 25.96 for Sindh (Table-12). Details are at Anex-XVIII and for summary Table-12.

Table-12: 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	------ Rs per tonne ----	
1. During 1996-97 to 2000-01	252.00	26.46	27.08
2. During 2001-02 (Oct-Dec)	242.41	25.36	25.96

Source: Annex-XVIII.

8.8 Comparative economics of sugarcane and competing crops

134. Allocation of resources among the competing enterprises is primarily governed by economic considerations reflected in gross cost, gross income, profit margin, net income, output-input ratio, returns to purchased inputs, irrigation water and crop duration, etc. The estimation of such indicators may provide useful insights into the pattern of resource use at farm level. As these indicators are derived from the farm management data and input-output prices these are subject to change over time and space. Moreover the use of multiple criteria in ascertaining the resource allocation patterns of farmers may provide conflicting signals.

135. Sugarcane, an annual crop, is grown in the irrigated regions of the country and occupies the fields round the year. Thus, land planted to it may not be available for sowing other kharif/rabi crops in a given year. Consequently, it competes against all other crops. The likely crop combinations would be cotton+wheat, cotton+sunflower, rice+wheat and rice+sunflower.

136. The economics of sugarcane and its competing crops/combinations has been analysed in terms of the prices realized by the growers during the 2001-02 crop year.

137. The details of the analysis are provided in Annex-XIX, while summaries of the economic indicators like output-input ratio and returns to crop duration, purchased inputs and irrigation water for the Punjab and Sindh are presented in Tables 13 and 14, respectively.

Punjab

138. As per results of the economic analysis reported in Table-13, sugarcane farming does fairly well against competing crops during 2001-02 crop year. The returns to overall investment as reflected in output-input ratio are reasonably good for sugarcane. Sugarcane yields the highest returns to purchased inputs. In case of returns to irrigation water, sugarcane has an edge over the rice combinations but lags behind cotton combinations. In respect of revenue per day of crop duration, the competing crop combinations enjoy upper hand.

Table-13: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in the Punjab: 2001-02 Crops

Crop/crop combination	Output-input ratio	Gross revenue per		
		rupee of purchased inputs cost	day of crop duration	Acre-inch of irrigation water
		--------- Rupees --------		
1. Sugarcane	1.03	3.16	42.89	384.06
2. Cotton+Wheat	1.00	2.30	50.38	542.56
3. Cotton+Sunflower	1.11	2.83	56.96	497.09
4. Basmati+Wheat	0.90	1.80	45.35	217.68
5. Basmati+Sunflower	1.03	2.23	52.59	212.98
6. IRRI+Wheat	0.92	1.89	43.52	198.30
7. IRRI+Sunflower	1.07	2.40	50.55	194.98

Source: Annex-XIX.

Sindh

139. In Sindh, sugarcane has fetched attractive prices during the current crushing season. High prices received by the growers have strengthened the economic position of sugarcane viz-a-viz competing crops. Sugarcane out-competes all the crop combinations in terms of returns to overall investment. It also edges out competing crops in terms of revenue per rupee of purchased inputs cost and per day of crop duration. In case of revenue per unit of irrigation, sugarcane out-competes rice combinations but lags behind cotton combinations.

Table-14: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in Sindh: 2001-02 Crops

Crop/crop combination	Output-input ratio	Gross revenue per		
		rupee of purchased inputs cost	day of crop duration	Acre-inch of irrigation water
		--------- Rupees --------		
1. Sugarcane	1.42	3.64	51.56	433.81
2. Cotton+Wheat	1.03	2.54	43.50	553.58
3. Cotton+Sunflower	1.13	3.07	51.17	491.23
4. IRRI+Wheat	1.04	2.41	41.50	210.42
5. IRRI+Sunflower	1.16	3.01	50.37	209.24

Source: Annex-XIX.

8.9 Economics of fertilizer use on sugarcane

140. Sugarcane responds well to the use of fertilizer nutrients viz. N, P and K particularly when these are applied in balanced doses. The economics of fertilizer use plays an important role in the use level of nutrients which have to be purchased entailing substantial outlays in the process which ought to be more than recovered for sustainable use of fertilizers. This means that use of fertilizers should not just increase the yield but the increase should be large enough to pay back for fertilizer costs alongwith reasonable margin. The present section examines economics of using N and P fertilizer on sugarcane through estimating (a) benefit cost ratios (BCRs) at various levels of crops responses to the use of fertilizers and (b) parity ratios between prices of fertilizer and sugarcane. The results are discussed below:

8.9.1 Benefit Cost Ratios (BCRs)

141. BCR is the ratio between gross values of additional produce and the costs of additional fertilizer used. BCR of 1.00 indicates no profit no loss situation or the break even point. BCR of less than one means a loss, that is money spent on fertilizer is more than what can be earned by selling the extra produce including the by-product etc. BCR of more than one implies that returns

from additional produce and its by-products are higher than the additional cost spent on fertilizers. The experts recommend a BCR of 2 or more under low risk (irrigated) farming conditions for sustainable use of fertilizers. Because of large variations in soil and climatic conditions across various agro-climatic regions the crops response to use of fertilizer nutrients exhibit considerable variation. The BCRs are also subject to change due to changing prices of inputs and output. Accordingly the benefit-cost analysis of fertilizer use on sugarcane has been attempted at different response ratios for the period of 1990-91 to 2001-02. The details of BCR calculations are given in Annex-XX while a summary of the results is presented in Table-15

Table-15: Benefit Cost Ratios (BCRs) of Fertilizer Use on Sugarcane at Support Prices: 1990-91 to 2001-2002

Crop year	BCR at response ratios (sugarcane: Nutrient) of			
	50:1	70:1	90:1	110:1
1990-91	1.86	2.23	2.51	2.72
1991-92	1.63	1.98	2.24	2.45
1992-93	1.45	1.73	1.94	2.11
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

Sources: 1. For 1990-91 to 2000-01 APCom's Support Price Policy Reports on Sugarcane.

2. For 2001-02: Annex-XX

142. The BCRs provided in Table-15 reveal that fertilizer use on sugarcane crop has remained profitable during the entire period under analysis. However, acceptable profitability level of BCR ≥ 2 has been generally observed at 90:1 and 110:1 response ratios though with sharp fluctuations. At crop nutrient response ratio of 90:1 BCR was 2.51 in 1990-91 which fell to 1.70 in 1996-97 due to continuous rise in fertilizer prices. However, from 1997-98 onward BCRs rose to more than 2, reflecting the desired profitability in the use of fertilizer on sugarcane. At response ratio of 70:1 BCR has ranged from 1.47 to 2.23 during the period under review.

In situations where sugarcane nutrient response ratio is 50:1 the BCRs has remained well below the desired level of 2 proposed by the experts. In situations where the response ratio of sugarcane to fertilizer use has been 110:1 the BCRs have been quite attractive. The results of the above analysis point out the need for increasing response of sugarcane crop to fertilizers through the use of improved cultural practices as well as the complementary inputs.

143. The above analysis is based on the output prices as fixed by the government. The situation may change if the prices of sugarcane actually realized by the growers are applied. The BCRs calculated at these prices as given in Table-16 show that profitability level is higher in the province of Sindh as compared to Punjab because in the former case growers have generally got better prices of their produce.

Table-16:- Benefit Cost Ratios (BCRs) of Fertilizer Use on Sugarcane at Market Prices:1995-96 to 2001-02

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

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.

8.9.2 Parity between prices of fertilizers and support prices of sugarcane

144. The parity ratios between prices of fertilizers and sugarcane refer to the quantity of sugarcane needed to purchase a nutrient unit of chemical fertilizer. Lesser the units of commodity required to purchase a given quantity of fertilizer more attractive is its economics of application on that crop and vice versa. To study the over time changes in fertilizer crop price relationship, the parities between the sale prices of fertilizers and average market prices of sugarcane in the Punjab and Sindh for the period 1991-92 to 2001-02 have been worked out and given in Table-17 and 18 respectively.

Table-17: Ratio Between Prices of Fertilizers (Nutrients) and Prices of Sugarcane in the Punjab:1991-92 to 2001-02

Crop year	Prices of fertilizer nutrients		Average market price of sugarcane	Quantity of sugarcane needed to buy one nutrient tonne of	
	N	P_2O_2		N	P_2O_2
	Rs per nutrient tonne		Rs per tonne	Tonnes	
1991-92	8043	8157	419	19.20	19.47
1992-93	8478	7552	438	19.36	17.24
1993-94	8696	8423	475	18.31	17.73
1994-95	10174	11236	512	19.87	21.95
1995-96	10217	13393	625	16.35	21.43
1996-97	13478	19509	950	14.19	20.54
1997-98	15870	18573	875	18.14	21.23
1998-99	15000	18913	800	18.75	23.64
1999-00	15217	24915	875	17.39	28.47
2000-01	14783	22476	1125	13.14	19.98
2001-02	17391	24499	925	18.80	26.49

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 for the Punjab in the respective support price policy papers.

2. Market prices of sugarcane i.e the prices actually received by the growers as collected during the field surveys in the Punjab by APCom have been used for computing parity ratios for the respective crop years.

145. It may be seen from the data given in Table-17 that in the Punjab province 19 to 20 units of sugarcane were required to purchase one unit of nitrogenous fertilizer upto 1994-95. However, due to improved market prices of sugarcane in 1996-97 its parity ratio improved in favour of sugarcane as only 14.19 units of the produce were needed to buy one unit of nitrogen. The parity ratio between prices of N fertilizer and cane prices remained swinging between 17 and 19 units upto 1999-2000 implying marginal fluctuation in the cane units required to buy one nutrient unit of nitrogenous fertilizer. In 2000-01 as prices of nitrogen declined to Rs 14783 per tonne and market prices of sugarcane went up the most favourable parity ratio of 13.14 during the period under consideration was estimated. However, due to low market prices of sugarcane and higher prices of fertilizers in 2001-02 season the parity ratio has deteriorated requiring about 19 units of sugarcane to purchase one unit of nitrogen.

146. In case of phosphatic fertilizer, the data reveal that during 1991-92, 19.47 units of cane were needed to purchase one nutrient unit of phosphatic fertilizer. In the following year this ratio improved in favour of sugarcane and the lowest parity ratio (17.24) during the period under review was observed. Since then the parity between the price of P_2O_5 and that of sugarcane has been continuously rising. The highest parity ratio of 28.47 was observed during 1999-00 as a result of 31.7 per cent increase in the price of P_2O_5 fertilizer as compared with the previous year. In 2000-01 due to fall in P_2O_5 prices accompanied with appreciated market prices of sugarcane the parity ratio became favourable to sugarcane. Nevertheless in the wake of low sugarcane price in 2001-02 the parity ratio has deteriorated for sugarcane.

147. In case of Sindh, the trend in parity ratios both for nitrogen and phosphatic fertilizer remained the same as in the Punjab. However, as cane growers in Sindh reportedly were getting high prices than in the Punjab therefore lesser units of cane were needed to purchase one unit of N and P_2O_5 (Table-18).

Table-18: Ratio Between Prices of Fertilizers (Nutrients) and Prices of Sugarcane in Sindh:1991-92 to 2001-02

Crop year	Prices of fertilizer nutrients		Average market price of sugarcane	Quantity of sugarcane needed to buy one nutrient tonne of	
	N	P_2O_2		N	P_2O_2
	Rs per nutrient tonne		Rs per tonne	Tonnes	
1991-92	8043	8157	444	18.11	18.37
1992-93	8478	7552	481	17.63	15.70
1993-94	8696	8423	510	17.05	16.52
1994-95	10087	10836	548	18.41	19.77
1995-96	10435	13004	625	16.70	20.81
1996-97	13478	19509	1000	13.48	19.51
1997-98	15435	18743	975	15.83	19.22
1998-99	15217	18828	900	16.91	20.92
1999-00	15217	24915	1050	14.49	23.73
2000-01	14783	22476	1250	11.83	17.98
2001-02	17391	24499	1175	14.80	20.85

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 for Sindh province in the respective support price policy papers.

2. Market prices of sugarcane i.e the prices actually received by the growers as collected during the field surveys in Sindh by APCom have been used for estimating parity ratios for the respective crop years.

148. The data in Table-18 reveal that parity ratio between the prices of nitrogen and those of cane ranged between 11.83 in 2000-01 to 18.11 units in 1991-92 with some fluctuations. In the year 2001-02 when the price of nitrogen has been reported about 17.6 per cent higher than the previous year alongwith 6 per cent decline in cane price, the parity ratio has deteriorated for sugarcane as 14.80 units of cane were required to purchase one unit of nitrogen.

149. In case of phosphatic fertilizers, the data reveal that during 1991-92, 18.37 units of cane were needed to purchase one nutrient unit of phosphatic fertilizer. However, due to appreciated price of sugarcane and about 7.4 per cent decrease in P_2O_5 price the purchasing power of cane improved in 1992-93. Since then the parity between the price of phosphatic fertilizer and that of sugarcane has been continuously rising and reached 23.73 in 1999-00, the highest level in the period under review. The purchasing power of sugarcane improved in 2000-01 as the parity ratio declined to 17.98 due to decrease in P_2O_5 prices and substantial rise in the price of sugarcane in the province of Sindh. In the year 2001-02, the purchasing power of sugarcane for phosphatic fertilizer again deteriorated because of higher prices of phosphatic fertilizer and relatively lower price of sugarcane.

150. It may be concluded from the above discussion that the purchasing power of sugarcane has not changed much in terms of nitrogenous fertilizer both in the Punjab and Sindh but has deteriorated in terms of phosphatic fertilizer. This situation does not bode well for the balanced and judicious use of fertilizers on sugarcane.

9. THE SUPPORT PRICE

151. The cane production from the current crop i.e. 2001-02 estimated at 49.1 million tonnes reflects an increase of 12.6 per cent over last year's 43.6 million tonnes. This increase has entirely been contributed by the Punjab province witnessing 21.4 per cent increase. The sugar production from sugarcane in the current season is expected at 2,994 to 3,100 thousand tonnes. Adding opening stocks of 621 thousand tonnes, total availability of sugar during 2001-02 may range from 3,615 to 3,721 thousand tonnes against the domestic consumption requirements of 3241 thousand tonnes implying a carry over stocks of 374 to 480 thousand tonnes. These stocks may improve to the extent of sugar production from sugarbeet. Thus, the country may not require sugar imports during the year 2001-02. The domestic requirements of sugar to be met from 2002-03 crop of sugarcane are projected at 3,310 thousand tonnes. Thus maintaining the current year's crop position in the Punjab and a little improvement in the cane production of Sindh province may enable the country to meet its sugar requirements domestically.

152. The analysis of the various domestic and international factors impacting on domestic prices of sugarcane as detailed in earlier sections of this report has provided price policy options for the 2002-03 crop, as summarized in Table-19. These policy options are briefly discussed in succeeding paragraphs.

Table-19:- Price Policy Options for Sugarcane, 2002-03 Crop

Basis	Mill gate price of sugarcane		
	Punjab	NWFP	Sindh
	Rupees per 40 kgs		
1 Cost of production of sugarcane (Annexes-X to XII)	36.71	34.26	36.25
2 Domestic parity prices worked back from:			
i) Average wholesale price of sugar during 2001-02 crushing season (Annex-XIII)	37.40	37.40	38.28
ii) Average wholesale price of "Gur" during October-December, 2001 (Annex-XIV)	34.35	46.40* 47.75**	-
3 If real value of support price were to be equated with the level of 1990-91	37.20	37.20	38.41
4 Import parity prices (Economic) as worked back from the average fob (London) price of white sugar (Annex-XVI)			
i) During 1996-97 to 2000-01	44.81	44.81	45.86
ii) During 2001-02 (October-December)	43.44	43.44	44.46
5 Import parity prices (Financial) as worked back from the average fob (London) price of white sugar (Annex-XVII)			
i) During 1996-97 to 2000-01	59.55	59.55	60.95
ii) During 2001-02 (October-December)	57.67	57.67	59.03
6 Export parity prices (Economic) as worked back from the average fob (London) price of white sugar (Annex-XVIII)			
i) During 1996-97 to 2000-01	26.46	26.46	27.08
ii) During 2001-02 (October-December)	25.36	25.36	25.96

* With license fee
** Without license fee

153. The cost of production of sugarcane for the 2002-03 crop, at mill gate calculates to Rs 36.71 per 40 kgs in the Punjab, Rs 34.26 per 40 kgs in NWFP and Rs 36.25 per 40 kgs in Sindh. The comparison of these costs with the support/indicative price of sugarcane announced for the current crop i.e. 2001-02 reveals a margin of 15 to 23 per cent. Compared with the market prices of cane obtaining in Sindh the margin increases to 30 per cent. In the NWFP also, the

margin is quite attractive. However, in case of the Punjab market prices are only marginally higher than the estimated cost of the produce.

154. Based on the average wholesale price of 'gur' during 2001-02 crushing season (Oct-Dec), the mill gate prices of sugarcane work back to Rs 34.35 per 40 kgs in the Punjab and Rs 46.40 and 47.75 per 40 kgs in the NWFP with and without license fee respectively.

155. The parity prices of sugarcane as worked back from 'gur' prices may not be of much help towards policy decision for the Punjab and Sindh but for the NWFP where cane supply is short and 'gur' making an attractive proposition, this parity does indicate the upper limit for the prices of sugarcane.

156. When calculated on the basis of average wholesale prices of sugar obtaining in the current season cane prices at mill gate come to Rs 37.40 per 40 kgs for Punjab and NWFP and Rs 38.28 per 40 kgs for Sindh.

157. Economic import parity price of sugarcane on the basis of average fob (London) prices of white sugar, from 1996-97 to 2000-01 have been worked back at Rs 44.81 per 40 kgs for Punjab and NWFP, and Rs 45.86 per 40 kgs for Sindh. These prices come to Rs. 43.44 and Rs 44.46 per 40 kgs, respectively when calculated on the basis of fob (London) prices of sugar during October to December of 2001. These parities may provide a limit for the ceiling price of sugarcane by way of encouraging import substitution.

158. The financial import parity prices of sugarcane worked back from the average fob (London) prices of sugar from 1996-97 to 2000-01 come to Rs 59.55 per 40 kgs for the Punjab and NWFP and Rs 60.95 per 40 kgs for Sindh. When calculated on the basis of average fob (London) prices in (October-December) 2001 these financial parity prices of sugarcane come to Rs 57.67 per 40 kgs for Punjab and NWFP and Rs. 59.03 per 40 kgs for Sindh. As price policy based on financial import parity, in view of the considerable weight of import taxes, may introduce a lot of distortions in resource allocation, it may not be advisable to use these as a reference point.

159. The export parity price of sugarcane on the basis of average fob (London) prices of sugar during 1996-97 to 2000-01 works back to Rs 26.46 per 40 kgs for Punjab and NWFP, and Rs 27.08 per 40 kgs for Sindh. Based on the fob (London) prices of sugar during 2001 (October-December) the export parity price of sugarcane works back to Rs 25.36 to 25.96 per 40 kgs. These prices are much below the prevailing support prices implying that Pakistan cannot compete in the sugar export markets. Given the current demand supply situation in Pakistan, export parity prices, however, may not be of much relevance.

160. In view of the results of the analysis discussed above, the balanced domestic demand and supply situation with not much scope for competitive exports of sugar, the sugarcane policy should aim at sustaining the current situation of around self sufficiency with only marginal imports to maintain buffer stocks to check the price hike.

161. In view of the above mentioned factors the APCom proposes that the support prices fixed for 2001-02 crop of sugarcane may be maintained for the 2002-03 crop as given below. These prices still provide a reasonable margin of profit over cost of production provided they are ensured to the growers.

Province	**Support Price for**	
	2001-02 crop actual	**2002-03 crop proposed**
	Rupees per 40 kgs at mill gate	
Punjab and NWFP	42.00	42.00
Sindh and Balochistan	43.00	43.00

162. The dichotomy between the minimum prices fixed by the Government of the Punjab and those by the Federal Government and the confusion between the indicative and support price need to be removed for promoting the healthy relationship between the various sub sectors of the sugar sector.

10. MARKETING OF SUGARCANE, 2001-02 CROP

163. For ascertaining the situation regarding marketing of sugarcane APCom organized field visits and surveys in the cane producing areas of Punjab, Sindh and NWFP during first fortnight of January, 2002. On the basis of results obtained from this survey and the discussions in the meeting of Standing Committee on Sugarcane held at Hyderabad on 7-1-2002, the main issues relating to the marketing of sugarcane are described below:

10.1 Sugarcane prices

164 For 2001-02 sugarcane crop, the ECC in its meeting held on 17-9-2001 had decided the support prices at mill gates as follows:

- Punjab and NWFP Rs 42 per 40 kgs
- Sindh and Balochistan Rs 43 per 40 kgs

165. The support prices of sugarcane have been, as per the practice, fixed by the Federal Cabinet/ECC of the Cabinet and notified by the provincial Governments in exercise of the powers under respective provincial Sugar Factories Control Act 1950. This year, the sugarmills starting their crushing in November procured cane in NWFP and Sindh at the announced support prices of Rs 42 and Rs 43 per 40 kgs respectively or higher than that. But the mills in the Punjab started purchases of sugarcane at the last year's rate of Rs 35 per 40 kgs. On protests by the growers and their organizations, the Government of Punjab intervened and fixed the minimum price of sugarcane at Rs 40 per 40 kgs on December 29, 2001. Thus, in the Punjab, the mills started purchasing of sugarcane at this price in the first week of January, 2002. It was, perhaps, the first instance in the history of support price programme that the provincial Government fixed the minimum price of sugarcane less than that announced by the Federal Government.

166. According to field survey, the sugarmills in the upper Sindh were procuring cane at the support price of Rs 43 per 40 kgs while in lower Sindh the prices ranged between Rs 43-50. In the mid of January 2002, the cane prices in some cases were as high as Rs 60 per 40 kgs. In

Punjab market price was Rs 4 to 5 per 40 kgs less than the support price at the purchase centres. In the NWFP, the sugarmills were paying Rs 42 - 45 per 40 kgs of cane (including transport subsidy) while the cane crushers making gur, were reported to be paying around Rs 55 per 40 kgs.

10.2 Underweighment and deductions

167. The complaints about underweighment and undue deductions on the part of sugar mills and their agents are very common, though not confined to this year only. However, with the emergence of middlemen between growers and the mills, these complaints have increased manifold. According to mills the deductions from the sale proceeds are on account of high trash contents, binding material and poor quality of cane supplied. These deductions vary from mill to mill. During the current crushing season the average deductions were reported as high as upto two per cent of the cane weight whereas the legal provision was just 250 grams per 40 kgs to be deducted on account of binding material. The growers alleged that sugar mills impose illegal deductions in the name of cane quality and poor preparation. However, mills management complained that cane supplied to the mills was not properly stripped and had higher trash contents. As the high trash contents with cane causes sugar loss, therefore, growers should properly clean the trash before supply to mills.

168. As regards under weighment, the middlemen operating in the countryside have become notorious in this context. Weigh bridges/scales installed at the procurement centres do not record the correct weight of the produce. The growers alleged that underweighment has been 30-40 maunds per truck load and 20-25 maunds per trolley load. In some instances, the underweighment was reported upto 50 maunds per consignment.

10.3 Sugarcane supply to mills

169. According to Sugar Factories Control Act, the crushing season commences in October but this year the mills started crushing in November. However, in Sindh mills started a bit earlier than the mills of Punjab and NWFP. Cane supply to the mills was not normal and generally the

mills were running below their capacity. The supply situation in NWFP was more precarious. The mills had not entered into cane supply agreements with growers in any province. No premium was paid over any variety/planting time. The most common varieties supplied to the mills were COJ-84, COJ-1148, CP 77/400, Triton, CO-975, Mardan 92/93, BL 4, BF 129, COL 29 & L-116.

170. In NWFP, the mills compete with cane crushers engaged in 'gur' making for cane supply. Till the time of APCom's field survey, the cane crushers were not paying any tax. Thus the crushers were in a position to offer higher prices to the growers as compared to the mills who pay various taxes to the Government. The mills were purchasing cane at Rs 42 – 45 per 40 kgs including Rs 3 as transport subsidy, whereas cane crushers were paying upto Rs 50 to 60 per 40 kgs. Due to diversion of cane to cane crushers for gur making, mills were facing acute shortage of cane, so much so that even in the prime days of crushing, the industry was running at one third of its capacity. The 'gur' making industry in NWFP is popular among growers due to the following reasons:

i) The use of gur is important part of the food culture in the NWFP and fetches attractive prices. Thus, 'gur' making is profitable due to attractive gur prices, ranging from Rs 625 to 867 per 40 kgs.

iii) Cane marketing to mills is complicated and time consuming than supply to cane crushers.

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

171. As a result of uncertainty in 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 to some others it was not sufficient. Any way, the growers in the Punjab are facing all sorts of difficulties in disposing of their produce to sugarmills i.e. long waiting time at mill gate, 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 last year as well. The plight of growers needs to be redressed. The sugar mills were offering prices of cane at Rs 35 per 40 kgs during November and December. However, in

January they started paying Rs 40 per 40 kgs at mill gates but the fate of their dues of earlier consignments, which emerged from difference of price (i.e. Rs 40 – 35 = Rs 5 per 40 kgs), was not known.

172. Sugarmills in Sindh were expecting less supply of cane as compared to last year. Because of non-commissioning of Kirn Sugarmills, Rohri, and Dadu Sugarmills, the other mills of upper Sindh were getting reasonable quantities of cane. However, the Larkana sugarmills suffered from acute shortage of cane as ever. The cane supply situation in lower Sindh was also tight and the mills were facing a sort of cut-throat competition and offering a price of over Rs 50 per 40 kgs and making the spot payments through their agents. But there were wide spread complaints of underweighment at the various procurement points.

10.4 Emergence of middlemen and purchases from distant areas

173. The middlemen have emerged in cane marketing during the last few years. These middlemen make purchases through their private purchase centres established at far off places. They make prompt payments to the growers, albeit, at reduced rate by Rs 4 - 5 per maund as compared to the mill gate price. The mills have also been purchasing cane from the distant areas through their purchase centres. The mills pay less price to the growers at purchase centres by deducting transportation charges @ paisas 8-10 per killometer per 40 kgs.

174. Purchases through middlemen and purchase centres established by the mills encourage cross transportation over the long distances. This practice no doubt helps mills to meet their demand for cane but puts lot of pressure on the road network resulting in congestion of traffic on high ways and wasteful use of resources. Therefore, it is urged upon that mills should buy cane from the nearby areas to reduce the cross transportation. By making prompt payments to growers supplying cane at the mill gates, the role of middlemen, who are in the practice of purchasing CPR's from the growers at reduced price in return for prompt cash payments could be reduced to a considerable extent. The practice of purchase of CPR's is now wide spread. It has emerged as a new line of business. The growers allege that quite a large number of such middlemen are paid agents of the mills, who help the mills in getting cane supplies at reduced price. The

Provincial Governments should streamline the payment of cane proceeds to check this practice which adversely affects the income of farmers.

175. In order to properly implement the sugarcane support price and to safeguard the interest of both growers and the industry, following suggestions have come forth during the course of survey.

- The Provincial Governments should ensure the payment of minimum support price as fixed by the Federal Government rather than lowering the same to the disadvantage of growers.
- Sugar price may also be fixed keeping in view the cost of raw material i.e. cane and processing costs etc.
- In case of depressed sugar prices, government should make necessary arrangements to purchase sugar at the pre-determined price.
- Allocation and usage of Sugarcane Development Cess needs to be streamlined.
- The Federal Government should persuade the Provincial Governments for adopting a strict system of checking the accuracy of weigh bridges and scales at the sugarmills and cane purchase centres, so that wide spread menace of underweighment of sugarcane is eliminated.
- The Government of Punjab should bind the sugarmills to pay the difference of price i.e. Rs 40 - 35 = Rs 5 per 40 kgs for all the quantities procured by them during the months of November and December, 2001.
- Non-clearance of trash from sugarcane causes huge losses of sugar at national level. Farmers need to be sensitised to this aspect through a campaign in the mass media.
- The provincial Cane Commissioners should strictly implement the provisions of Sugar Factories Control Act, 1950 to stop excessive deductions and late payments of cane proceeds.

11. PAYMENT OF QUALITY PRICES FOR SUGARCANE

176. At present sugarcane price in Pakistan is generally paid to growers in relation to its weight without much regard to the quality and its sucrose contents although at the end of crushing season, quality premium on collective basis is paid by certain mills in varying degrees.

As the system of payments by weight does not encourage the cultivation of high sucrose containing varieties, APCom has been recommending measures to improve this state of affairs. The important among these are reviewed and discussed below.

11.1 Payment of quality premium on collective basis

177. The support prices of sugarcane in different provinces are fixed by Federal Government, keeping in view the average recovery of the respective province, i.e. 8.7 per cent in Sindh and Balochistan and 8.5 per cent in the Punjab and NWFP. In case a sugarmill's overall recovery is higher than the base recovery level, that mill is supposed to share with the farmers, the extra revenue earned by the mill due to higher recovery. Therefore, every year 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 point additional sugar recovery over the respective provincial base levels. As for the 2002-03 crop, quality premium has been calculated below on the basis of existing support prices of sugarcane.

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 recovery over base recovery (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)	Ps per 40 kgs	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.

178. The quality premium payable to the growers for 2002-03 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 now this system has failed to work because:

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 still lying in the Supreme Court.

ii) The above concept of quality premium was workable and practised 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 purchase cane at higher than support price (especially in Sindh & NWFP), the payment of quality premium is considered to be made/included in the price.

iii) The growers who deliver cane through middlemen, automatically lose their right of quality premium and this intermediary has increased overtime. In view of the sub judice nature of the matter and other considerations as mentioned above, no change in quality premium is recommended.

11.2 Ratio proportion system

179. 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 has been 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.

180. 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 cropped up and those countries wherein ratio proportion system was run successfully in the earlier stages are now finding it difficult to cope with these issues. Thus, these countries now are returning to the payment of price according to the individual consignments. Moreover, the system does not encourage the efficiency in the processing or cultivation of sugarcane as the ratio of sharing the proceeds get fixed.

11.3 Payment according to individual consignments

181. In the initial stages of the development of sugarcane cultivation for sugar processing, all the countries adopted the 'flat rate system" of payments, linking cane price to weight without regard to its quality. Later on many countries introduced various refinements so as to link cane price to the sucrose contents in addition to the weight. However, this required scientific determination of the level of the sucrose in individual consignments through random sampling. In this way cane price to be paid to the growers is calculated. This system has proved helpful in enhancing the efficiency of the both sugarcane farming at farm and its processing at mills levels.

182. The Cabinet in 1986 had approved the installation of core samplers in the sugar mills. However, only Thatta sugarmills (a public sector enterprise) installed the core sampler device and ran trials on the determination of sucrose content. As no other mill had installed the core sampler, the Thatta sugar mills did not link the payments of sugarcane to its price either. Neither the formula of quality premium payment provided for discounted price of sugarcane for inferior quality produce nor the growers were willing to accept the lower price than support one for their sugarcane if it had lower recovery than the basic one. The system could work only if all the competing mills adopted the system simultaneously which has not become possible even uptil now. Above all, there was and still is a wide gulf of mistrust between the growers and millers. The growers hardly believe the mills' calculations of sucrose recovery. Thus due to these reasons the system could not work. There is a need for the establishment of a neutral laboratory at each

mill premises for the objective determination of sucrose contents of the sugarcane tendered by the growers. The system must enjoy the confidence of all the parties involved.

183. Under free market system, the marketing is governed by the consumers/buyers. In sugar sector this principle also holds good. The payment of quality prices cannot be implemented or enforced unless the buyers i.e. the sugarmills are ready to buy cane according to quality. It is the duty of the sugarmills to make the system transparent and win the confidence of the cane producers. The government has least role in this respect especially in view of current emphasis on market forces. It is high time for the sugar industry to compete on quality basis and adopt a scientific method and basis for payment to the growers for sustainable supply of raw material. In the wake of globalization it has become all the more imperative to increase the efficiency by providing level playing field to all the sub-sectors of the sugar industry. Thus, each mill should install core-sampler at its premises and start making payment according to sucrose contents. However, in this respect a reference price for sugar would need to be worked out keeping in view the international market and the provincial base recoveries. The suppliers of cane with higher sucrose than bench mark should be compensated while suppliers of inferior cane be paid at discounted price. To build the trust of the growers, individual sucrose readings may be compared with the average seasonal recovery and payments adjusted in case of higher seasonal average.

12. IMPROVING PRODUCTIVITY AND MARKETING OF SUGARCANE

12.1 Improving productivity

184. The development of sugar industry in Pakistan has encouraged the expansion of sugarcane area. Pakistan ranking 4th in terms of area under sugarcane nevertheless ranks quite low in terms of yield and sucrose contents. The yield potential of the available varieties as manifested in yields obtained by the progressive growers in major cane growing areas offers a ray of hope. The need is for transplanting this potential into actual achievement on the vast majority of farms operated by the average and traditional growers.

185. The crop experts/researchers have identified a number of factors in this context viz: (i) varietal development; (ii) improper land preparation; (iii) provision of seed of approved varieties; (iv) low plant population and (v) inadequate weed control/plant protection (vi) unbalanced use of fertilizer; (vii) biological control of sugarcane pests; and (viii) use of press mud/organic matter. These are briefly discussed below :

12.1.1 Varietal development

186. 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 has been constrained due to insufficient funds and land.

187. 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 few lacs of rupees by the government of NWFP allocation of cess fund for cane research development has remained on the papers. Therefore, APCom emphasizes on the implementation of the decisions on cess fund. It is also suggested that the breeding research stations both under the control of provincial as well as federal government should be strengthened and their research programmes monitored and reviewed periodically through peer reviews.

12.1.2 Improper land preparation

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

12.1.3 Provision of seed of approved varieties

189. The researchers/breeders have developed some high yielding varieties for early, mid and late seasons which if adopted may help increase the cane yield by 20-25 per cent provided their disease free seed is made available. According to the information obtained from Sugarcane Research Centres, high yielding cane varieties recommended for Punjab include: BL-4, L-116, BF-162, CP-43-33, CP-77-400, CP-72-2086, CPF-237 and HSF-240. CO-1148 is an Indian variety and is not recommended but due to its physical weight and good ratooning it has been adopted by a large number of growers. 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-XXI

190. 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 sole beneficiaries of increased production of sugarcane and sugar. For this purpose sugar mills should establish their Cane Development Centres either individually or collectively. These centres in collaboration with the progressive growers and sugarcane researchers should undertake the multiplication and distribution of certified cane seed.

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

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

12.1.4 Low plant population

191. Lack of adequate plant population is another important reason for low productivity. 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 but to ensure 100 per cent germination this quantity of seed must be enhanced through presently recommended double sett sowing method. 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.

12.1.5 Inadequate weed control/plant protection

192. 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 a 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. Provincial agriculture departments should play their role to persuade the growers and the sugar mills on the subject through a comprehensively planned programme.

12.1.6 Unbalanced use of fertilizer

193. Chemical fertilizers play an important role in enhancing crop productivity but real key for getting maximum returns from money spent on fertilizers is their balanced use at proper time. 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

194. The empirical research has proved that nitrogenous fertilizers stimulates 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 entirely depends on the nutrients already available in the soil. Our soils though not deficient in potash but need some application of this element for improving the efficiency of other nutrients. The current use of 3 kgs of potash per acre 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.

195. Although research on fertilizer use in the country is much ahead of other research areas, yet growers are not being benefited by the recommendations/conclusions that researchers have prescribed/drawn. 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.

12.1.7 Biological control of sugarcane pests

196. 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.

197. 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 spear head 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.

12.1.8 Use of press mud/organic matter

198. As a result of intensive cropping most of our lands/soils have lost 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 need for intensive cropping does not allow these practices. 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 APCom in its last year's policy stressed upon the provincial governments for taking measures to discourage burning of press mud as fuel and promoting its use as organic matter/manure in crop production. Reiterating its earlier recommendation, the APCom further suggests that sugarmills 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 and in turn will yield higher economic returns to the sugarmills.

12.2 Improving marketing

199. The sugarcane crop has periodically suffered from a number of marketing bottlenecks resulting in considerable fluctuation in the supply of cane to the sugar industry. In order to improve the situation, APCom in the previous years support price policy papers recommended a number of non-price measures which have not received due attention of the concerned agencies. These measures have been reviewed and described below for implementation during 2002-03 crop year.

12.2.1 Use of sugarcane cess fund

200. The sugarcane cess levied on sugarcane is shared by the growers and the sugarmills equally. The mill deducts the share of growers before making the payments and after adding an equal amount as prescribed by the provincial government, as its own share deposits in the cess fund maintained by the Provincial Government. This fund is for the development of roads, other such infrastructure in the mills area and for agriculture research purposes.

201. The cess rate previously reflected wide disparity among the provinces and was a cause of concern. With the recent downward revision of the cess rate in the Punjab, which was long overdue, the rates have become more or less uniform. The uses of cess fund nevertheless need to be streamlined with special focus on research and development activities on sugarcane and other infrastructure.

12.2.2 Price for sugar

202. Sugar price is directly affected by the prices of sugarcane as raw material. So any increase in sugarcane price would ultimately lead to enhancement in market prices of sugar. In years when sugar prices due to surplus stocks, low international prices etc. did not increase in line with sugarcane prices, the sugar mills were reluctant/unable to implement the support price for sugarcane. Consequently, the farmers did not receive the due prices for their produce suffering financial loss. The payments of sale proceeds in such circumstances were also held up for quite a long time. To improve the situation, PSMA has argued that price for sugar may also be fixed keeping in view the price of sugarcane and other processing costs for maintaining a realistic market price of sugar complemented by adequate trade policy measures. The determination of such a cost can be helpful in levying the import duty and designing of trade policy for sugar.

12.2.3 Amendments in sugar factories control act, 1950

203. The Sugar Factories Control Act, 1950, in the wake of many developments in the farming of sugarcane, large scale developments of sugar industry and increasing deregulation of economy needs to be amended. Necessary amendments in the Act are needed to reflect these developments providing for the future requirements of the sector.

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ANNEX-I

AREA,YIELD AND PRODUCTION OF SUGARCANE: 1991-1992 TO 2001-2002

YEARS	PUNJAB	SINDH	NWFP	BALOCH.	PAKISTAN
AREA			***000 HECTARES***		
1991-92	536.2	255.3	104.0	0.6	896.1
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
1999-2000	672.1	230.6	106.3	0.8	1009.8
2000-2001	615.5	238.8	105.9	0.6	960.8
2001-2002	689.8	240.7	104.5	0.6	1035.6
YIELD			***TONNES PER HECTARE***		
1991-92	37.3	55.8	43.9	47.8	43.4
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
1999-2000	40.3	62.0	46.3	54.3	45.9
2000-2001	43.4	50.5	45.2	53.7	45.4
2001-2002	47.0	48.6	47.1	52.7	47.4
PRODUCTION			***000 TONNES***		
1991-92	20026.8	14240.5	4568.9	28.7	38864.9
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
1999-2000	27081.3	14290.8	4917.1	43.4	46332.6
2000-2001	26740.0	12049.7	4784.4	32.2	43606.3
2001-2002	32455.0	11689.9	4921.7	31.6	49098.2

Sources:
1. From 1991-92 to 1999-00: Agricultural Statistics of Pakistan 1999-00, MINFAL,Islamabad.
2. For 2000-2001: Final estimates provided by MINFAL, Islamabad.
3. For 2001-2002: Second estimates provided by Provincial Agriculture Departments.

ANNEX-II

DISTRICT-WISE AREA AND PRODUCTION OF SUGARCANE: AVERAGE OF 1998-99 TO 2000-01

Area = 000 hectares
Production = 000 tonnes

S.No	District/Province	Area	Per cent	Production	Per cent	S.No	District/Province	Area	Per cent	Production	Per cent
	PUNJAB						**NWFP**				
1	Faisalabad	113.40	10.88	5190.03	10.73	1	Charsada	33.07	3.17	1708.53	3.53
2	Jhang	81.87	7.86	3368.23	6.96	2	Mardan	29.67	2.85	1265.80	2.62
3	Sargodha	77.40	7.43	3153.10	6.52	3	Peshawar	12.77	1.23	656.23	1.36
4	Kasur	52.00	4.99	2344.07	4.85	4	D.I.Khan	8.53	0.82	336.13	0 69
5	T.T.Singh	42.00	4.03	1966.93	4.07	5	Nowshera	6.00	0.58	290.57	0.60
6	Okara	30.10	2.89	1499.37	3.10	6	Malakand	4.90	0.47	194.30	0 40
7	M.B.Din	33.40	3.21	1302.53	2.69	7	Swabi	4.33	0.42	176.00	0.36
8	R.Y.Khan	32.20	3.09	1286.30	2.66	8	Mohmand Agency	2.13	0.20	57.43	0.12
9	Bahawalnagar	30.20	2.90	1166.17	2.41	9	Bannu	1.20	0.12	48.23	0.10
10	Bhakkar	23.37	2.24	959.37	1.98	10	Khyber Agency	0.60	0.06	15.97	0.03
11	Sheikhupura	22.33	2.14	823.20	1.70	11	Tank	0.60	0.06	14.10	0.03
12	Sahiwal	16.83	1.62	724.57	1.50	12	Lakki	0.33	0.03	13.47	0.03
13	Vehari	15.90	1.53	653.90	1.35	13	Kohat	0.23	0.02	7.70	0.02
14	Pakpatan	15.20	1.46	632.13	1.31	14	Bunner	0.27	0.03	6.77	0.01
15	Layyah	16.37	1.57	618.90	1.28	15	Haripur	0.10	0.01	3.30	0.01
16	M.Garh	17.37	1.67	611.57	1.26	16	Dir	0.10	0.01	2.70	0.01
17	Bahawalpur	10.33	0.99	434.63	0.90	17	F.R. Bannu	0.10	0.01	2.57	0.01
18	Khushab	9.17	0.88	361.63	0.75	18	Bajour "	0.10	0.01	2.37	0.00
19	Khanewal	8.73	0.84	352.23	0.73	19	N/Waziristan	0.03	0.00	1.80	0.00
20	Hafizabad	7.87	0.76	321.03	0.66	20	F.R.D.I.Khan	0.10	0.01	1.77	0.00
21	Mianwali	5.10	0.49	205.57	0.42	21	F.R.Peshawar	0.00	0.00	0.70	0.00
22	Narowal	4.97	0.48	184.87	0.38	22	F.R.Kohat	0.00	0.00	0.27	0.00
23	Multan	4.30	0.41	178.03	0.37	23	Manshera	0.00	0.00	0.17	0.00
24	Gujrat	4.30	0.41	168.20	0.35	24	Shanglapar	0.00	0.00	0.13	0.00
25	Gujranwala	3.83	0.37	148.23	0.31						
26	Sialkot	2.30	0.22	100.37	0.21						
27	Rajanpur	2.33	0.22	83.53	0.17						
28	Lodhran	1.93	0.19	73.57	0.15						
29	D.G.Khan	2.00	0.19	73.07	0.15						
30	Lahore	1.73	0.17	67.17	0.14						
31	Jhelum	0.27	0.03	8.60	0.02						
32	Attock	0.20	0.02	6.73	0.01						
	Sub-total	**689.30**	**66.16**	**29068.03**	**60.09**		***Sub-total***	**105.17**	**10.09**	**4807.00**	**9.94**
	SINDH						**Balochistan**				
1	Hyderabad	61.53	5.91	3768.30	7.79	1	Lasbela	0.23	0.02	15.83	0.03
2	Badin	45.77	4.39	2653.27	5.48	2	Sibi	0.27	0.03	12.37	0.03
3	Nawab shah	24.57	2.36	1583.40	3.27	3	Nasirabad	0.13	0.01	6.23	0.01
4	N.Feroze	22.33	2.14	1415.60	2.93	4	Jafarabad	0.07	0.01	2.20	0.00
5	Thatta	25.67	2.46	1409.37	2.91	5	Bolan	0.00	0.00	1.27	0.00
6	Khairpur	15.90	1.53	893.10	1.85						
7	Mirpurkhas	14.53	1.39	770.23	1.59						
8	Sanghar	11.03	1.06	671.33	1.39						
9	Umer Kot	8.73	0.84	452.43	0.94						
10	Ghotki	6.20	0.60	324.67	0.67						
11	Sukkur	4.27	0.41	240.33	0.50						
12	Dadu	4.90	0.47	231.07	0.48						
13	Larkana	1.00	0.10	41.40	0.09						
14	Shikarpur	0.23	0.02	8.00	0.02						
15	Jacobabad	0.07	0.01	1.23	0.00						
	Sub-total	**246.73**	**23.68**	**14463.73**	**29.90**		***Sub-total***	**0.70**	**0.07**	**37.90**	**0.08**
							Total (PAKISTAN)	**1041.90**	**100.00**	**48376.67**	**100.00**

Note:

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 2001-2002, BY PROVINCE.

S.No.	SUGARMILLS	LOCATION AND DISTRICT	YEAR OF INSTAL-LATION	CRUSHING CAPACITY (Tonnes/Day)		DATE OF START 2000-01
	PUNJAB					
1	Layyah	Layyah Sugarmills, Layyah	1953	64	3000	03-12-2001
2	Kohinoor	Jauharabad, Khushab	1955	44	2700	03-12-2001
3	Crescent	New Lahore Road, Nishatabad, Faisalabad	1960-61	67	1500	06-12-2001
4	Hamza	Jetha Bhutta, 43 Khanpur, Rahim Yar Khan	1963-64	64	3000	03-12-2001
5	Fecto	Darya Khan Bhakkar	1966-67	61	5000	30-11-2001
6	Noon	Bhalwal, District, Sargodha	1966	57	2500	26-11-2001
7	Adam	Chak No.4/ Ford, Tehsil, Chishtian, B/nagar	1967-68	41	3500	10-11-2001
8	Shahtaj	Mandi Bahauddin	1968	61	8000	30-11-2001
9	Hussain	Lahore Road, Jaranwala, Faisalabad	1968	66	4500	05-12-2001
10	United	Bakhshabad, Sadiqabad, R.Y. Khan.	1971	65	3000	04-12-2001
11	Fauji	Sangla Hill, Sheikhupura	1972	52	3800	21-11-2001
12	Shakarganj	Toba Tek Singh Road, Jhang	1974	15	8000	15-10-2001
13	G.Samundri	Chak 226, Tehsil Samundri, GoJra Samundri Road, Faisalabad.	1977-78	71	2500	10-12-2001
14	Pasrur	Pasrur, Sialkot	1977-78	—	1500	Not operating
15	Pattoki	Pattoki, Kasur	1978-79	68	3000	07-12-2001
16	Kamalia	Kamalia, Toba Tek Singh	1980	64	4000	03-12-2001
17	Baba Farid	Gojra-Faisalabad Road, Okara	1980	61	3000	30-11-2001
18	Ittefaq	P.O. Box No.125, Sahiwal	1982-83	64	4000	03-12-2001
19	Ashraf	P/O Ashrafabad, Bahawalpur	1982	66	4000	05-12-2001
20	Punjab	Chak 84/15-L,Mian Channu,P.O.Box 66,Khanewal	1986	61	3000	30-11-2001
21	Phalia	Karmanwala, Mano Chok, Phalia, Gujrat	1988	91	5000	30-12-2001
22	Brothers	2-KM Chunian, Kasur	1989	66	6500	29-11-2001
23	Chishtia	Silanwali, Distt, Sargodha	1989-90	63	2000	01-12-2001
24	Ramzan	Chiniot, Jhang	1991-92	59	8000	28-11-2001
25	Tandlianwala	Chak No. 542/G-B Kangwani, Samundri, Faisalabad.	1992	65	6000	04-12-2001
26	Hasib Waqas	Mirajabad, Nankana Sahib, Sheikhupura	1992	63	6000	02-12-2001
27	Chaudhry	14-KM Pensara Road, Gojra, T.T.Singh	1992	63	6000	02-12-2001
28	National	Village Jan Muhammad Wala Near Talib Wala Pattan Bhalwal,Sargodha	1992	36	5000	05-11-2001
29	Pharianwali	Lallan, Jhang	1992	56	4000	25-11-2001
30	Indus	Kot Bahadur, Rajanpur	1992	64	4000	03-12-2001
31	Fatima	G.T. Road Near Railway Crossing Sinwan, Tehsil Kot Abdu, Muzaffargarh	1992	64	4000	03-12-2001
32	Chanar	Chak 407 GB, Tandlianwala, Samundri, Distt: Faisalabad.	1992	64	4000	03-12-2001
33	Shekhoo	Anwarabad Patti NAICH,Near Sanwan, Kotaddu, Muzaffargargh.	1993	61	6000	30-11-2001
34	JDW	Mauza Sharin, Jamal Din Wali, Rahim Yar Khan	1993	64	4000	03-12-2001
35	Qand garh	Chak No. 66 RB, Shah Kot Chak Jumra Road, P.O. Box 922, Faisalabad	1994	—	4000	Not operating
36	Yousaf	Mirajabad, Shahpur, Distt, Sargodha	1995	62	6500	01-12-2001
37	Abdullallah	17 KM Chunia, Hujra Road, Depalpur, Okara	1996	63	6500	02-12-2001
38	Kashmir	6 KM Shore Kot City to Cantt.	1997	64	6000	03-12-2001
39	Mian Muhammad	Azad Kashmir.	1998	—	2000	Not operating
		Total crushing capacity in the Punjab			**169000**	

	Sindh					
1	Fauji	Tando Muhammad Khan, Hyderabad	1960	40	4000	09-11-2001
2	Habib	P.O.Box No. 25, Nawabshah	1962	45	7500	14-11-2001
3	Mirpurkhas	Umar Kot Road, P.O.Sugarmills, Mirpurkhas	1964	34	4000	08-11-2001
4	Mehran	Tando Adam Road, Tando Allah Yar, Hyderabad	1965	41	7000	10-11-2001
5	Bawany	Ahmadnagar P.O.Talhar, Tand Bago Road, Badin	1965	—	6000	N.A
6	Al-Noor	Noorpur Jahania, Moro Nawabshah	1970-71	49	8000	18-11-2001
7	Fauji (Khoski)	Khoski, Badin	1971	43	4500	12-11-2001
8	Larkana	Naudero, Larkana	1974-75	—	1500	Not Operating
9	Ranipur	Kot Diji, Ranipur, Khairpur	1976-77	47	3000	16-11-2001
10	Dadu	P.O. Piarogoth, Dadu	1977-78	—	2800	Not Operating
11	Thatta	Deh Bijora, Thatta - Sujawal Road, Thatta	1979	—	2800	Not Operating
12	Shahmurad	Jhok Sharif, Mirpur Bathoro, Thatta	1980-81	48	8000	17-11-2001
13	Faran	Tando Ibrahim, Sheikh Bhirkio, Hyderabad	1983	40	7500	09-11-2001
14	Army Welfare	Badin, Badin	1983	46	4000	15-11-2001
15	Pangrio	Deh Rajouri-2, Tando Bago, Badin	1984-85	38	3500	07-11-2001
16	Sindh Abadgar's	Deenpur, Tando Muhammad Khan, Hyderabad	1985	43	4500	12-11-2001
17	Dewan	Jianiabad, Budho Talpur, Sujawal, Thatta	1987	47	9000	16-11-2001
18	Al-Asif	Asifabad, Village Jararkot, P.O. Gharo, Taluka Ghorabari, Thatta.	1987	—	4000	N.A
19	Sanghar	13 Km, Sindhri-Sanghar Road P.O.Box No.2, Sanghar	1988	41	4500	10-11-2001
20	Matiari	Nasarpur Road, Deh Pannu, Matiari, Hyderabad	1989-90	40	4000	09-11-2001
21	Sakrand	Deh Tharo Unar, Qazi Ahmed, Sakrand, Nawabshah	1990	47	6000	16-11-2001
22	Ansari	Deh Jagsiyani,Tando Mohd Khan, Hyderabad	1991	40	6500	09-11-2001
23	Kiran	Noman Goth, Dubar Road, Taluka Rohri Sukkur	1992-93	—	8000	Not Operating
24	Khairpur	Naroo Dhoro Taluka, Kot Digi District Khairpur	1992-93	46	4000	15-11-2001
25	Al-Abbas	Mirwah Gorchani, Mirpurkhas	1992-93	36	4000	05-11-2001
26	Mirza	Deh Charo, Tapo Lowori Sharif, Kudhan Badin	1992-93	43	4000	12-11-2001
27	Larr	Deh Kinjhir Takyja Sujawa , Thatta	1995	47	4000	16-11-2001
28	Seri	Seri Deh Norai Jagir. 1986		40	6000	09-11-2001
29	Tharparkar	Tharparkar 95-96		-	4000	N.A
30	Digri	Digri 95-96		33	4000	02-11-2001
31	Bachani	Tando Allahyar, Distt. Hyderabad. 95-96		—	4000	Not Commis-sionned
32	(Najma) Thar	Tharparkar				Not Commis-sionned
		Total crushing capacity in Sindh			**154600**	
	NWFP					
1	Frontier	Takht-i-Bhai, Mardan	1938	38	3500	07-11-2001
2	Premier	Mardan, Mardan	1949-50	36	1500	05-11-2001
3	Saleem	Charsada, Charsada	1956-57	—	4700	N.A
4	Bannu	Seral-Naurang, Bannu	1965	62	1500	01-12-2001
5	Khazana	P.O. Box No.88, Charsada Road, Peshawar	1976	59	5500	29-10-2001
6	Chashma	University Road, Dera Ismail Khan	1991	—	3000	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

PER CAPITA AVAILABILITY (CONSUMPTION) OF SUGAR: 1990-91 TO 2000-01 (October - September)

S.No.	Item	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
		Thousand tonnes										
1	Opening stocks as on 1st October	263	201	218	224	309	265	104	245	513	371	27
2	Production	1932	2326	2394	2922	3001	2470	2393	3555	3542	2429	3016
3	Imports	323	155	80	8	4	166	604	11	4	421	628
4	Exports	----	----	----	139	328	29	----	477	648	22	----
5	Closing stocks as on 30 September	201	218	224	309	265	104	245	513	371	27	621
6	Net availability (item 1+2+3-4-5)	2317	2464	2468	2706	2721	2768	2856	2821	3040	3172	3050
		Million										
7	Population on first April (a)	116.67	118.39	121.06	124.04	127.00	130.04	132.96	136.19	139.07	142.34	145.64
		kgs per annum										
8	Per capita availability (consumption)	19.83	20.81	20.39	21.82	21.43	21.29	21.48	20.71	21.86	22.28	20.94
9	Average per capita availability											
	i) Average					21.19						
	ii) Forecast for 2001-02					21.76						

Notes:

(a) Population of AJ&K, NAs and Afghan refugees have also been included:
(b) Production from 2000-01 crop includes cane, raw and beet.

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, 2000-01.
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-V

RELATIONSHIP BETWEEN SUGAR AND SUGARCANE PRODUCTION: 1991-92 TO 2000-01 AND ESTIMATE OF SUGAR AND SUGARCANE PRODUCTION DURING 2001-02

Year	Cane production	Sugar production from cane	Additional sugar production per 100 tonnes of additional cane production
	Thousand tonnes		**Tonnes**
1991-92	38865	2297	8.05
1992-93	38059	2375	7.98
1993-94	44427	2920	8.49
1994-95	47168	2983	8.69
1995-96	45230	2450	8.55
1996-97	41998	2379	8.30
1997-98	53104	3549	9.12
1998-99	55191	3531	9.26
1999-00	46697	2415	8.66
2000-01	43606	2466	7.96
2001-02 (Estimated)	49098	2994	7.42

1. Sugar production $= 0.005844\ (\text{cane production})^{1.2171}$

2. Add. sugar production $= 0.007112\ (\text{add. cane production})^{0.2171}$

3. Correlation between sugar production and sugarcane production = 0.75
4. Coefficient of determination = 0.57

Note: The coefficients in equations 1 and 2 have been estimated through Ordinary Least Square Method from the data given above on production of sugar and sugarcane.

ANNEX-VI

MONTHLY AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 2000 AND 2001

Year/Month	Lahore	Faisalabad	Karachi	Hyderabad	Peshawar	Average
	---------- Rupees per 100 kgs ----------					
2000						
January	1825	1825	1646	1728	1738	1752
February	1995	2008	1918	1905	1923	1950
March	2023	2053	1975	2003	2085	2028
April	2143	2133	2080	2083	2173	2122
May	2155	2170	2125	2093	2200	2149
June	2438	2425	2290	2285	2458	2379
July	2505	2493	2380	2350	2515	2449
August	2675	2638	2510	2490	2690	2601
September	2688	2645	2550	2520	2735	2628
October	2723	2695	2530	2615	2775	2668
November	2783	2768	2838	2743	2838	2794
December	2525	2555	2460	2403	2620	2513
Average	**2373**	**2367**	**2275**	**2268**	**2396**	**2336**
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**

Source: **ALMA, Karachi.**

ANNEX - VII

MONTHLY AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 1991-92 TO 2000-01

(October - September)

Year (October - September)	Lahore	Faisalabad	Karachi	Hyderabad	Peshawar	Average	Increase (+) decrease (-) in average price over previous year
	---------- Rupees per 100 kgs ----------						**Percent**
1991-92	1123	1125	1075	1078	1103	1101	---
1992-93	1198	1200	1143	1158	1200	1180	7.2
1993-94	1200	1185	1188	1173	1233	1196	1.4
1994-95	1355	1348	1333	1345	1368	1350	12.9
1995-96	1695	1705	1650	1625	1718	1679	24.4
1996-97	1988	2020	1975	1923	2110	2003	19.3
1997-98	1745	1713	1720	1643	1835	1731	-13.6
1998-99	1865	1861	1823	1726	1864	1828	5.6
1999-00	2179	2168	2087	2082	2183	2140	17.1
2000-01	2551	2524	2482	2353	2566	2478	15.8
			Average annual increase:				**9.00**

Source: ALMA, Karachi.

ANNEX-VIII

COMPARISON OF DOMESTIC WHOLESALE PRICES OF SUGAR AND SUPPORT PRICE OF SUGARCANE: 1991-92 TO 2001-02

Year (Oct - Sep)	Domestic market price of sugar (a)	Percent increase over previou year	Support price of sugarcane			
			Punjab & N.W.F.P	Percent increase over prev year	Sindh	Percent increase over previous year
	Rs/100 kgs	Percent	Rs/40 kgs	Percent	Rs/40 kgs	Percent
1991-92	1101	-----	16.75	-----	17.00	------
1992-93	1180	7.18	17.50	4.48	17.75	4.41
1993-94	1196	1.36	18.00	2.86	18.25	2.82
1994-95	1350	12.88	20.50	13.89	20.75	13.70
1995-96	1679	24.38	21.50	4.88	21.75	4.82
1996-97	2003	19.33	24.00	11.63	24.50	12.64
1997-98	1731	-13.58	35.00	45.83	36.00	46.94
1998-99	1828	5.59	35.00	0.00	36.00	0.00
1999-00	2140	17.06	35.00	0.00	36.00	0.00
2000-01	2478	15.79	35.00	0.00	36.00	0.00
2001-02*	2070	-16.45	42.00	20.00	43.00	19.44
Average increase per annum (Percent)	**6.52**		**9.63**		**9.72**	

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

* Prices are upto January 14, 2002.

Sources: 1. MINFAL, Islamabad.

2. ALMA, Karachi.

ANNEX-IX

Design of Sample Survey

Agricultural Prices Commission (APCom) in collaboration with the Provincial Agriculture Departments of the Punjab, Sindh and the NWFP conducted large sample survey on sugarcane during 2000 and collected data on various aspects of sugarcane production and marketing for the 1999-00 crop.

A three stage sample design was used to select the survey respondents. At first stage 18 tehsils from the Punjab namely, Bhahwal Shah pur, Bhakkar, kotaddu, Phalia, Nankana Sahib, Faisalabad, Jaranwala, Summundri, Kamalia, Jhang, Chinnot, Burewala, Chistian. R.Y. khan + Sadiqabad, Hafeezabad, Chichawatni and Chunian, 10 talukas/tehsils from Sindh namely, matli, Tando Bagho, Hyderabad + Tando Muhammad Khan, Tando Allah Yar, Mir Wah + Faiz Gang, Daulat pur + Mooro, Mir pur Bathoro + Shah Bander, kot Ghulam Muhammad, Shahdad pur and Nawab Shah and 5 tehsils from NWFP, namely Peshawar, Charsada, Mardan, Bannu and Pahar pur were randomly selected from various agro-climatic zones.

At the second stage, using the sample of the Provincial Agriculture Departments for the sample tehsils, sample villages were selected. From the selected tehsils/talukas 99 villages randomly selected from the Punjab, 49 from Sindh and 18 from NWFP. At the third stage, sugarcane growers were stratified by farm size and randomly selected from the lists of farmers especially prepared for the sample villages. 1248 sugarcane growers in the Punjab, 676 from Sindh and 277 from NWFP were interviewed.

CRITERIA FOR CATEGORIZATION OF SAMPLE FARMERS

A farmer is to be classified as Progressive (A), Traditional (B) and Average (C), based on a number of factors considered together. While no hard and fast rule can be laid down, the criteria to be taken into consideration for each category are defined as follows:-

A. Progressive Farmers:-

1. Practise deep tillage operations.
2. Use the recommended seed rate and are conscious about plant population
3. Cultivate disease resistant varieties of sugarcane.
4. Practise judicious use of plant protection measures.
5. Are particular about balanced use of fertilizers.
6. Are particular about interculture operations.
7. Adopt improved farm management practices.

B. Traditional Farmers:-

1. Do not practise deep ploughing.
2. Are not particular about optimum seed rate and plant population.
3. Are indifferent about selection use of diseases resistant varieties.
4. Practise inadequate plant protection measures.
5. Are not particular about balanced use of fertilizer nutrients.
6. Are indifferent about improved farm management practices.

C. Average Farmers:-

These are farmers who stand in between categories A and B. They might be considered in a transitional stage and on their way to graduating from traditional to Progressive farmers, thus depicting some features of both.

The COP of the `average' growers, which generally exceeds that of the `progressive' but is less than that of the `traditional' growers has been taken as a reference point in price policy analysis for the following reasons:

3.1 The COP of the `progressive' growers, which is relatively low, if adopted in price setting, would result in the use of too restrictive a criterion, leading to excessive resource transfers out of the agriculture sector and discourage farm investments.

3.2 The use of COP of the `traditional' growers which is relatively higher if adopted in price setting, would encourage inefficiency in farm production and adversely affect the competitiveness of exports.

ANNEX-X

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN THE PUNJAB : 2002-03 CROP

Sr. No.	Operations / inputs	Avg No. of oprs/units/ acre	2002 - 03 crop	
			Cost per unit	Cost per acre
1	2	3	4	5=3*4
			---------Rupees---------	
1.	Land preparation:			
	1.1 Deep ploughing	0.476	380.00	180.88
	1.2 Rotavator	0.152	420.00	63.84
	1.3 Ploughing	7.847	140.00	1098.58
	1.4 Planking	3.309	70.00	231.63
	1.5 Levelling	0.561	185.00	103.79
2.	Seed bed preparation:			
	2.1 Ploughing/Furrow making	0.467	140.00	26.81
	2.2 Planking	0.193	70.00	5.54
	2.3 Trench/Ridge making			
	2.3.1 Manual (m.days)	0.106	95.00	4.13
	2.3.2 Tractor	0.700	140.00	40.18
	2.4 Bund making			
	2.4.1 Manual (m.days)	1.655	95.00	64.46
	2.4.2 Tractor	0.158	140.00	9.07
3.	Seed and Sowing operations:			
	3.1 40 kg units	6.578	45.00	121.36
	3.2 Marlas	10.640	225.00	981.54
	3.3 Harvesting, stripping (m.days) and making of sets	4.796	95.00	186.80
	3.4 Transport	-	-	100.00
	3.5 Sowing of sets (m.days)	0.781	95.00	30.42
	3.6 Contract sowing	-	-	115.00
4.	Interculture and Earthing up:			
	4.1 Manual/binding of plants	0.609	375.00	228.38
	4.2 Bullock/tractor	2.008	140.00	281.12
5.	Plant Protection:			
	5.1 Weedicides	0.124	216.00	26.78
	5.2 Granules	0.070	210.00	14.70
	5.3 Sparys	0.331	193.00	63.88
	5.4 Others	0.161	446.00	71.81
6.	Irrigation:			
	6.1 Canal/scarp tubewell	8.900	-	177.16
	6.2 Private tubewell	4.440	228.00	1012.32
	6.3 Mixed	2.160	54.00	116.64
7.	Labour for irrigation and water course cleaning (m.days)	4.860	95.00	461.70
8.	Farm Yard Manure:			
	8.1 Material	-	-	475.00
	8.2 Transport & application	-	-	350.00
9.	Fertilizers: (bags)			
	9.1 DAP	1.280	738.00	944.64
	9.2 Urea	1.730	392.00	678.16
	9.3 Nitrophos	0.350	545.00	190.75
	9.4 SSP	0.010	238.00	2.38
	9.5 CAN	0.010	328.00	3.28
	9.6 SOP	0.070	792.00	55.44
	9.7 Gypsum	0.440	40.00	17.60
10.	Fert. transport and application	3.890	21.00	81.69
11.	Mark up @ 14.0 % per annum for 13 months on item 1 to 10 minus item 6.1	-	-	1280.39
12.	Land rent for 13 months	-	4250.00	4604.17
13.	Management charges for 13 months	-		471.00
14.	Harvesting & stripping (40 kg units)	565.150	4.25	2377.87
15.	Expected escalation in cost of selected items	-	-	571.00
16.	Total cost (items 1 to 15)	-	-	17921.88
17.	Yield (40 kg units)	-	-	565.15
18.	Cost per 40 kgs at farm level:			
	18.1 including land rent	-	-	31.71
	18.2 excluding land rent	-	-	23.56
19.	Marketing expenses: (Rs/40 kgs)			
	19.1 Transport, etc.	-	-	4.50
	19.2 Development cess	-	-	0.50
20.	Cost per 40 kgs at millgate:			
	20.1 including land rent	-	-	36.71
	20.2 excluding land rent	-	-	28.56

ANNEX-XI

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN SINDH: 2002-03 CROP

Sr. No.	Operations / inputs	Avg No. of oprs/units/ acre	2002 - 03 crop	
			Cost per unit	Cost per acre
1	2	3	4	5=3*4
			---------Rupees----------	
1.	Land preparation :			
	1.1 Deep ploughing	0.523	370.00	193.51
	1.2 Ploughing	5.606	200.00	1121.20
	1.3 Planking	1.577	100.00	157.70
	1.4 Levelling	0.972	200.00	194.40
2.	Seed bed preparation:			
	2.1 Ploughing/Furrow making	1.136	200.00	156.77
	2.2 Planking	1.340	100.00	92.46
	2.3 Trench/ridge making			
	2.3.1 manual (m.days)	0.074	95.00	4.85
	2.3.2 tractor (hrs)	0.174	160.00	19.21
	2.4 Bund making (m.days)			
	2.4.1 manual (m.days)	0.403	95.00	26.42
	2.4.2 tractor (hrs)	0.812	160.00	89.64
3.	Seed and Sowing operations:			
	3.1 40 kg units	64.118	55.00	2433.28
	3.2 Ghuntas	0.685	1340.00	633.35
	3.3 Harvesting,stripping and making of sets (m.days)	4.420	95.00	289.73
	3.4 Transportation	-	-	190.00
	3.5 Sowing of sets (m.days)	0.588	95.00	38.54
	3.6 Contract sowing	-	-	185.00
4.	Interculture and Earthing up:			
	4.1 Manual	1.762	360.00	634.32
	4.2 Bullock/tractor	1.725	200.00	345.00
5.	Plant Protection :			
	5.1 Weedicides	0.344	294.00	101.14
	5.2 Granules	0.342	203.00	69.43
	5.3 Sprays	0.398	209.00	83.18
6.	Irrigation			
	6.1 Canal	20.880	-	181.87
	6.2 Private tubewell	2.450	137.00	335.65
7.	Labour for irrigation and water course cleaning (m.days)	5.859	95.00	556.61
8.	Farm Yard Manure:			
	8.1 Material	-	-	710.00
	8.2 Transport & application	-	-	335.00
9.	Fertilizers: (bags)			
	9.1 DAP	1.512	722.00	1091.66
	9.2 Urea	3.625	389.00	1410.13
	9.3 Nitrophos	0.376	566.00	212.82
	9.4 CAN	0.185	328.00	60.68
	9.5 AS	0.046	303.00	13.94
	9.6 SOP	0.085	792.00	67.32
10.	Fert. transport and application	5.829	21.00	122.41
11.	Mark up @ 14.0 % per annum for 16 months on item 1 to 10 minus item 6.1	-		2269.75
12.	Land rent for 16 months	-	2150.00	2866.67
13.	Management charges for 16 months	-		579.00
14.	Harvesting & stripping (40 kg units)	676.020	4.25	2873.09
15.	Expected escalation in the cost of selected items	-	-	445.00
16.	Total cost (items 1 to 15)	-	-	21190.71
17.	Yield (40 kg units)	-	-	676.02
18.	Cost per 40 kgs at farm level:			
	18.1 including land rent	-	-	31.35
	18.2 excluding land rent	-	-	27.11
19.	Marketing expenses: (Rs/40 kgs)			
	19.1 Transport, etc.	-	-	4.50
	19.2 Development cess	-	-	0.32
	19.3 Drainage cess	-	-	0.08
20.	Cost per 40 kgs at mill-gate:			
	20.1 including land rent	-	-	36.25
	20.2 excluding land rent	-	-	32.01

ANNEX-XII

AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN NWFP: 2002-03 CROP

Sr. No.	Operations / inputs	Avg No. of oprs/units/ acre	2002 - 03 crop	
			Cost per unit	Cost per acre
1	2	3	4	5=3*4
			---------Rupees---------	
1.	Land preparation:			
	1.1 Deep ploughing/Rotavator	0.665	405.00	269.33
	1.2 Ploughing	2.776	160.00	444.16
	1.3 Planking	0.435	80.00	34.80
	1.4 Levelling	0.344	160.00	55.04
2.	Seed bed preparation:			
	2.1 Ploughing/Furrow making	0.982	160.00	81.70
	2.2 Planking	0.027	80.00	1.12
	2.3 Trech/Ridge making (tractor hrs)	0.039	160.00	3.24
	2.4 Bund making (m.days)	1.274	90.00	59.62
3.	Seed and Sowing operations:			
	3.1 40 kg units	76.337	55.00	2183.24
	3.2 Harvesting, stripping (m.days) and making of sets	3.671	90.00	171.80
	3.3 Transport	-	-	160.00
	3.4 Sowing of sets (m.days)	4.097	90.00	191.74
4.	Interculture and Earthing up :			
	4.1 Manual/binding of plants	1.642	415.00	681.43
	4.2 Bullock/tractor	1.859	160.00	297.44
5.	Plant Protection:			
	5.1 Weedicides	0.336	296.00	99.46
	5.2 Granules	0.094	260.00	24.44
	5.3 Sprays	0.306	185.00	56.61
	5.4 Others	0.261	250.00	65.25
6.	Irrigation:			
	6.1 Canal/scarp tubewell	15.19	-	399.20
	6.2 Private tubewell	2.61	181.00	472.41
	6.3 Private canal	2.43	10.00	24.30
7.	Labour for irrigation and water course cleaning (m.days)	7.953	90.00	715.77
8.	Farm Yard Manure:			
	8.1 Material	-	-	750.00
	8.2 Transport & application	-	-	470.00
9.	Fertilizers: (bags)			
	9.1 DAP	0.830	721.00	598.43
	9.2 Urea	1.970	387.00	762.39
	9.3 Nitrophos	0.330	512.00	168.96
	9.4 CAN	0.130	290.00	37.70
10.	Fert. transport and application	3.260	21.00	68.46
11.	Mark up @ 14.0 % per annum for 15 months on item 1 to 10 minus item 6.1	-	-	1554.07
12.	Land rent for 15 months	-	4250.00	5312.50
13.	Management charges for 15 months	-	-	543.00
14.	Harvesting & stripping (40 kg units)	585.460	4.25	572.29
15.	Expected escalation in cost of selected items	-	-	404.00
16.	Total cost (items 1 to 15)	-	-	17733.90
17.	Yield (40 kg units)	-	-	585.46
18.	Cost per 40 kgs at farm level:			
	18.1 including land rent	-	-	30.29
	18.2 excluding land rent	-	-	21.22
19.	Marketing expenses: (Rs/40 kgs)			
	19.1 Transport,octroi, etc.	-	-	3.70
	19.2 Development cess	-	-	0.27
20.	Cost per 40 kgs at millgate:			
	20.1 including land rent	-	-	34.26
	20.2 excluding land rent	-	-	25.19

Notes for Annexes-X to XII.

1. The physical input-output parameters for estimating cost of production for sugarcane 2002-03 crop have been adopted from the large sample survey for sugarcane 1999-00 crop conducted in the Punjab, Sindh and NWFP in 2000. Details of the sample for sugarcane surveys are given in Annex-IX.

2. Seed and related costs (items 2 and 3) for the fresh planted crop were estimated @ 41, 69, and 52 per cent for the Punjab, Sindh and NWFP respectively in view of the incidence of ratooning observed in the survey data.

3. The prices of farm inputs, chemical fertilizers and custom hire rates of farm operations involved in the sugarcane cultivation have been updated in view of the prevailing market rates as collected through the mini field survey conducted during January, 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 7th January, 2002 at Hyderabad.

4. The cost of weedicides/pesticides has been kept on the level of the cost as estimated in the large survey. It has not been revised in view of the information obtained from the Director, Plant Protection Department, Karachi 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.

5. The rates of chemical fertilizers have been taken from the mini field survey and Federal Bureau of Statistics, Islamabad.

6. 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.

7. 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.

8. The likely escalation during 2002-03 crop year in the cost of operations like interculture, plant protection, supplementary irrigation, urea fertilizer, harvesting/stripping and marketing has been estimated as 8 per cent in the Punjab, 6 per cent in Sindh and 9 per cent in the NWFP on the basis of weighted average annual increase in their costs for the last 4 years.

9. During the mini field surveys conducted by the APCom in the Punjab, Sindh and NWFP, great variations have been observed in the Land rent. The situation was discussed at length with the knowledgeable growers, crop experts and members of the Standing Committee on sugarcane and revised accordingly.

ANNEX - XIII

MILL- GATE PRICES OF SUGARCANE WORKED BACK ON THE BASIS OF EX-FACTORY AVERAGE WHOLESALE PRICE OF SUGAR IN THE 2001-02 CRUSHING SEASONS (NOVEMBER - DECEMBER)

S.No	Item	Rupees per tonne	
1	Ex-mill average wholesale price of sugar	20000	
2	Wholesale dealer margin @ 5 % on ex-mill price	833	
3	Sales tax @ 15 per cent on ex-mill price	2500	
4	Net price (item 1 minus 2 minus 3)	16667	
		Punjab & N.W.F.P	**Sindh**
5	Processing cost of sugar (a)	5667	5667
6	Value of cane to produce one tonne of sugar (item 4 minus 5)	11000	11000
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)	935.02	957.02
10	Mill - gate price of sugarcane (Rs per 40 kgs)	37.40	38.28

Note: a) 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 ex-mill price of sugar: Various Sugarmills.

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

ANNEX- XIV

MILL- GATE PRICES OF SUGARCANE WORKED BACK ON THE AVERAGE WHOLESALE PRICE OF GUR DURING 2001-02 CRUSHING SEASON (OCTOBER - DECEMBER)

S.No	Item	NWFP with licence fee	NWFP without licence fee	Punjab
		---------- Kgs ----------		
1	Gur produced from 400 kgs of cane at 10 % recovery	40.00	40.00	40.00
		----- Rupees per 40 Kgs of gur ------		
2	Sale price of gur	737.00	737.00	565.00
3	Marketing cost of gur including transport, commission, etc.	58.00	58.00	39.00
4	Net price of gur at farm level (item 2 minus item 3)	**679.00**	**679.00**	**526.00**
5	Processing cost including cane crushing and labor used for gur making	190.00	190.00	152.50
6	Cost of chemicals.	11.50	11.50	30.00
7	Licence fee on cane crusher @ Rs 27000 per season assuming 20000 x 40 kgs average cane crushing capacity	13.50	---	---
8	Net value of 400 kgs of cane used in making 40 kgs gur (item 4 minus 5 minus 6 minus 7)	464.00	477.50	343.50
9	Value of 40 kgs of sugarcane	46.40	47.75	34.35

Sources:

1. Based on the information collected during Agricultural Prices Commission field survey, January, 20
2. Directorate of Agriculture (Economics & Marketing), Punjab, Lahore for Punjab's prices.
3. Directorate of Agriculture (Extension),N.W.F.P., Peshawar for NWFP's prices.

ANNEX - XV

AVERAGE OF INTERNATIONAL DAILY PRICES OF SUGAR: 1990-91 TO 2001-02
(OCTOBER - SEPTEMBER)

Years	Months	Raw sugar		White sugar		Difference	
		ISA price fob & stowed Caribbean ports in bulk		fob and stowed London port		Between white and raw sugar price	
Oct - Sept		Cents/ lb	$/ per tonne	Cents/ lb	$/ per tonne	Cents/ lb	$/ per tonne
1990-91		9.20	202.82	13.75	303.13	4.55	100.31
1991-92		9.16	201.94	12.68	279.54	3.52	77.60
1992-93		9.57	210.98	12.42	273.81	2.85	62.83
1993-94		11.24	247.80	14.63	322.53	3.39	74.73
1994-95		13.72	302.47	17.99	396.61	4.27	94.14
1995-96		12.25	270.06	17.41	383.82	5.16	113.76
1996-97		11.10	244.71	14.48	319.23	3.38	74.52
1997-98		9.89	218.03	12.33	271.83	2.44	53.80
1998-99		6.63	146.20	9.79	215.83	3.16	69.63
1999-00		7.23	159.30	9.18	202.38	1.95	43.08
2000-01		9.34	205.91	11.35	250.29	2.01	44.38
2001-02	(Oct - Dec)	7.44	163.95	11.00	242.41	3.56	78.47
	October	6.79	149.69	10.19	224.59	3.40	74.90
	November	7.69	169.53	11.27	248.47	3.58	78.94
	December	7.83	172.62	11.53	254.18	3.70	81.56

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

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

Item	1996-97 to 2000-01		2001- 02 (Oct-Dec)	
	.... US $ per tonne			
1. Average fob (London) price	252.00		242.41	
2. Freight charges upto Karachi	30.00		30.00	
3. C & f cost at Karachi port	282.00		272.41	
	OR ... Rs. per tonne (a)...			
	17089		16508	
4. Marine insurance (actual)	56		56	
5. Import value (items 3+4)	**17145**		**16564**	
6. L/C opening charges @ 0.5% of c&f cost	85		83	
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	342		330	
9. Wharfage, handling and stevedoring charges	610		610	
10. Allowance for shortage and unforeseen expenses @ 1% of c&f cost	171		165	
11. Service charges of inspection @ 0.5% (cif) value	86		83	
12. Importer commission @ 1% of c&f cost	171		165	
13. Transport charges from Karachi to Lahore including loading/unloading	1350		1350	
14. Landed cost at Lahore (items 6 to 13)	**19961**		**19351**	
	Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
15. Processing cost of sugar (b)	6786.78	6786.78	6579.31	6579.31
16. Value of cane to produce one tonne of sugar (item 14 minus item 15)	13174.33	13174.33	12771.59	12771.59
17. Provincial base recovery level (%)	8.50	8.70	8.50	8.70
18. Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 17)	11.76	11.49	11.76	11.49
19. Price of one tonne of sugarcane (item 16 / item 18) (Rs per tonne)	1120.27	1146.59	1086.02	1111.54
20. Price of 40 kgs of cane (Rs per 40 Kgs)	44.81	45.86	43.44	44.46

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

Notes: (a) Selling exchange rate of one US $ = 60.60 Pak rupees, annouced by National Bank of Pakistan as on January, 23, 2002.
(b) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCom and Business & Consultancy Services.

Annex - XVII

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

Item	1996-97 to 2000-01		2001-02 (Oct-Dec)	
	.... US $ per tonne			
1. Average fob (London) price	252.00		242.41	
2. Freight charges upto Karachi	30.00		30.00	
3. C & f cost at Karachi port	282.00		272.41	
	OR --------Rs per tonne----------			
	17089		16508	
4. Marine insurance (actual)	56		56	
5. Import value (items 3+4)	**17145**		**16564**	
6. Custom duty @30 % of import value	5144		4969	
7. Sales tax @ 15% of (Import value + Custom duty)	3343		3230	
8. Custom duty, Sales tax & Wharfage on empty bages	165		165	
9. Duty paid value (DPV)(items 5+6+7+8)	**25797**		**24929**	
10. Income tax @6% at import stage of DPV	1548		1496	
11. Income tax on empty bags(fixed)	40		40	
12. Income tax @3.5 at sale stage	928		899	
13. L/C opening charges @ 0.5% of c&f cost	85		83	
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	342		330	
16. Wharfage, handling and stevedoring charges	610		610	
17. Allowance for shortage and unforeseen expenses @ 1% of c&f cost	171		165	
18. Sindh Govt excise duty @ 0.3% of DPV	77		75	
19. Service charges of inspection @ 0.5% (cif) value	86		83	
20. Importer commission @ 1% of c&f cost	171		165	
21. Transport charges from Karachi to Lahore including loading/unloading	1350		1350	
22. Landed cost at Lahore (item 9+items 10 to 21)	**31207**		**30225**	
23. Sales tax @ 15% of landed cost at Lahore	4681		4534	
24. Cost of one tonne of imported sugar after deducting sale tax @ 15% of landed cost at Lahore	**26526**		**25691**	
	Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
25. Processing cost of sugar (b)	9018.74	9018.74	8734.99	8734.99
26. Value of cane to produce one tonne of sugar (item 24 minus item 25)	17506.96	17506.96	16956.15	16956.15
27. Provincial base recovery level (%)	8.50	8.70	8.50	8.70
28. Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 27)	11.76	11.49	11.76	11.49
29. Price of one tonne of sugarcane (item 26 / item 28) (Rs per tonne)	1488.69	1523.67	1441.85	1475.73
30. Price of 40 kgs of cane (Rs per 40 Kgs)	59.55	60.95	57.67	59.03

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

Notes: (a) Selling exchange rate of one US $ = 60.60 Pak rupees, annouced by National Bank of Pakistan as on January, 23, 2002.
(b) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCom and Business & Consultancy Services.

ANNEX-XVIII

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

Item	1996-97 to 2000-01		2001- 02 (Oct-Dec)	
	.... US $ per tonne			
1. Average fob (London) price	252.00		242.41	
	OR ... Rs. per tonne (a)...			
2. Average fob Karachi price (assuming equivalent to fob London price)	15145		14569	
3. Transport charges from interior Sindh to port	750		750	
4. Special packing	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)	13866		13290	
13. Sales tax @ 15% of ex-mill price	2080		1993	
14. Price of one tonne sugar without sale tax (Item 12- item 13	11786		11296	
	Punjab & NWFP	Sindh	Punjab & NWFP	Sindh
15. Processing cost of sugar (b)	4007.33	4007.33	3840.76	3840.76
16. Value of cane to produce one tonne of sugar (item 14 minus item 15)	7778.94	7778.94	7455.60	7455.60
17. Provincial base recovery level (%)	8.50	8.70	8.50	8.70
18. Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 17)	11.76	11.49	11.76	11.49
19. Price of one tonne of sugarcane (item 16 / item 18) (Rs per tonne)	661.47	677.02	633.98	648.88
20. Price of 40 kgs of cane (Rs per 40 Kgs)	26.46	27.08	25.36	25.96

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

Notes: (a) Buying exchange rate of one US $ = 60.10 Pak rupees, annouced by National Bank of Pakistan as on January, 23, 2002.
(b) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCom and Business & Consultancy Services.

ANNEX-XIX

ECONOMICS OF SUGARCANE AND COMPETING CROPS AT PRICES REALIZED BY GROWERS: 2001-02 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	44	16467	5340	16899	11559	432	1.03	3.16	42.89	384.07
2 Seed cotton	240	22	12584	5518	13052	7534	468	1.04	2.37	54.38	593.27
3 Basmati paddy	180	58	9582	5406	8218	2812	-1364	0.86	1.52	45.66	141.69
4 IRRI paddy	180	62	8308	4594	7558	2964	-750	0.91	1.65	41.99	121.90
5 Wheat	180	17	8631	3681	8108	4427	-523	0.94	2.20	45.04	476.94
6 Sunflower (spring)	144	22	7038	2223	8820	6597	1782	1.25	3.97	61.25	400.91
7 Cotton + wheat	420	39	21215	9199	21160	11961	-55	1.00	2.30	50.38	542.56
8 Cotton + sunflower	384	44	19622	7741	21872	14131	2250	1.11	2.83	56.96	497.09
9 Basmati+wheat	360	75	18213	9087	16326	7239	-1887	0.90	1.80	45.35	217.68
10 Basmati +sunflower	324	80	16620	7629	17038	9409	418	1.03	2.23	52.59	212.98
11 IRRI + wheat	360	79	16939	8275	15666	7391	-1273	0.92	1.89	43.52	198.30
12 IRRI+sunflower	324	84	15346	6817	16378	9561	1032	1.07	2.40	50.55	194.98
Sindh											
1 Suagarcane	488	58	17728	6910	25161	18251	7433	1.42	3.64	51.56	433.81
2 Seed cotton	240	18	10311	4177	10829	6652	518	1.05	2.59	45.12	601.61
3 IRRI paddy	180	56	7005	3194	7501	4307	496	1.07	2.35	41.67	133.95
4 Wheat	180	15	7353	3013	7439	4426	86	1.01	2.47	41.33	495.93
5 Sunflower (Spring)	144	22	7038	2223	8820	6597	1782	1.25	3.97	61.25	400.91
6 Cotton+Wheat	420	33	17664	7190	18268	11078	604	1.03	2.54	43.50	553.58
7 Cotton + Sunflower	384	40	17349	6400	19649	13249	2300	1.13	3.07	51.17	491.23
8 IRRI+Wheat	360	71	14358	6207	14940	8733	582	1.04	2.41	41.50	210.42
9 IRRI+sunflower	324	78	14043	5417	16321	10904	2278	1.16	3.01	50.37	209.24

Notes for Annex-XIX

1. The economic analysis presented in the above exercise is based on the input-output prices for 2001-02 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, 2001-02 crops. However, the relevant data for sunflower were adopted from the support price policy for non-traditional oilseeds, 2000-01 crops with necessary amendments in input prices. To incorporate the escalations in input prices which occurred during the growing period of 2001-02 crops, some marginal revisions have been made as under:

   2.1 The cost of supplementary irrigation for sugarcane has been adjusted in view of 14.50 percent rise in electric power in March 2001, for cotton in view of 14.50 percent increase in electric power and 11 percent in diesel prices in June 2001, for rice in view of 11 percent rise in diesel prices and for wheat in view of 16.48 percent decline in diesel prices in November 2001. The ratio of diesel and electric tubewels 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 2.18 percent in the Punjab and 10.44 percent in Sindh for sugarcane, at 11.53 percent in the Punjab and 13.52 per cent in Sindh for cotton, at 9.35 percent in the Punjab and 3.08 per cent in Sindh for rice while at 14.01 percent decline in Punjab and 4.61 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 2001-02 season.

   2.3 The value of kind payments has been revised in view of prices applicable during the post harvest for the respective crops.

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 2001-02 wheat crop is yet to be harvested. Therefore the support price of wheat at Rs 300 per 40 kgs for 2001-02 crop has been adopted for the current analysis.

   4.2 The rice paddy is primarily transacted by the private sector in the open market. The data on wholesale prices of rice paddy were available from different sources at farm-gate and market levels during the post-harvest months of Oct 2001 to Jan 2002 in the major producing areas. Therefore the wholesale prices data have been adjusted as farm-gate prices at Rs 339 per 40 kgs for basmati-385 and Rs 215 for IRRI-6 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 205 per 40 kgs in the APCom's field survey.

   4.3 The wholesale market prices of seed cotton during the post-harvest months of Sep, 2001 to Jan, 2002 in the main producer area markets have averaged at Rs 782 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 715 per 40 kgs by the PCCC, Karachi during Sep to Nov, 2001.

4.4 The 2001-02 sunflower crop is yet to be harvested. The market price of this crop is not regularly reported by any agency. Therefore, the average market price of 2000-01 crop as reported by the PODB at Rs 600 per 40 kgs has been adopted in this analysis.

4.5 The market prices of sugarcane are not available from any agency. However the average mill-gate prices in the major cane producing areas were reported at Rs 37 per 40 kgs in the Punjab and Rs 47 in Sindh in view of the APCom's field survey.

5. The market prices have been adjusted for the marketing expenses to make them effective at the farm level. These expenses amount to Rs 4.90 per 40 kgs for sugarcane, Rs 14 for seed cotton and Rs 12 for rice paddy, 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-XX

ECONOMICS OF FERTILIZER USE ON SUGARCANE IN PAKISTAN AT THE 2001-2002 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. 21.68 i.e. Rs. 17.39, 24.50 and 27.44 per nutrient kgs of N, P and K respectively in the ratio of 2:1:1	216.80	216.80	216.80	216.80
3.	Indirect cost due to the application of 10 nutrient kgs of fertilizer	145.72	188.67	231.62	274.57
3.1	Transportation and application charges of 20 kgs of fertilizer @ Rs. 20.00 per 50 kgs bag of fertilizer	8.00	8.00	8.00	8.00
3.2	Harvesting, stripping, transport, development cess etc on the additional produce @ Rs. 8.59 per 40 kgs	107.37	150.32	193.27	236.22
3.3	Mark up on direct cost of fertilizer for 12 months @ 14.00 per cent per annum	30.35	30.35	30.35	30.35
4.	Total additional cost (item 2+3)	362.52	405.47	448.42	491.37
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)	1.47	1.83	2.13	2.38

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 2001-02 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 2001-02 crop.

3. Additional produce has been valued at the average support prices fixed for 2001-02 crop of the Punjab, Sindh and NWFP.

ANNEX-XXI

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. .