

API's SERIES NO. 223



**PRICE POLICY  
FOR  
SUGARCANE, 2007-08 CROP**

**AGRICULTURE POLICY INSTITUTE  
GOVERNMENT OF PAKISTAN  
MINISTRY OF FOOD, AGRICULTURE AND LIVESTOCK  
ISLAMABAD**

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## ABBREVIATIONS

|        |  |
|--------|--|
| AARI   | Ayub Agricultural Research Institute         |
| AJ&K   | Azad Jammu and 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                         |
| CRS    | Crop Reporting Service                       |
| CPR    | Cane Procurement Receipt                     |
| DAP    | Di-Ammonium Phosphate                        |
| DRC    | Domestic Resource Cost                       |
| DPV    | Duty Paid Value                              |
| ECC    | Economic Coordination Committee              |
| E&M    | Economics & Marketing                        |
| EPC    | Effective Protection Coefficient             |
| EPB    | Export Promotion Bureau                      |
| FAO    | Food and Agriculture Organization            |
| FBS    | Federal Bureau of Statistics                 |
| FCA    | Federal Committee on Agriculture             |
| FOB    | Free on Board                                |
| FYM    | Farm Yard Manure                             |
| GDP    | Gross Domestic Product                       |
| GST    | General Sales Tax                            |
| HYVs   | High Yielding Varieties                      |
| IPM    | Integrated Pest Management                   |
| ISO    | International Sugar Organization             |
| LSD    | Light Speed Diesel                           |
| MINFAL | Ministry of Food, Agriculture and Livestock  |
| NARC   | National Agricultural Research Centre        |
| NAs    | Northern Areas                               |
| NFDC   | National Fertilizer Development Centre       |
| NPC    | Nominal Protection Coefficient               |
| NWFP   | North West Frontier Province                 |
| OLS    | Ordinary Least Squares                       |
| PARC   | Pakistan Agricultural Research Council       |
| PSMA   | Pakistan Sugarmills Association              |
| PSST   | Pakistan Society of Sugar Technologists      |
| TCP    | Trading Corporation of Pakistan              |
| USDA   | United States Department of Agriculture      |
| WPI    | Wholesale Price Index                        |
| WAPDA  | Water and Power Development Authority        |
| WTO    | World Trade Organization                     |

# ***PRICE POLICY FOR SUGARCANE, 2007-08 CROP***

## ***EXECUTIVE SUMMARY AND RECOMMENDATIONS***

Sugarcane production has increased from 44.7 million tonnes in 2005-06 to 54.7 million tonnes in 2006-07. This increase is solely due to 13.4 per cent expansion in area as the yield improved by 7.9 per cent. The sugarmills did not face severe shortage in cane supply despite some price disputes between the millers and growers during the current season.

It is expected that the sugar industry, 3527 thousand tonnes of sugar is likely to be produced during 2006-07. Total availability of sugar during 2006-07 including opening stocks of 1311 thousand tonnes has been estimated at 4838 thousand tonnes. The domestic requirements for 2007-08 are estimated at 4178 thousand tonnes, showing a surplus of 660 thousand tonnes.

Based on the analysis of relevant factors discussed in main text of this Report, likely pricing options for sugarcane, 2007-08 crop are given in the following Table.

## Price Policy Options

| S.No              | Basis   | Likely prices of sugarcane at mill gate                            |      |       |
|-------------------|---|--|------|-------|
|                   |   | Punjab   | NWPF | Sindh |
| Rupees per 40 Kgs |   |  |      |       |
| 1.                | Cost of production of sugarcane (Table-9 )  | 57   | 52   | 58    |
| 2.                | Market price realized by growers (2006-07)  | 60   | 60   | 67    |
| 3.                | Domestic parity prices worked back from:  |  |      |       |
|                   | i) Average wholesale price of "gur" during October-January, 2006-07 (Annex-XIII)                                | 96   | 96   | -     |
|                   | ii) Average wholesale prices of sugar during 2006-07 crushing season (Annex-XIV)                                | 54   | 54   | 55    |
| 4.                | If real value of cane price for 2006-07 crop were to be equated with the level of 2000-01                       | 60   | 60   | 67    |
| 5.                | Import parity prices (economic) as worked back from the average fob (London) price of white sugar (Annex-XVI):  |  |      |       |
|                   | i) During 2003-04 to 2005-06  | 55   | 55   | 56    |
|                   | ii) During 2006-07 (October – January)  | 62   | 62   | 64    |
|                   | iii) On 13 <sup>th</sup> August 2007  | 52   | 52   | 53    |
| 6.                | Export parity price (economic) as worked back from the average fob (London) price of white sugar (Annex- XVIII) |  |      |       |
|                   | i) During 2003-04 to 2005-06  | 39   | 39   | 40    |
|                   | ii) During 2006-07 (October – January)  | 46   | 46   | 47    |
|                   | iii) On 13 <sup>th</sup> August 2007  | 36   | 36   | 37    |
| 7.                | Cost of domestic resources (Table – 19 ) involved in:   |  |      |       |
|                   |   | <b>Rupees per US \$</b><br><b>(At exchange of Rs 61=one US \$)</b> |      |       |
|                   | i) Producing cane for sugar import substitution   |  |      |       |
|                   | - Based on 2006-07 prices of sugar  | 40   | -    | 44    |
|                   | ii) Producing cane for exports of sugar   |  |      |       |
|                   | - Based on 2006-07 prices of sugar  | 78   | -    | 82    |

## ***RECOMMENDATIONS***

### **Prices of Sugarcane, 2006-07 Crop**

In view of the problems faced by the growers as well as the sugar industry, the current policy of fixing the cane prices by the provincial governments needs to be reconsidered. The prices of sugarcane, as in case of other crops, should be determined by the Federal Government.

In view of the relevant factors analysed in Section 7.12 of this Report, API recommends the indicative price for sugarcane, 2007-08 crop at the previous year level i.e. Rs 60 per 40 kgs.

### **Linking Prices of Sugarcane to its Quality**

Presently cane is purchased on weight basis without considering its quality. To enhance the efficiency both at farm and mill level it is imperative that the price of cane be linked to its quality. The efforts being done in this connection need to be emphasized at Federal level.

### **Improving Marketing of Sugarcane**

The problems of underweighment, delayed payments, purchase of CPRs, etc have subsided this year due to short supply of sugarcane. However, following measures are suggested in view of problems faced by sugarcane growers in years of good harvest.

**i) Underweighment**

In order to check the underweighment at weighbridges, the effective supervisory committee may be deputed. The use of private/temporary bridges may be banned and district governments should install their own weighbridges in the producing areas at a reasonable distance.

**ii) Undue deductions**

The growers should be educated for proper cleaning the trash before supply of sugarcane to mills and the Cane Commissioners should check against undue deductions.

**iii) Presence of middlemen**

The role of middlemen should be eliminated through amendment in the Sugar Factories Control Act, 1950.

**iv) Delayed payments/sale of CPRs**

In order to ensure prompt payments to growers and discourage the sale of CPRs to the middlemen, the provisions of Sugar Factories Control Act, 1950 need to be strictly enforced by the provincial governments.

**v) Use of sugarcane cess fund**

Provincial governments should ensure the proper utilization of sugarcane cess fund for improvement of roads and for research purposes.

**vi) Amendments in Sugar Factories Control Act, 1950**

Keeping in view the emerging needs of the sector, the Sugar Factories Control Act, 1950 may be amended accordingly.

## **Value-addition in Sugar Industry**

In the wake of increasing globalization and WTO requirements, sugar industry which primarily relies on manufacturing sugar in Pakistan needs to further concentrate on value-addition through processing of molasses, bagasse and press mud. The Ministry of Industries/Experts Advisory Cell may work out a strategy in this context as already initiated by Shakar Gung Sugarmills, Jhang.

## **Improving Productivity**

### **Biological Control**

The government should emphasize PSMA and provincial research institutes to establish IPM labs for rearing predators for disease control in sugarcane crop.

### **Varietal Development**

The Government should pursue the PSMA and provincial research institutes to emphasize on cane varietal development. Provincial governments should take strict measures to implement the ECC decision regarding the release and utilization of 'Cess Fund' in this regard.

### **Improved Cultural Practices**

Provincial departments of agriculture extension should take the following steps in this regard:

- promote use of deep tillage for seedbed preparation for sugarcane cultivation
- practise recommended 'row to row' distance in sugarcane fields for effective weed control
- discourage cultivation of un-approved varieties of sugarcane

- motivate farmers for 'Hot Water Treatment' of sugarcane setts for disease control
- apprise the farmers for achieving the desirable plant population per acre
- educate sugarcane growers for using different fertilizers in recommended dosage

### **Role of Sugar Industry in Cane Development**

To promote sugarcane crop, the sugar industry of Pakistan should:

- take concrete measures to multiply and disseminate high sucrose varieties alongwith necessary extension work for development of sugarcane crop.
- take immediate steps to increase supply of improved varieties of cane seed among the farmers in addition to government efforts in this regard
- supply press mud free of cost to sugarcane growers to ensure adequate amounts of organic matter in the soil to sustain necessary fertility level to improve yield of the sugarcane crop
- discourage the role of middlemen in cane marketing

**( Qadir Bux Baloch )**  
**Chairman, API**

**March 12, 2007**

# ***PRICE POLICY FOR SUGARCANE, 2007-08 CROP***

## ***INTRODUCTION***

Sugarcane is the second most important cash crop of Pakistan occupying about 5 percent of the total cropped area. Its share in the value-added by major crops has ranged between 10 – 13 percent during the last five years. It also provides a valuable by-product in the form of sugarcane tops as fodder for the livestock. Sugar industry of Pakistan comprising of 78 sugar mills with investment of 60 billion rupees entirely depends on sugarcane farming for raw material. Located mainly in the countryside, it provides not only employment opportunities but also contributes to rural development through the provision of infrastructure and many other forward and backwards linkages activities. Moreover, sugarcane farming and sugar industry have significantly contributed to the public exchequer in the form of excise duty and other taxes. However, indiscriminate expansion in the sugar industry particularly in the cotton zone has not only led to uneconomic horizontal expansion in sugarcane cultivation on marginal lands but also posed a serious threat to the country's water resources and forex earnings from cotton crop.

2. Though not substantiated by the economic indicators sugar industry has always maneuvered the situation against the cane growers. Persistently low sugar prices, in the domestic and international markets have also affected the economics of sugarcane and its dependent sectors in the past. The situation, however, started changing in 2005 wherein declining supplies to the mills and rise in sugar prices in the international market led to high prices of sugarcane and sugar in the domestic market. This situation induced certain state policy measures like import of white and raw sugar, etc.

3. During the field survey on 2006-07 crop it was reported that due to short production of sugarcane during 2005-06 mills offered higher prices to the growers of sugarcane. In 2006-07 growers were expecting the cane prices at previous level but increased production by about 23 percent and declining trend in the sugar price did not permit higher cane prices to prevail. However, growers still felt comfortable and enhanced the acreage under sugarcane 2007-08 crop. Thus expected bumper crop size of about 62 million tonnes may result into big losses to the growers.

4. It is strongly felt that the sugar industry should improve its efficiency through converting molasses into ethanol and inducing cultivation of high sucrose cane varieties so that it could become competitive in the global market. This may require to move from the existing weight-based payment system to sucrose-based. This policy shift would lead to the elimination of low sucrose cane varieties from the field and restore the miller – grower confidence. There is also a need of strict vigilance on variety evolution process at the research level. No variety should go for commercial cultivation unless it is fully tested at the research stations. The sugarmills should work hard to multiply and disseminate seed of high sucrose varieties to their contract growers in the surrounding areas.

5. In the global context Pakistan ranks 4<sup>th</sup> in terms of acreage under sugarcane, 5<sup>th</sup> in terms of production and almost at the bottom in terms of per hectare yield. A host of performance indicators most specifically relating to the economics of the crop suggest that horizontal expansion in cane production is neither desirable nor feasible particularly under the prevailing sugar exporting scenario. However, there is a considerable scope for increasing cane production through improving the productivity of farm resources committed to its cultivation. Similarly, there exists a huge potential for improving sugar recovery through adoption of high sucrose varieties at the farm level and improvement in the processing efficiency at the mills. Efforts are also required to improve the efficiency of resources already employed to produce sugarcane and sugar so that the cost of production of this farm enterprise could be reduced for welfare of the economy.

6. In view of the importance of sugarcane crop and sugar industry in the economy, the problems confronting the farmers and industry need to be resolved through policy measures aimed at addressing the core issues of regular supply of sugarcane, price escalations, malpractices in its marketing, production of ethanol and other by-products etc. The API has put forward a number of proposals in this context for the consideration of Government in this Report. Implementation of these measures can help resolve the afore-mentioned bottlenecks concerning sugarcane production and sugar industry.

## 2. SUGARCANE PLANTING AND HARVESTING SEASONS

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

**Table-1: Planting Times of Sugarcane by Province**

| Province | Planting Time  |                                       |
|----------|--|---------------------------------------|
|          | Spring crop  | Autumn crop                           |
| Punjab   | 15 <sup>th</sup> February to 3 <sup>rd</sup> week of March | September                             |
| Sindh    | 1 <sup>st</sup> February to 15 <sup>th</sup> March         | September to 15 <sup>th</sup> October |
| NWFP     | 15 <sup>th</sup> February to 3 <sup>rd</sup> week of March | September                             |

Source: Sugarcane Coordinator, NARC, Islamabad.

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

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

## 3. PROVINCIAL SHARES

10. Provincial shares in area and production of sugarcane, cane crushed and sugar made have been discussed below:

### 3.1 Area and Production

11. Shares of area and production of sugarcane during the decade encompassing 1996-97 to 2006-07 and changes therein have been discussed in Table-2.

**Table-2: Comparison of Provincial Shares in Area and Production of Sugarcane: 1996-97 to 1998-99 and 2004-05 to 2006-07**

| Country/Province | Area                     |                          | Production               |                          |
|------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                  | 1996-97<br>to<br>1998-99 | 2004-05<br>to<br>2006-07 | 1996-97<br>to<br>1998-99 | 2004-05<br>to<br>2006-07 |
|                  | ----- Percent -----      |                          |                          |                          |
| <b>Pakistan</b>  | <b>100.0</b>             | <b>100.0</b>             | <b>100.0</b>             | <b>100.0</b>             |
| Punjab           | 65                       | 68                       | 60                       | 68                       |
| Sindh            | 25                       | 21                       | 31                       | 23                       |
| NWFP             | 10                       | 11                       | 10                       | 9                        |

**Source:** Annex-II.

12. Punjab, Sindh and NWFP share 68, 21 and 11 percent in area and 68, 23 and 9 percent in production. Over time share of Punjab has gone up by 3 percent in area and 8 percent in production. In case of Sindh area share is down by 4 percent and that of production by 8 percent. In the NWFP area share is up by one percent while production share is gone down by 1 percent. Provincial shares are also depicted in Figures 1 to 4.

13. During the Average area, yield and production of the periods 1996-99 and 2004-07 has been compared to period area under sugarcane has decreased by 8.6 percent at country level (Annex-II). Area in all the provinces has decreased but at varying degrees; Punjab, 4.2 percent; Sindh 21.8 percent and NWFP, 4.3 percent.

14. The yield, however, during this period increased by 6.6 percent at country level. Increase in yield is not shared by all provinces. It only increased in the Punjab by 16 percent. In Sindh it diminished by 7.5 percent. In the NWFP yield is declined by 0.4 percent.

PROVINCIAL SHARES IN AREA AND PRODUCTION OF SUGARCANE:  
AVERAGE OF 1996-97 TO 1998-99

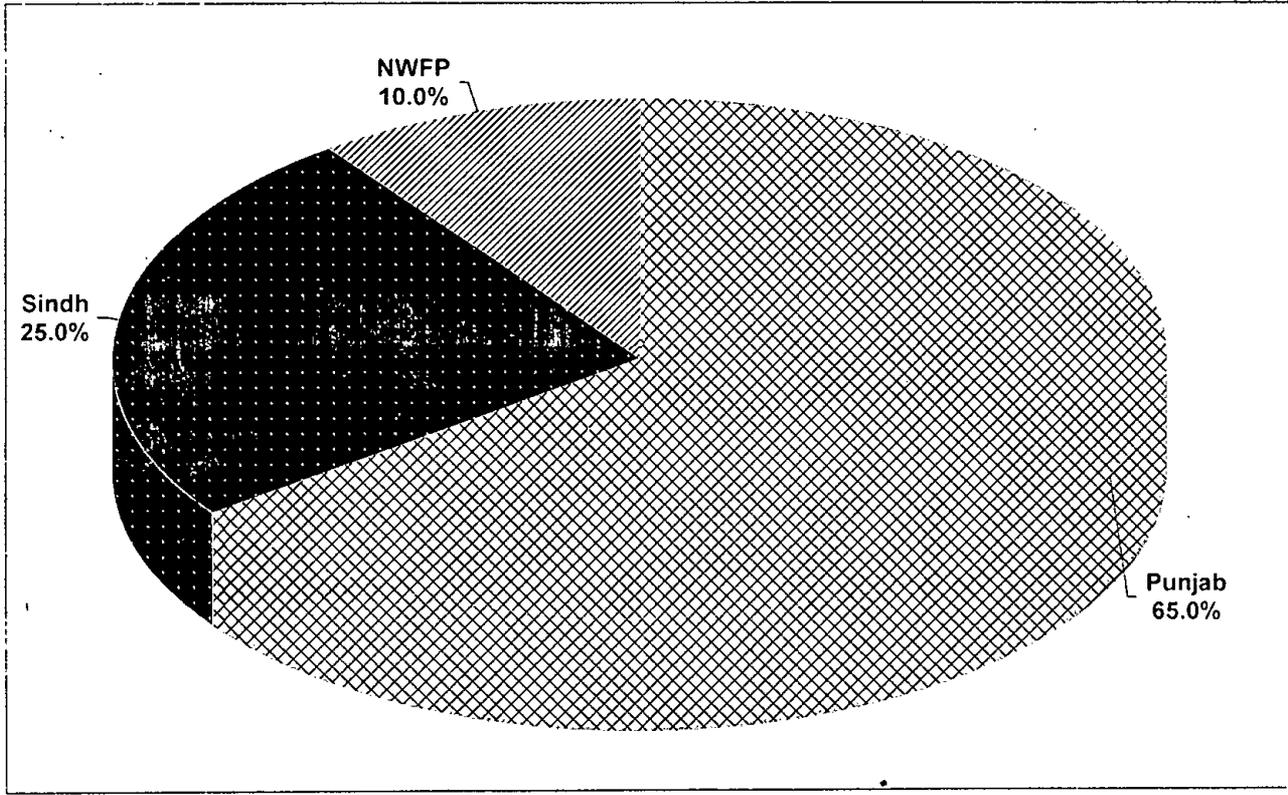


Fig-1: Shares in Area

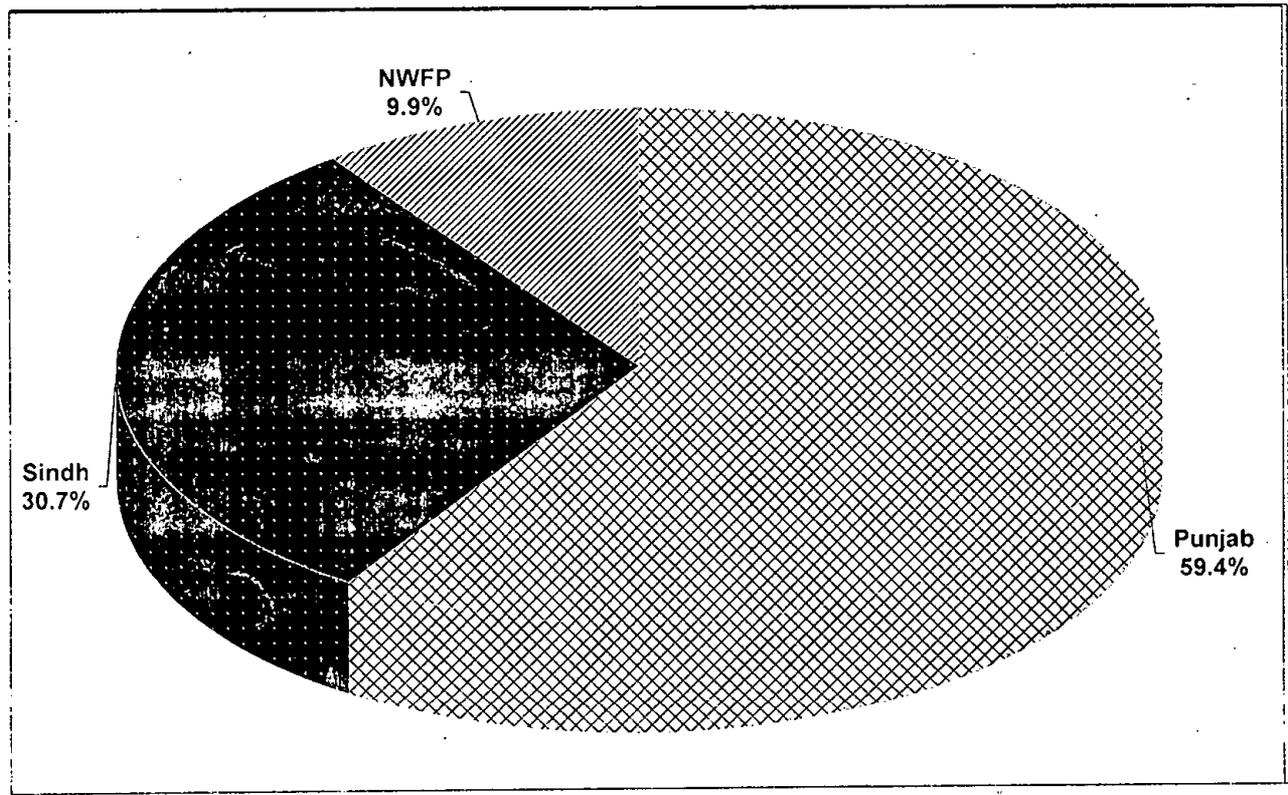


Fig-2: Shares in Production

PROVINCIAL SHARES IN AREA AND PRODUCTION OF SUGARCANE:  
AVERAGE OF 2004-05 TO 2006-07

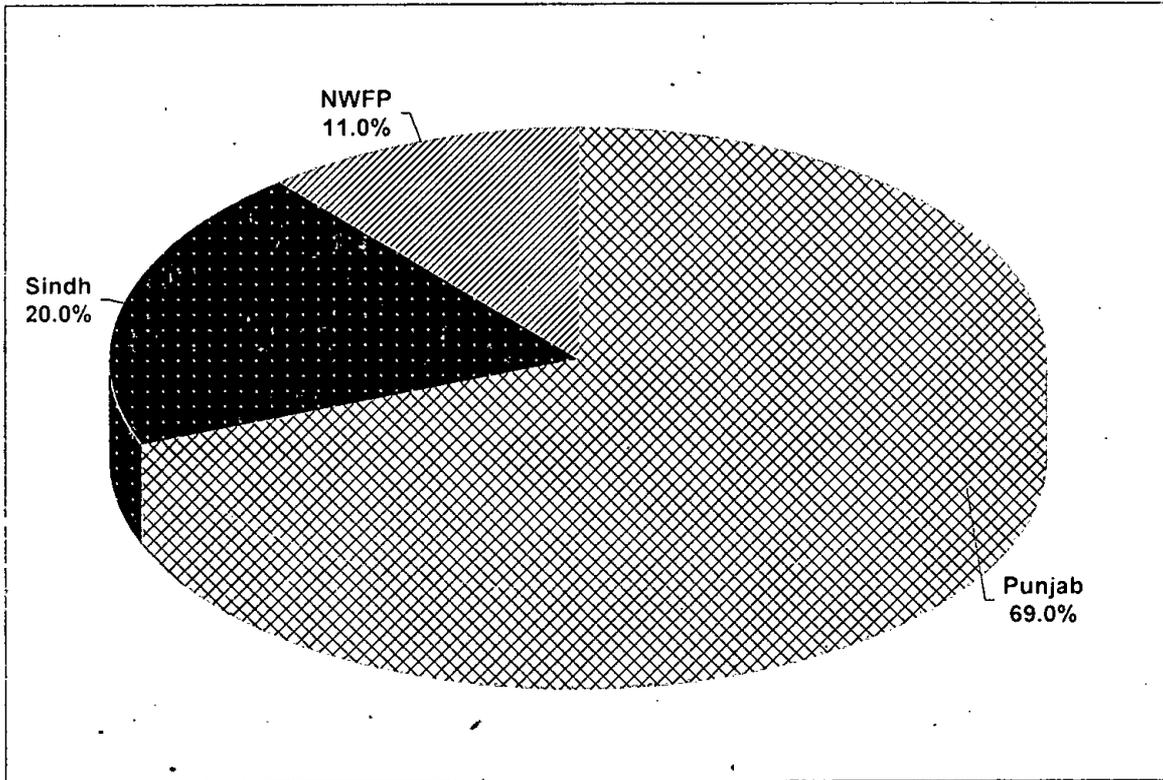


Fig-3: Shares in Area

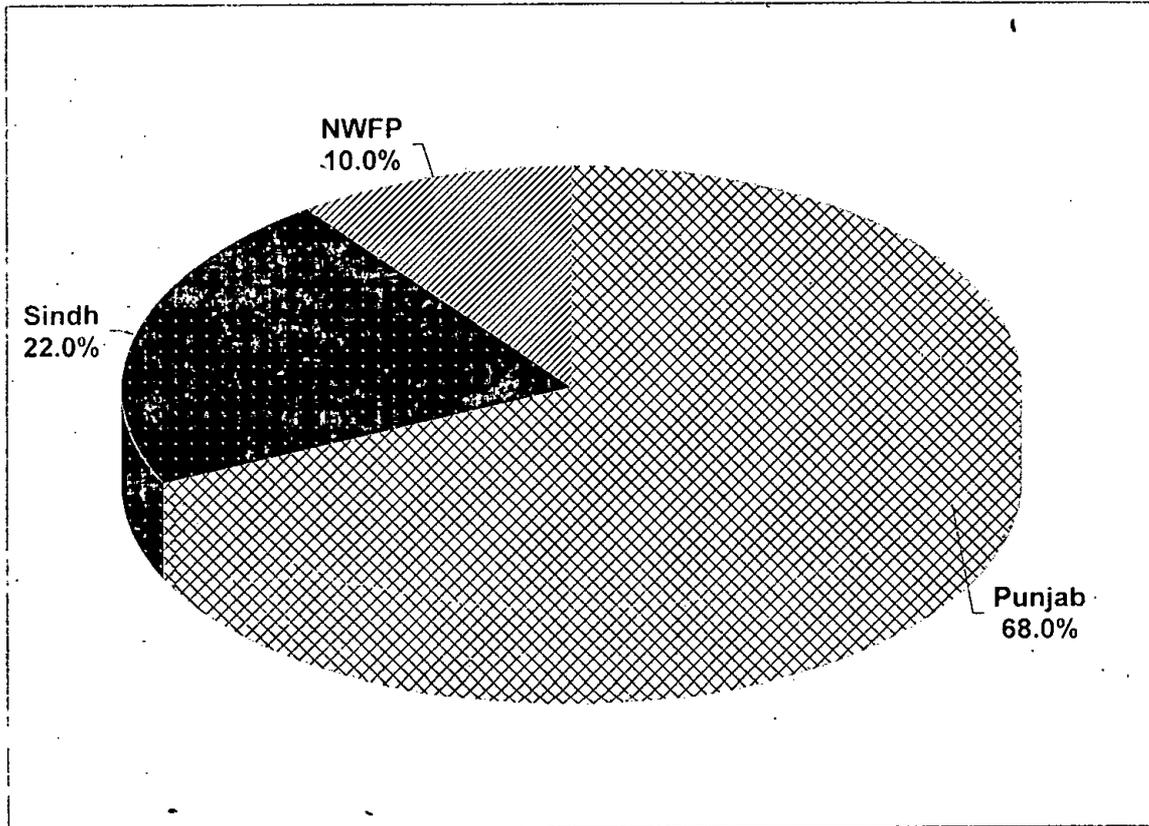


Fig-4: Shares in Production

15. Production during this period at country level is increased by 2.4 percent due to contraction in area by 8.6 percent. Improvement in yield by 6.6 percent restricted the production to fall beyond 2.4 percent. Production fell in Sindh and NWFP by 28.6 and 2.1 percent but increased by 11.4 percent in the Punjab.

16. Area and production shares of the Punjab have increased over time while that of Sindh have decreased. Water stress conditions in Sindh have reduced area and yield in the province. In the Punjab Tubewell irrigation is keeping up the pace of increase in area and yield.

### 3.2 Cane Crushing

17. Sugarcane is a raw material for the Sugar Industry. Other uses of sugarcane are Gur making and animal feed. Cane crushing and provincial shares in cane crushed have been compared for the periods 1996-97 to 1998-99 average and 2003-04 to 2005-06 average in Table-3.

**Table-3: Provincial Shares in Cane Crushing**

| Country/Province | Percent cane crushed     |                          | Provincial share in cane crushed |                          |
|------------------|--------------------------|--------------------------|----------------------------------|--------------------------|
|                  | 1996-97<br>to<br>1998-99 | 2003-04<br>to<br>2005-06 | 1996-97<br>to<br>1998-99         | 2003-04<br>to<br>2005-06 |
|                  | ----- Percent -----      |                          |                                  |                          |
| <b>Pakistan</b>  | <b>74</b>                | <b>73</b>                | <b>100</b>                       | <b>100</b>               |
| Punjab           | 76                       | 74                       | 61                               | 67                       |
| Sindh            | 85                       | 86                       | 35                               | 28                       |
| NWFP             | 27                       | 36                       | 4                                | 5                        |

**Source:** Annex-III.

18. During the period under review percentage of cane crushed has decreased from 74 to 73 percent at country level. The decrease in percentage of cane crushed is mainly due to less percentage of cane crushing in the Punjab which decreased from 76 to 74 percent.

Crushing in Sindh and NWFP has improved from 85 to 86 per cent and 27 to 36 percent. Gur making is traditional in the NWFP that is why the percentage of cane crushed is significantly low in the province.

19. Punjab leads in cane crushing. Its share has increased from 61 to 67 per cent. The share of NWFP has also increased. However, Sindh has lost 7 points. Its share decreased from 35 to 28 percent. Six points were gained by Punjab and one by NWFP during the decade.

### 3.3 Sugar Production

20. Sugar production depends upon size of the sugarcane crop, percentage of cane supplied to mills and contents of sugar in cane. Provincial shares in sugar production from cane have been compared for the two periods 1996-97 to 1998-99 average and 2003-04 to 2005-06 average in Table-4.

**Table-4: Provincial Shares in Sugar Production**

| Country/Province | Sugar recovery           |                          | Shares in sugar production |                          |
|------------------|--------------------------|--------------------------|----------------------------|--------------------------|
|                  | 1996-97<br>to<br>1998-99 | 2003-04<br>to<br>2005-06 | 1996-97<br>to<br>1998-99   | 2003-04<br>to<br>2005-06 |
|                  | ----- Percent -----      |                          |                            |                          |
| <b>Pakistan</b>  | <b>8.5</b>               | <b>9.0</b>               | <b>100</b>                 | <b>100</b>               |
| Punjab           | 7.9                      | 8.8                      | 57                         | 66                       |
| Sindh            | 9.5                      | 9.5                      | 40                         | 30                       |
| NWFP             | 8.5                      | 8.2                      | 3                          | 4                        |

**Source:** Annex-IV.

21. Table-4 reveals that sucrose content in cane has improved from 8.5 to 9.0 percent at country level. Improvement in recovery is mainly due to higher recovery achieved in Punjab which improved from 7.9 to 8.8 percent.

22. Punjab is the leading sugar producer. Its share in sugar production has improved from 57 to 66 percent. However, share of sugar production in Sindh has decreased from 40 to 30 percent. There is some improvement in the share of NWFP. Ten percent decrease in the share of sugar production in Sindh has disturbed the sugar balance which has also affected the goal of self sufficiency in sugar. Water stress conditions in Sindh has contracted the sugarcane area, reduced yield and affected the recovery levels of cane. Gur production in the NWFP and inordinate delays in cane crushing by the mills have intensified the problem. Concerned quarters including Provincial Agriculture Departments and PSMA should take suitable steps to reverse the trend.

#### 4. IMPORTANT SUGARCANE PRODUCING DISTRICTS

23. Sugarcane is a high water delta crop. It is grown in irrigated conditions. Districts which grow 100 thousand tonnes or more of sugarcane are Faisalabad, Jhang, R.Y.Khan, Sargodha Kasur, T.T.Singh, M.B.Din, Muzaffargarh, Okara, Bahawalnagar, Vehari, Sheikhpura, Layyah, Bhakkar, Bahawalpur, Khanewal, Sahiwal, Pakpattan, Khushab, Rajanpur, Hafizabadm Mianwali, D.G.Khan, Gujrat and Multan in the Punjab; Hyderabad, Badin, Nawabshah, Thatta, N.Feroze, Khairpur, Sanghar, Mirpurkhas/Umar Kot, Ghotki and Dadu and Sukkur from Sindh; Charsadda, Mardan Peshawar, D.I.Khan, Naushera, Malakand and Swabi from NWFP. These 41 districts; 25 from the Punjab, 9 from Sindh and 7 from NWFP collectively account for 98 per cent of the sugarcane's area and production (Annex-V).

24. However Faisalabad, Jhang, R.Y.Khan, Sargodha, Kasur, T.T.Singh, Hyderabad, Badin, Charsadda and Mardan collectively produce 60 per cent of the total sugarcane produced in the country. Out of 77 sugarmills, 33 are located in these districts.

## 5. CHANGES IN AREA, YIELD AND PRODUCTION

25. During the decade ending 2006-07 area under sugarcane at country level ranged in between 907.3 to 1028.8 thousand hectares (2342 to 2542 thousand acres) production from 42 to 55 million tonnes and yield oscillated between 44 to 53 tonnes per hectare.

26. Long-term and short-term changes in area, yield and production of sugarcane are discussed below:

### 5.1 Long-term Changes: 1996-97 to 2006-07

27. During the period under discussion sugarcane production increased @ 0.3 per cent per annum mainly due to improvement in yield @ 0.8 per cent. The area, however, contracted @ 0.5 per cent per annum (Table-5).

**Table-5: Average Annual Growth Rates of Area Yield and Production of Sugarcane: 1996-97 to 2006-07**

| Country/Province | Area              | Yield   | Production |
|------------------|-------------------|---------|------------|
|                  | Percent per annum |         |            |
| Pakistan         | (-) 0.5           | (+) 0.8 | (+) 0.3    |
| Punjab           | (+) 0.2           | (+) 1.8 | (+) 2.1    |
| Sindh            | (-) 2.8           | (-) 0.9 | (-) 3.7    |
| N.W.F.P.         | 0.0               | (+) 0.3 | (+) 0.3    |

**Note:** The growth rates have been worked out by estimating the equation,  $Y=(1+r)$ , through ordinary least square method (OLS) from the data given in Annex-I.

28. Sugarcane production in the Punjab during the period under reference has increased @ 2.1 percent per annum based upon 1.8 per cent improvement in yield and 0.2 per cent expansion in area. Sugarcane production in Sindh is declining @ 3.7 per cent due to 2.8 per cent contraction in area and 0.9 percent fall in yield.

29. In the NWFP sugarcane production is increasing @ 0.3 per cent per year mainly due to improvement in yield as there is no change in area.

## 5.2 Medium-term Changes: 2001-02 to 2006-07

30. During the period under reference, at the country level, sugarcane production has increased @ 0.2 per cent per year because of 1.7 per cent improvement in yield as area under sugarcane crop has declined by 1.5 per cent per annum (Table-6).

**Table-6: Average annual Growth Rates of Area, Yield and Production of Sugarcane: 2001-02 to 2006-07**

| Country/Province | Area               | Yield   | Production |
|------------------|--------------------|---------|------------|
|                  | Per cent per annum |         |            |
| Pakistan         | (-) 1.5            | (+) 1.7 | (+) 0.2    |
| Punjab           | (-) 0.5            | (+) 1.7 | (+) 1.1    |
| Sindh            | (-) 5.0            | (+) 3.5 | (-) 1.7    |
| NWFP             | (+) 0.2            | (-) 1.2 | (-) 1.0    |

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

31. In the Punjab, sugarcane production has increased @ 1.1 per cent per annum based upon 1.7 per cent improvement in yield as area is declining @ 0.5 per cent per year.

32. Medium term trends of area, yield and production in Sindh are showing that yield is increasing @ 3.5 per cent and area is contracting @ 5.0 per cent per annum. As a result, sugarcane production is declining @ 1.7 per cent per annum.

33. In the NWFP, sugarcane production has decreased @ 1.0 per cent due to decline in yield by 1.2 per cent per annum as area under sugarcane crop has increased by 2.0 per cent.

34. Water scarce conditions have adversely affected sugarcane yields in Sindh. In the Punjab, supplementary tubewell irrigation has overcome this deficiency.

### 5.3 Short-term Changes: 2005-06 and 2006-07 Crops

35. According to the final estimates of Provincial Agriculture Departments sugarcane production at country level for 2006-07 crop is reported at 54.7 million tonnes reflecting an increase of 22.6 percent over last year's crop of 44.7 million tonnes. The rise in production is shared by 13.4 percent expansion in area and 7.9 percent rise in yield (Table-7).

**Table-7: Area, Yield and Production of Sugarcane: 2005-06 and 2006-07 Crops**

| Country/<br>Province | Area         |               | Changes        | Yield      |           | Changes        | Production     |                | Changes         |
|----------------------|--------------|---------------|----------------|------------|-----------|----------------|----------------|----------------|-----------------|
|                      | 2005-06      | 2006-07       |                | 2005-06    | 2006-07   |                | 2005-06        | 2006-07        |                 |
|                      | 000 ha       |               | Per cent       | Kgs per ha |           | Per cent       | 000 tonnes     |                | Per cent        |
| <b>Pakistan</b>      | <b>907.3</b> | <b>1028.8</b> | <b>(+)13.4</b> | <b>49</b>  | <b>53</b> | <b>(+) 7.9</b> | <b>44665.5</b> | <b>54741.4</b> | <b>(+) 22.6</b> |
| Punjab               | 625.2        | 711.8         | (+)13.9        | 46         | 53        | (+)13.8        | 28968.6        | 37542.0        | (+) 29.6        |
| Sindh                | 183.2        | 214.7         | (+) 17.2       | 61         | 58        | (-) 4.9        | 11243.4        | 12529.1        | (+) 11.4        |
| NWFP                 | 98.6         | 101.8         | (+) 3.2        | 45         | 45        | (+)2.2         | 4439.0         | 4645.1         | (+) 4.6         |

**Source:** Annex-I.

36. In the Punjab sugarcane production reported at 37.5 million tonnes shows an increase of 29.6 percent over the crop harvested last year, due to increases of 13.9 and 13.8 percent in area and yield.

37. Area under sugarcane in Sindh enlarged by 17.2 percent over previous year but yield diminished by 4.9 percent as a result production increase by 11.4 percent, from 11.2 to 12.5 million tonnes.

38. In the NWFP production is increased by 4.6 percent mainly due to expansion in area by 3.2 percent and improvement in yield by 2.2 percent the same ratio.

39. Provincial Agriculture Departments of the Punjab and Sindh have provided following reasons for increase/decrease in area and production.

### Area

40. In the Punjab area shows an increase of about 13.4 percent over the previous year which is mainly due to high prices of sugarcane received by the growers of the frost affected crop in 2005-06. Some of the crop has been planted late even after wheat harvest.

41. In Sindh area increase due to higher price offered by millers in the crushing season 2005-06 which induced the growers to bring more area under the sugarcane crop and they also continued the ratoon crop.

### Production

42. In the Punjab the increase in production is attributed to increase in area and favourable weather condition especially heavy rain in time, although some losses to production are reported because of lodging of heavy crop.

43. In Sindh the production increased by 11.4 percent. During the last season miller offered attractive prices of sugarcane therefore the growers kept more areas under ratoon crop which affected the yield of the crop. During the prolong monsoon rains the growers failed to apply required dose of chemical fertilizer.

## **6. TARGETS VS ACHIEVEMENTS: 2006-07 CROP**

44. FCA (Federal Committee on Agriculture) had fixed sugarcane production target for 2006-07 crop at 50.5 million tonnes. As per final estimates of Provincial Agriculture Departments sugarcane production is reported at 54.8 million tonnes. 8.4 percent more than the target due to 2.4 percent excess achievement in area and 5.8 percent in yield Table-8.

## 7.1 Cost of production of sugarcane

47. The cost of production of farm commodities constitutes an important consideration in their pricing. However, its empirical estimation is subject to several conceptual problems and practical difficulties because of wide variation in the use level of inputs and management practices resulting from the varied agro-climatic conditions and farming systems under which the crop is raised. Sugarcane has been traditionally sown during the months of March-April in the country. Autumn planting of sugarcane crop during the months of September- November has also become popular in certain regions of the country. Moreover, sugarcane is also produced from the ratoon crop. There are considerable variations in the input use level, cultural practices and yields of sugarcane obtaining from these crops. Besides, practices of inter cropping of other crops with sugarcane make it interesting but complicated subject for analysis, especially for estimating its cost of production for use in price setting.

48. The cost of production of sugarcane for the 2007-08 crop has been updated by using the input-output parameters adopted in the Price Policy Report for sugarcane 2006-07 crop in conjunction with the latest input prices and custom hire rates of field operations. The input prices and rates of cultural operations were obtained through field surveys conducted by the API in major sugarcane growing areas of the Punjab, Sindh and NWFP during January 2007. These rates were supplemented with the information provided by the representatives of the Provincial Agriculture Departments and Farmers' Associations in the meeting of the API's Standing Committee on sugarcane, held on 23<sup>rd</sup> January 2007 at Islamabad. Details of the cost of production estimates for the Punjab, Sindh and NWFP are given in Annex -VI to VIII, while a summary of the results is presented in Table-9.

**Table-8: Targets and Estimated Achievements of Area, Yield and Production of Sugarcane: 2006-07 Crop**

| Country/<br>Province | Area           |                  | Deviation<br>from the<br>target | Yield     |                  | Deviation<br>from the<br>target | Production       |                  | Deviation<br>from the<br>target |
|----------------------|----------------|------------------|---------------------------------|-----------|------------------|---------------------------------|------------------|------------------|---------------------------------|
|                      | Target         | Achieve-<br>ment |                                 | Target    | Achieve-<br>ment |                                 | Target           | Achieve-<br>ment |                                 |
|                      | --- 000 ha --- |                  | Per cent                        | Tonnes/ha |                  | Per cent                        | -- 000 tonnes -- | Per cent         |                                 |
| <b>Pakistan</b>      | 1005.0         | 1028.8           | (+) 2.4                         | 50.2      | 52.2             | (+) 4.0                         | 50500.0          | 54741.1          | (+) 8.4                         |
| Punjab               | 670.0          | 711.8            | (+) 6.2                         | 50.3      | 52.7             | (+) 4.8                         | 33500.0          | 37542.0          | (+) 12.1                        |
| Sindh                | 230.0          | 214.7            | (-)6.7                          | 52.0      | 58.4             | (+) 12.3                        | 11960.0          | 12529.1          | (+)4.8                          |
| NWFP                 | 105.0          | 101.8            | (-) 3.0                         | 48.0      | 45.7             | (-) 4.8                         | 5040.0           | 4645.1           | (-) 7.8                         |

**Sources:** 1. For targets: Working paper of the 86<sup>th</sup> Meeting of FCA.  
2. For achievements: Annex-I.

45. In the Punjab and Sindh sugarcane production exceed the target by 12.1 and 4.8 percent while in the NWFP, it is lagged behind the target by 7.8 percent.

## 7. FACTORS CONSIDERED FOR PRICE POLICY OPTIONS

46. In formulating the price policy proposals for sugarcane, 2007-08 crop, following factors have been considered and analysed.

- 7.1 Cost of production of sugarcane
- 7.2 Market prices of sugarcane, 2006-07 crop
- 7.3 Nominal and real prices of sugarcane
- 7.4 Economics of fertilizer use on sugarcane
- 7.5 Domestic demand, supply, stocks and prices of sugar
- 7.6 Comparative economics of sugarcane and competing crops
- 7.7 Prices of sugarcane on the basis of 'gur' prices
- 7.8 Prices of sugarcane worked back from average wholesale market price of sugar
- 7.9 World supply, demand, stocks, trade and price situation of sugar
- 7.10 Import and export parity prices
- 7.11 Economic efficiency in sugarcane production

**Table-9: Average Farmers' Cost of Production of Sugarcane: 2006-07 and 2007-08 Crops**

| Items                               | Unit        | Cost estimates |              | Increase in 2007-08 over 2006-07 |
|-------------------------------------|-------------|----------------|--------------|----------------------------------|
|                                     |             | 2006-07 Crop   | 2007-08 Crop |                                  |
| <b>Punjab</b>                       |             |                |              |                                  |
| 1. Cost of cultivation              | Rs/acre     | 26268          | 28819        | 2551                             |
| 2. Yield                            | 40 kgs/acre | 565.15         | 565.15       | -                                |
| 3. Cost of production at farm level | Rs/40 kgs   | 46.48          | 50.99        | 4.51                             |
| 4. Marketing cost                   | "           | 6.25           | 6.50         | 0.25                             |
| 5. Cost of production at mill-gate  | "           | 52.73          | 57.49        | 4.76                             |
| <b>Sindh</b>                        |             |                |              |                                  |
| 1. Cost of cultivation              | Rs/acre     | 32154          | 34972        | 2818                             |
| 2. Yield                            | 40 kgs/acre | 676.02         | 676.02       | -                                |
| 3. Cost of production at farm level | Rs/40 kgs   | 47.56          | 51.73        | 4.17                             |
| 4. Marketing cost                   | "           | 6.32           | 6.57         | 0.25                             |
| 5. Cost of production at mill-gate  | "           | 53.88          | 58.30        | 4.42                             |
| <b>NWFP</b>                         |             |                |              |                                  |
| 1. Cost of cultivation              | Rs/acre     | 23730          | 26734        | 3004                             |
| 2. Yield                            | 40 kgs/acre | 585.46         | 585.46       | -                                |
| 3. Cost of production at farm level | Rs/40 kgs   | 40.53          | 45.66        | 5.13                             |
| 4. Marketing cost                   | "           | 6.27           | 6.52         | 0.25                             |
| 5. Cost of production at mill-gate  | "           | 46.80          | 52.18        | 5.38                             |

Source: Annex-VI to VIII.

## Punjab

49. The data summarized in Table-9 reveals that per acre cost of cultivation of sugarcane in the Punjab during 2007-08 crop year is likely to be Rs 28819 including land rent. Farm level cost of production, based on the average yield of 565 maunds per acre, works out to Rs 50.99 per 40 kgs. Accounting for the marketing charges and development

cess @ Rs 6.50 per 40 kgs, the mill-gate cost would be Rs 57.49 per 40 kgs, higher by Rs 4.76 (9 per cent) as compared to the last year.

## Sindh

50. The cost of cultivating one acre of sugarcane in Sindh for 2007-08 Crop is estimated at Rs 34972 with land rent. Taking an average yield of 676 maunds per acre, the unit cost of producing sugarcane at farm level is expected to be Rs 51.73 per 40 kgs. After adding transportation charges and development cess @ Rs 6.57 per 40 kgs, the cost of sugarcane at mill-gate would work out to Rs 58.30 per 40 kgs, reflecting an increase of Rs 4.42 (8 per cent) over the corresponding cost estimates for the previous year.

## NWFP

51. The cost of cultivation of sugarcane in the NWFP for 2007-08 crop works out to Rs 26734 per acre, including land rent. The farm level cost of production of sugarcane is estimated at Rs 45.66 per 40 kgs, based on an average yield of 585 maunds per acre. Accounting for marketing expenses @ Rs 6.52 per 40 kgs, the mill-gate cost of production would be Rs 52.18 per 40 kgs, higher by Rs 5.38 (12 per cent) over the corresponding cost estimates of the previous year.

52. The increases in the cost of production in all three provinces have resulted from upward trend in the rates of cultural operations and supplementary irrigation on account of increases in prices of diesel and power tariff. Further, the wage rates, managerial charges and land rental have also added to the increases in the cost of production. However, **lowered market prices of fertilizers on account of relief package of the government for farmers will partially offset the escalations in the cost of production.**

## Cost of major operations/inputs

53. In the total cost of cultivation of sugarcane for the 2006-07 and 2007-08 crop years in the Punjab, Sindh and NWFP, the shares of various operations and inputs are shown in the Table-10 below:

**Table-10: Cost of major operations/inputs of Sugarcane: 2006-07 and 2007- 08 Crops**

| <b>Operations/inputs</b>          | <b>2006-07</b> | <b>2007-08</b> | <b>Changes in</b>   |
|-----------------------------------|----------------|----------------|---------------------|
|                                   | <b>crop</b>    | <b>crop</b>    | <b>2007-08 over</b> |
|                                   | <b>Rs/acre</b> |                | <b>Per cent</b>     |
|                                   | <b>Punjab</b>  |                |                     |
| 1. Land preparation               | 2778 (11)      | 2910 (10)      | 5                   |
| 2. Seed and sowing operations     | 2586 (10)      | 3257 (11)      | 26                  |
| 3. Intercultural and earthling-up | 723 (3)        | 755 (3)        | 4                   |
| 4. Plant protection               | 188 (1)        | 190 (1)        | 1                   |
| 5. Irrigation                     | 3470 (13)      | 3550 (12)      | 2                   |
| 6. Fertilizer including FYM       | 3788 (14)      | 3578 (12)      | - 6                 |
| 7. Land rent                      | 5958 (23)      | 6500 (23)      | 9                   |
| 8. Harvesting and stripping       | 3637 (14)      | 3916 (14)      | 8                   |
| 9. "Others"                       | 3140 (11)      | 4163 (14)      | 33                  |
| 10. Total cost                    | 26268 (100)    | 28819 (100)    | <b>10</b>           |
|                                   | <b>Sindh</b>   |                |                     |
| 1. Land preparation               | 3510 (11)      | 3715 (11)      | 6                   |
| 2. Seed and sowing operations     | 4838 (15)      | 5322 (15)      | 10                  |
| 3. Intercultural and up-up        | 1423 (4)       | 1493 (4)       | 5                   |
| 4. Plant protection               | 268 (1)        | 270 (1)        | 1                   |
| 5. Irrigation                     | 1544 (5)       | 1598 (5)       | 3                   |
| 6. Fertilizer including FYM       | 5397 (17)      | 5139 (15)      | (-) 5               |
| 7. Land rent                      | 6667 (21)      | 7333 (21)      | 10                  |
| 8. Harvesting and stripping       | 4394 (14)      | 4732 (14)      | 8                   |
| 9. "Others"                       | 4113 (12)      | 5370 (14)      | 31                  |
| 10. Total cost                    | 32154 (100)    | 34972 (100)    | <b>9</b>            |
|                                   | <b>NWFP</b>    |                |                     |
| 1. Land preparation               | 1519 (6)       | 1605 (6)       | 6                   |
| 2. Seed and sowing operations     | 3519 (15)      | 4536 (16)      | 29                  |
| 3. Intercultural and up-up        | 1427 (6)       | 496 (6)        | 5                   |
| 4. Plant protection               | 259 (1)        | 264 (1)        | 2                   |
| 5. Irrigation                     | 2307 (10)      | 2653 (10)      | 15                  |
| 6. Fertilizer including FYM       | 3928 (17)      | 3736 (14)      | (-) 5               |
| 7. Land rent                      | 6875 (29)      | 7500 (28)      | 9                   |
| 8. Harvesting and stripping       | 875 (4)        | 943 (4)        | 8                   |
| 9. "Others"                       | 3021 (12)      | 4001 (15)      | 32                  |
| 10. Total cost                    | 23730 (100)    | 26734 (100)    | <b>13</b>           |

- Notes: 1. Others include mark-up, management, land tax, drainage cess and expected escalation in the cost of selected items.  
2. Figures in parenthesis are percent shares in total cost.

Source: Annex VI to VIII

**Punjab**

54. Land rent is the dominant constituent in the cost of cultivation of sugarcane for the 2007-08 crop in the Punjab, accounting for 23 per cent. Harvesting and stripping operations and "others" (14 % each), fertilizers including FYM and irrigation (12 % each), seed and sowing operation (11 %) and land preparation (10 %) are the other major constituents of the cost of cultivation.

55. The cost of cultivation of sugarcane for the 2007-08 crop has increased by Rs 2551 per acre (10 per cent) over the last year. The shares of different items in the increased cost are: "Others" (33 %), seed and sowing operations (26 %), land rent (9 %), harvesting and stripping (8 %) and land preparation (5 %).

**Sindh**

56. In Sindh, during 2007-08 crop year, the major components of the cost of cultivation of sugarcane are: Land rent (21 %), seed and sowing operations and fertilizer including FYM (15 % each), harvesting and stripping operations and "others" (14 % each), land preparation (11 %) and irrigation (5 %).

57. The changes in cost of different operations have resulted in an increase of Rs 2818 per acre (9 per cent) in the cost of sugarcane for the 2007-08 crop over that of 2006-07 crop. The constituents of cost increase are: "Others" (31 %), land rent and seed and sowing operations (10 % each), harvesting and stripping (8 %) and land preparation (6 %).

**NWFP**

58. Land rent is the major component of the cost of cultivation of sugarcane for 2007-08 crop in the NWFP, accounting for 28 per cent. The other important components are: Seed and sowing operations (16 %), others (15 %), fertilizers including FYM (14 %), irrigation (10 %) land preparation and interculture (6 % each).

59. The increase of Rs 3004 per acre (13 per cent) in the cost of cultivation of sugarcane for the 2007-08 crop in NWFP is primarily attributed to increases in: "others" (32 %), seed and sowing operation (29 %), irrigation (15 %) and land rent (9 %).

#### Prices of major farm inputs

60. The prices of major farm inputs applied in estimation of the cost of production of sugarcane for the 2006-07 and 2007-08 crops are given as below:

| Items           | Units     | 2006-07 crop | 2007-08 crop | Per cent change |
|-----------------|-----------|--------------|--------------|-----------------|
| <b>Punjab</b>   |           |              |              |                 |
| 1. HSD          | Rs/litre  | 37.25        | 37.80        | 1.48            |
| 2. Power tariff | Rs/kwh    | 3.28         | 3.61         | 10.00           |
| 3. DAP          | Rs/bag    | 1073         | 908          | (-) 15.38       |
| 4. Urea         | Rs/bag    | 517          | 532          | 2.90            |
| 5. Seed         | Rs/40 kgs | 65           | 87           | 33.65           |
| <b>Sindh</b>    |           |              |              |                 |
| 1. HSD          | Rs/litre  | 37.25        | 37.80        | 1.48            |
| 2. Power tariff | Rs/kwh    | 3.28         | 3.61         | 10.00           |
| 3. DAP          | Rs/bag    | 1070         | 848          | (-) 20.75       |
| 4. Urea         | Rs/bag    | 507          | 542          | 6.90            |
| 5. Seed         | Rs/40 kgs | 70           | 78           | 11.43           |
| <b>NWFP</b>     |           |              |              |                 |
| 1. HSD          | Rs/litre  | 37.25        | 37.80        | 1.48            |
| 2. Power tariff | Rs/kwh    | 2.53         | 2.78         | 10.00           |
| 3. DAP          | Rs/bag    | 1130         | 920          | (-) 18.08       |
| 4. Urea         | Rs/bag    | 535          | 530          | (-) 0.93        |
| 5. Seed         | Rs/40 kgs | 70           | 95           | 35.71           |

## 7.2 Market Prices of Sugarcane

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

| <u>Province</u> | <u>2006-07</u>            | <u>2005-06 crop</u> |
|-----------------|---------------------------|---------------------|
|                 | ----- Rs per 40 kgs ----- |                     |
| Punjab          | 60                        | 45                  |
| Sindh           | 67                        | 60                  |
| NWFP            | 65                        | 48                  |

62. The API conducted field visits in the important sugarcane growing areas of the Punjab, Sindh and the NWFP provinces during January 2007. During the course of the field survey, the sugarcane growers informed our survey teams about the difficulties and the problems encountered by them in selling their sugarcane.

63. The Government of Punjab fixed sugarcane price @ Rs 60 per 40 kgs. Prices received by growers ranged between Rs 58 - 60 per 40 kgs. However in the cane yard of the sugarmills it was observed that cane supply was very short to run the sugarmills. Gur makers also purchased the sugarcane from growers at the rate of Rs 60 per 40 kgs. Rate of gur prevailed in the market ranged from Rs 1000 per 40 kgs to 1200 per 40 kgs.

64. According to survey in Sindh province, sugarcane growers had received Rs 67 per 40 kgs at mill gate including all expenses of marketing. However, government of Sindh is also fixed sugarcane price @ Rs 67 per 40 kgs. The cane supply position to sugar mills from growers side was very limited because of dispute on price between mill management and sugarcane growers. Last year, sugarcane growers had received higher price of cane, this year sugarcane growers were reluctant to supply cane to mills on a fixed price of Rs 67 per 40 kgs. They were demanding to increase cane price at last years level and put pressure on mill management for its implementation. The mill management

was reluctant not to pay more than government price fixed by Sindh Government. Therefore, supply of cane to sugar mills was limited resulting delayed wheat cultivation. Sugarmills were running under crushing capacity.

65. Role of middlemen in purchasing cane from the growers, middlemen/brokers who purchased cane individually or in group of growers directly from the growers at below the indicative price which ranged Rs 58 to 64 depending on mileage excluding transportation charges at spot. The same cane was supplied to mills at the rate of Rs 67 – 72 per 40 kgs. Payment of the cane is being paid on receiving CPR from the mill management by cash. The survey team has observed while interviewing sugarcane growers and mill management that mill management has under hand deputed brokers to purchase cane from growers at low price on cash payment. Sugarcane growers were complaining that mill management delaying in payment about 15 – 20 days of cane supplied to mill directly.

66. Cutthroat competition was observed between sugarmills and gur makers in NWFP. The mills were under immense pressure for cane supply because of increased numbers of cane crushers of gur making and expansion in their crushing capacity due to technological changes. In spite of offering reasonable price, supply of cane was tremendously short in sugarmills situated in Peshawar valley.

### **7.3 Nominal and Real Support and Market Prices of Sugarcane: 2000-01 to 2006-07**

67. The changes in the prices of a commodity in relation to general price level in the economy influence its purchasing power/real income of its producers. To ascertain overtime changes in the purchasing power of sugarcane, the nominal and real support and market prices of sugarcane for the period from 2000-01 to 2006-07 were deflated by the Consumer Price Index (CPI), the most common measures of inflation in the economy. The outcome of the analysis is set out in Table-11 and also shown in figures 5 to 8.

**Table-11: Nominal and Real Support and Market Prices of Sugarcane realized by the Growers in the Punjab and Sindh: 2000-01 to 2006-07**

| Crop year | Nominal prices          |           |           |           | Consumer Price Index (CPI) | Real Prices             |                      |                      |                       |
|-----------|-------------------------|-----------|-----------|-----------|----------------------------|-------------------------|----------------------|----------------------|-----------------------|
|           | Punjab                  |           | Sindh     |           |                            | Punjab                  |                      | Sindh                |                       |
|           | support *               | Market ** | Support * | Market ** |                            | support                 | Market               | Support              | Market                |
| 1         | 2                       | 3         | 4         | 5         | 6                          | $7=(2/6) \times 100$    | $8=(3/6) \times 100$ | $9=(4/6) \times 100$ | $10=(5/6) \times 100$ |
|           | ---- Rs per 40 kgs ---- |           |           |           | 2000-01=100                | ---- Rs per 40 kgs ---- |                      |                      |                       |
| 2000-01   | 35                      | 45        | 36        | 50        | 100.00                     | 35                      | 45                   | 36                   | 50                    |
| 2001-02   | 40                      | 37        | 43        | 47        | 103.54                     | 39                      | 36                   | 42                   | 45                    |
| 2002-03   | 40                      | 35        | 43        | 36        | 106.75                     | 37                      | 33                   | 40                   | 34                    |
| 2003-04   | 40                      | 34        | 41        | 35        | 111.63                     | 36                      | 30                   | 37                   | 31                    |
| 2004-05   | 40                      | 40        | 43        | 41        | 121.98                     | 33                      | 33                   | 35                   | 34                    |
| 2005-06   | 45                      | 60        | 60        | 60        | 131.18                     | 35                      | 46                   | 46                   | 46                    |
| 2006-07   | 60                      | 60        | 67        | 67        | 142.36                     | 42                      | 42                   | 47                   | 47                    |

- Sources: 1. Economic Survey of Pakistan: 2005-06.  
2. Various issues of Support Price Policy Papers for Sugarcane.
- Notes: 1. For 2006-07 (July-January), CPI data obtained from Economic Advisors Wing, Islamabad.  
2. \*Minimum purchase price of sugarcane at mill-gate fixed by the Provincial Governments.  
3. \*\*Prices of sugarcane actually realized by the growers.

### 7.3.1 Nominal and Real Support and Market Prices in the Punjab

68. The nominal and real prices of sugarcane for 2000-01 to 2006-07 are set out in Table-11 and depicted in figures 5 and 6.

#### 7.3.1.1 Support Prices of Sugarcane

69. The nominal support price of sugarcane in the Punjab during the period 2000-01 to 2006-07 reflects a cumulative increase of 71 per cent from Rs 35 per 40 kgs in 2000-01 to Rs 60 in 2006-07. During the same period, the cumulative CPI has soared by 42 per cent. Consequently, the real support price of sugarcane for 2006-07 worked at Rs 42 per 40 kgs, showing a surge of 20 per cent over the real price of Rs 35 in 2000-01 crop. In the meanwhile, the real support prices of sugarcane have experienced ups and downs, touching the highest level of Rs 42 per 40 kgs in 2006-07 and the lowest level of Rs 33 per 40 kgs in 2004-05 in terms of 2000-01 prices.

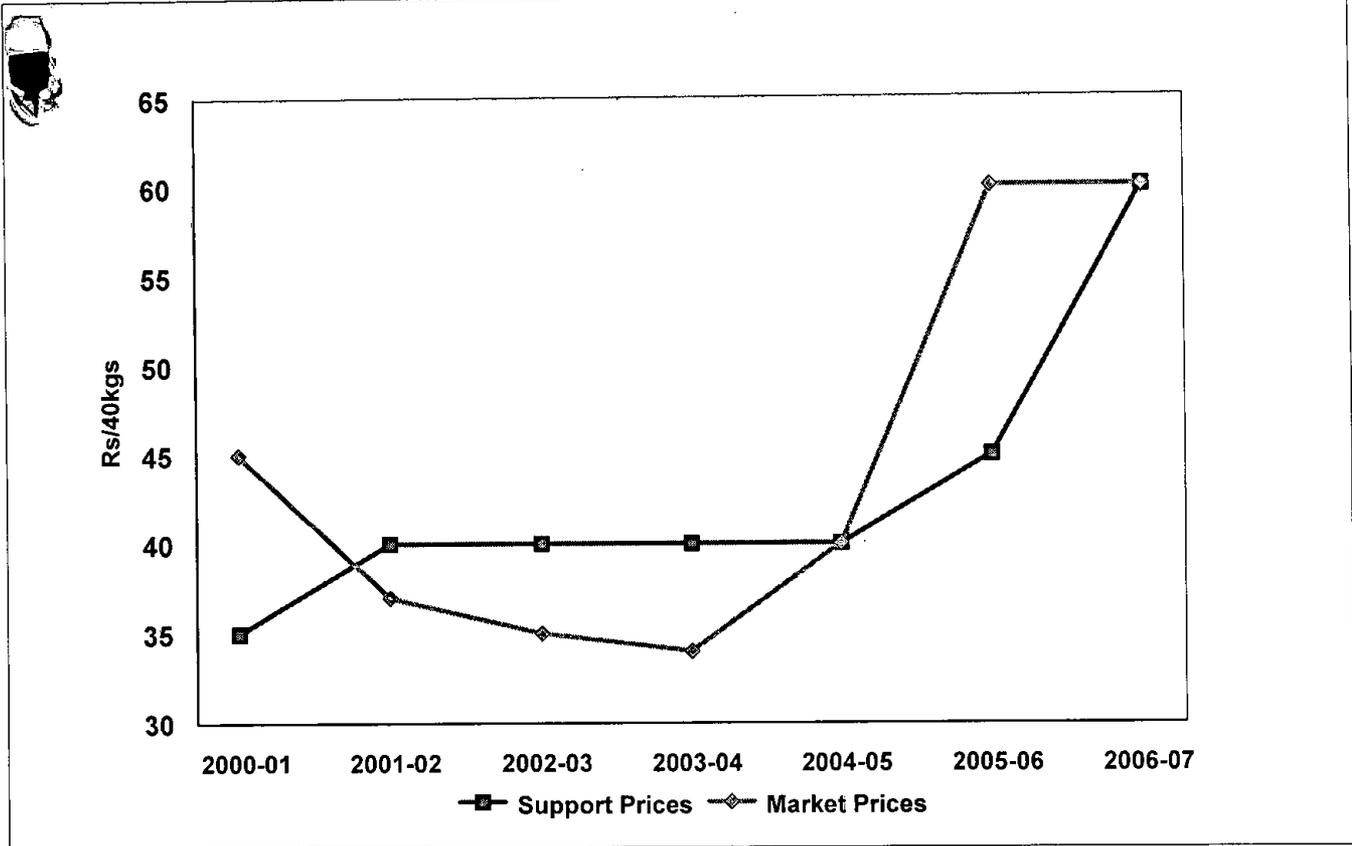


Fig-5:Nominal Support and Market Prices of Sugarcane in the Punjab 2000-01 to 2006-07

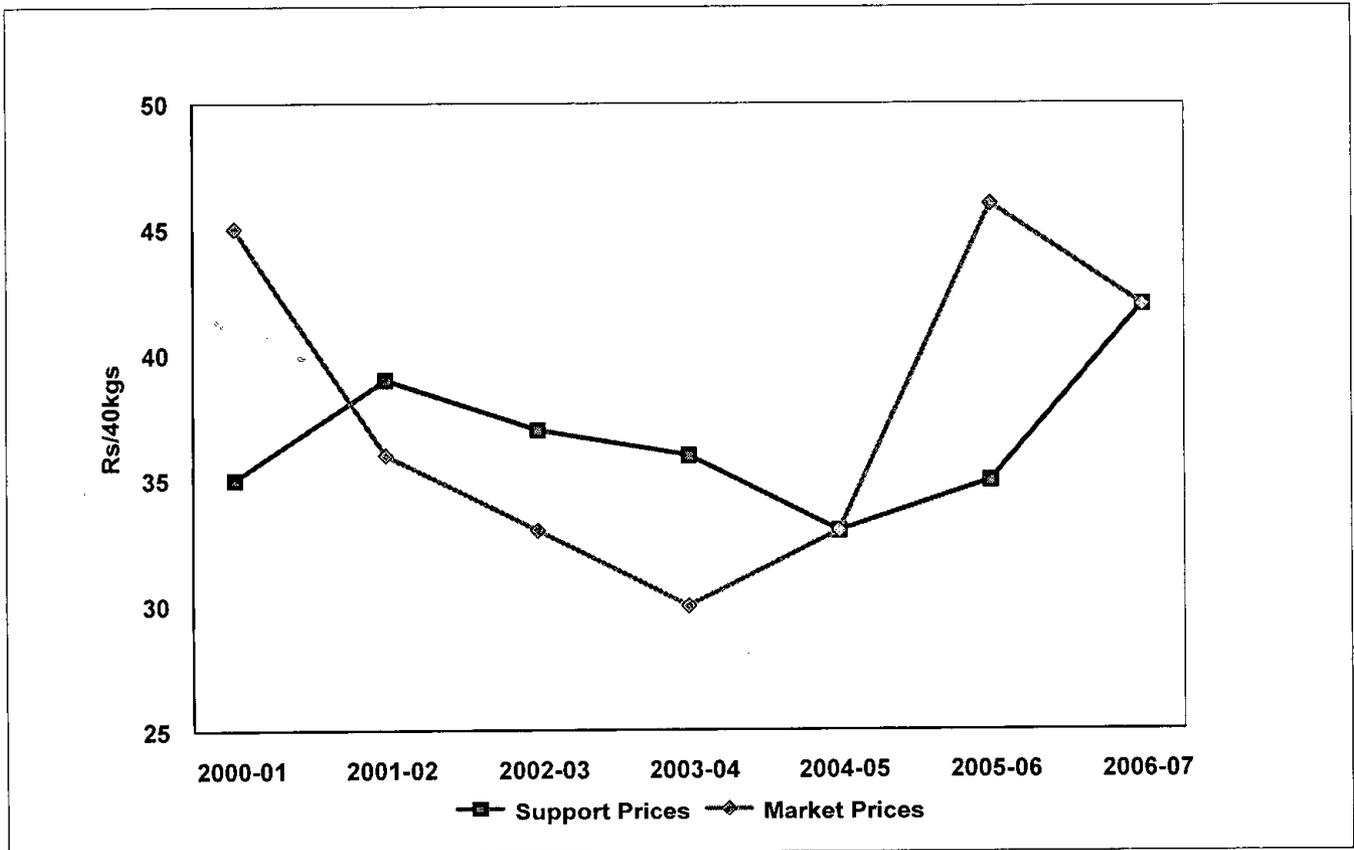


Fig-6:Real Support and Market Prices of Sugarcane in the Punjab 2000-01 to 2006-07

### 7.3.1.2 Market Prices of Sugarcane

70. The nominal market price of sugarcane averaging at Rs 45 per 40 kgs for 2000-01 crop has risen to Rs 60 per 40 kgs in 2006-07, indicating an overall surge of 33 per cent in the main sugarcane producing districts of Jhang, Faisalabad and Sargodha in the Punjab. During the same period, the cumulative CPI has escalated by 42 per cent. Consequently, the real market prices of sugarcane has deteriorated from Rs 45 per 40 kgs in 2000-01 to Rs 42 in 2006-07, showing a decline of 7 per cent. In the meanwhile, the real market prices of sugarcane have experienced ups and downs touching lowest level of Rs 30 per 40 kgs in 2003-04 and the highest of Rs 46 in 2005-06 crop.

71. It may be noted that the market prices fell short of maximum purchase prices announced by the Punjab Government in the years of 2001-02 to 2003-04 adversely affecting the purchasing powers of the growers. For 2006-07, the nominal market prices of sugarcane has averaged at the last year level, i.e. Rs 60 per 40 kgs. Therefore the real market price could not retain the last year position and fell short by 9 per cent.

### 7.3.2 Nominal and Real Support and Market Prices in Sindh

72. The nominal and real support and market prices of sugarcane for the period 2000-01 to 2006-07 are set out in Table-11 and also shown in figures 7 and 8.

#### 7.3.2.1 Support Prices of Sugarcane

73. The nominal support prices of sugarcane in Sindh during the period from 2000-01 to 2006-07 have reflected a cumulative increase of 87 per cent from Rs 36 per 40 kgs in 2000-01 to Rs 67 per 40 kgs in 2006-07. During the same period, the cumulative CPI has risen by 42 per cent. Consequently, the real support price of sugarcane for 2006-07 at Rs 47 per 40 kgs showed a surge of 31 per 40 kgs over 2000-01 crop. The real support prices of sugarcane during the period have experienced ups and downs, touching the lowest level of Rs 35 per 40 kgs in 2004-05 and the highest level of Rs 47 per 40 kgs in 2006-07 crop in terms of 2000-01 prices.

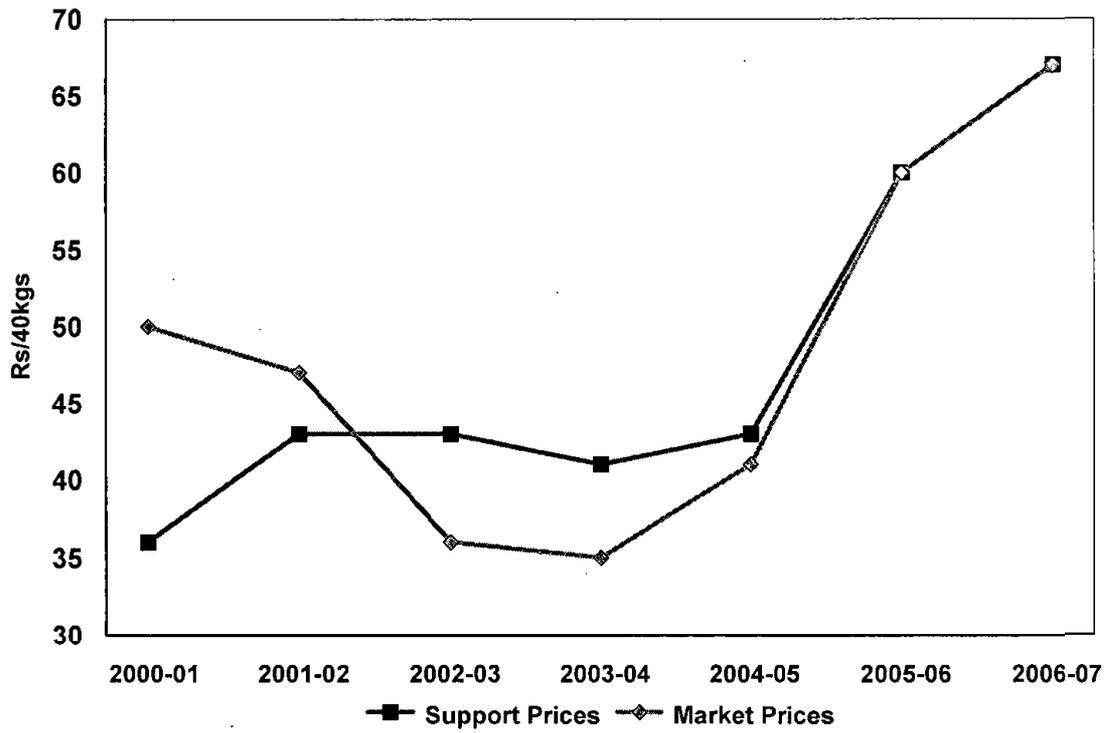


Fig-7:Nominal Support and Market Prices of Sugarcane in the Sindh 2000-01 to 2006-07

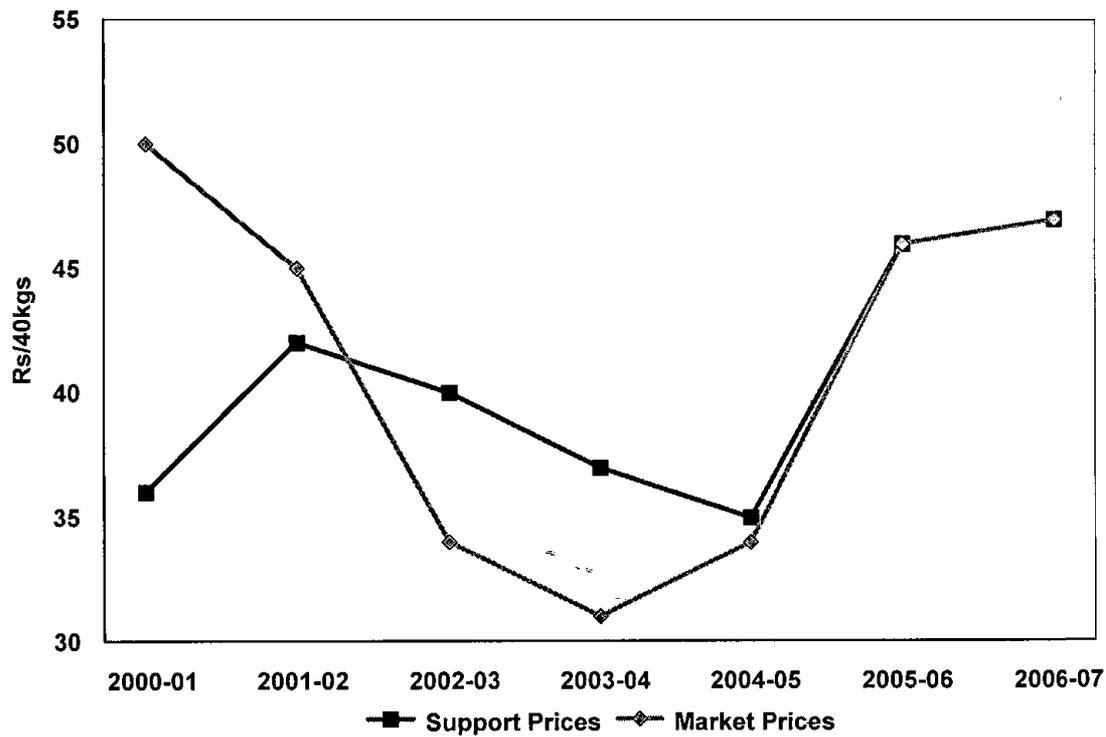


Fig-8:Real Support and Market Prices of Sugarcane in the Sindh 2000-01 to 2006-07

### 7.3.2.2 Market Prices of Sugarcane

74. The nominal market prices of sugarcane averaging at Rs 50 per 40 kgs for 2000-01 crop have soared to Rs 67 per 40 kgs in 2006-07, indicating an overall increase of 34 per cent in the main sugarcane producing districts of Thatta, Badin and Hyderabad in Sindh. During the same period, the cumulative CPI has spiraled by 42 per cent. Consequently, the real market prices of sugarcane have deteriorated from Rs 50 per 40 kgs to Rs 47 per 40 kgs in 2006-07, showing a decline of 6 per cent. The real market prices of sugarcane have followed several ups and downs during the period but remained below the base year level.

75. It may be noted that the market prices remained below the prices announced by the Government of Sindh during 2002-03 to 2004-05 which adversely affected the real income of the growers. For 2006-07, the nominal market prices of sugarcane have averaged at Rs 67 per 40 kgs, the highest market price during the period under report improving the real value by 2 per cent over the last year.

## 7.4 Economics of Fertilizer Use

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

### 7.4.1 Benefit Cost Ratio (BCR)

77. BCR refers to the ratio between value of additional produce resulting from using a certain dose of fertilizers and the costs thereof, both direct and indirect. A BCR of greater than one means that benefits are higher than the costs entailed in the process and vice versa. To encourage fertilizer use under low risk farming conditions (irrigated) a BCR of 2:1 or higher is recommended by researchers/agronomists. Because of large variations in soil and climatic conditions across various agro-climatic regions the crop response to the

use of fertilizer nutrients exhibits considerable variation. Moreover, BCRs are also subject to alter in view of changes in input and output prices. Thus the analysis of fertilizer use on sugarcane has been carried out at different response ratios for the period of 1997-98 to 2006-07 and are shown in Table -12.

**Table-12:- Benefit Cost Ratios (BCRs) of Fertilizer Use on Sugarcane at the Mill-gate Prices: 1997-98 to 2006-07**

| 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 |
| 1997-98   | 1.46  | 1.63  | 1.83   | 2.03  | 2.12   | 2.36  | 2.36   | 2.63  |
| 1998-99   | 1.34  | 1.50  | 1.67   | 1.88  | 1.94   | 2.18  | 2.16   | 2.43  |
| 1999-00   | 1.37  | 1.65  | 1.73   | 2.07  | 2.02   | 2.42  | 2.26   | 2.71  |
| 2000-01   | 1.80  | 2.00  | 2.26   | 2.51  | 2.63   | 2.92  | 2.93   | 3.26  |
| 2001-02   | 1.26  | 1.60  | 1.58   | 2.00  | 1.83   | 2.32  | 2.04   | 2.59  |
| 2002-03   | 1.29  | 1.25  | 1.62   | 1.56  | 1.88   | 1.82  | 2.09   | 2.03  |
| 2003-04   | 1.08  | 1.09  | 1.35   | 1.37  | 1.57   | 1.59  | 1.76   | 1.78  |
| 2004-05   | 1.20  | 1.23  | 1.50   | 1.53  | 1.74   | 1.77  | 1.93   | 1.97  |
| 2005-06   | 1.67  | 1.80  | 2.06   | 2.20  | 2.38   | 2.52  | 2.63   | 2.77  |
| 2006-07   | 1.30  | 1.47  | 1.60   | 1.81  | 1.83   | 2.07  | 2.02   | 2.29  |

**Note:** Market prices of sugarcane i.e. the prices realized by the growers at the mill-gate have been used for computing the BCRs for the respective crop years.

78. The data presented in Table-12 reveal that the BCRs at various response ratios have all along been greater than one implying fertilizer use on sugarcane has remained profitable throughout the period under analysis. However, acceptable profitability level of BCRs 2, as proposed by the experts, has been generally observed at response ratios of 90:1 and 110:1. The highest profitability level, at all response ratios was observed during

2000-01 crop years when price of sugarcane realized by the growers rose @ 23 per cent over the previous year. However, in the following four years i.e. 2001-02 to 2004-05, the BCRs at all response ratios have declined sharply reflecting price change unfavourable to crop.

79. During 2005-06 although prices of urea & DAP fertilizer increased by 13 & 18 percent respectively, BCRs again improved in favour of sugarcane as a result of 48 percent increase in the market price of the output. However, this position was not sustained during 2006-07 crop season both in the Punjab and Sindh at all response ratios. The BCR data further show that the profitability of fertilizer use on sugarcane in Sindh has been higher throughout the period under consideration as compared to Punjab because of better prices of sugarcane. The data on BCRs point to the need for improving the profitability of fertilizer use through confining sugarcane cultivation to rich soils and enhancing its productivity by inducing adoption of recommended agronomic practices.

#### **7.4.2 Parity between market prices of fertilizers and sugarcane**

80. The parity ratios between market prices of fertilizers and sugarcane refer to the quantity of sugarcane needed to purchase a certain quantity of chemical fertilizers. The overtime picture regarding purchasing power of sugarcane in terms of fertilizer nutrients N and P has been presented in Table-13.

**Table-13: Ratio Between Prices of Fertilizers (Nutrients) and Sugarcane: 1997-98 to 2006-07**

| Crop year | Prices of fertilizer nutrients |                               | Average market price of sugarcane | Quantity of sugarcane needed to buy one nutrient tonne of |                               |
|-----------|--------------------------------|-------------------------------|-----------------------------------|---|-------------------------------|
|           | N                              | P <sub>2</sub> O <sub>5</sub> |                                   | N   | P <sub>2</sub> O <sub>5</sub> |
|           | Rupees per tonne               |                               |                                   | Tonnes  |                               |
| 1997-98   | 15652                          | 18658                         | 925                               | 16.92   | 20.17                         |
| 1998-99   | 15108                          | 18870                         | 850                               | 17.77   | 22.20                         |
| 1999-00   | 15217                          | 24915                         | 962                               | 15.82   | 25.90                         |
| 2000-01   | 14783                          | 22476                         | 1187                              | 12.45   | 18.94                         |
| 2001-02   | 17391                          | 24499                         | 1050                              | 16.56   | 23.33                         |
| 2002-03   | 17040                          | 25420                         | 942                               | 18.09   | 26.98                         |
| 2003-04   | 17830                          | 25690                         | 925                               | 19.28   | 27.77                         |
| 2004-05   | 18170                          | 31540                         | 1012                              | 17.95   | 31.17                         |
| 2005-06   | 20475                          | 37225                         | 1500                              | 13.65   | 24.82                         |
| 2006-07   | 22261                          | 37898                         | 1575                              | 14.13   | 24.06                         |

- Notes:**
1. The prices of N and P have been worked out from those of Urea and DAP, which were used in estimating the cost of production of sugarcane in the respective support price policy papers.
  2. The prices of sugarcane realized by the growers in the Punjab and Sindh as collected during the field surveys have been used for computing the parity ratios for the respective crop years.

81. The ratios between prices of fertilizers and sugarcane having fluctuated between 12.45 and 19.28 for nitrogen and between 18.94 and 31.17 for phosphorus during the decade ending 2006-07. Those ratios were the most favourable to sugarcane in 2000-01 on account of remunerative prices of the produce. The quantity of sugarcane needed to buy one tonne of nitrogen in 2000-01 stood at 12.45 tonnes and of phosphorus at 18.94 tonnes. Fertilizer prices have since continued to rise while market prices of sugarcane trended downward. Consequently, the quantity of sugarcane required to buy the same amount of fertilizers has been increasing overtime.

82. At the prevailing market prices of sugarcane and fertilizers in 2005-06 crop season, 13.65 tonnes of sugarcane are required to buy one tonne of nitrogen while 24.82 tonnes of sugarcane would suffice to purchase one tonne of phosphorus implying that parity has moved in favour of cane crop. However, during 2006-07, purchasing power of sugarcane could not be sustained especially in terms of nitrogenous fertilizer while for P fertilizer it has been shown improvement @ of 3 per cent. The situation suggests that government is required to take certain measures to reduce the prices of fertilizer alongwith improvement in yield of cane which may improve both BCR as well as price parity in favour of the crop.

## **7.5 Domestic demand, supply, stocks and prices of sugar**

### **7.5.1 Domestic demand, supply and stocks**

83. The data on sugar production, trade, consumption and stocks during 1996-97 to 2006-07 are given in Annex-IX. Annual per capita availability/consumption of sugar has averaged at 23.47 kgs during the period ranging from 1996-97 to 2006-07.

84. At the beginning of sugar year 2005-06 the country had stocks of 578 thousand tonnes. Sugar production during the year has been reported at 2,999 thousand tonnes. Accounting for imports of 1593 thousand tonnes the end year stocks in 2005-06 come to 1311 thousand tonnes. Thus the total availability of sugar during 2005-06 was 4,106 thousand tonnes.

85. According to the final estimates of 2006-07 crop, sugarcane production is reported at 54.7 million tonnes 22.6 per cent higher than last year's level. The sugar industry estimates sugar production at 3527 thousand tonnes during the current season. Adding 1311 thousand tonnes of opening stocks, total availability of sugar during 2006-07 comes to 4066 thousand tonnes. Trend forecast of per capita sugar consumption comes to 24.71 kgs in 2007-08, accordingly, domestic requirements for 2007-08 for a mid year population of 169.08 million (as on 1<sup>st</sup> April 2008) work out to 4178 thousand tonnes.

86. During 2006-07 crushing season about 75 percent of the total production of cane was crushed to obtain 3527 thousand tonnes of sugar. It is expected that current un-lifted stocks of 760 thousand tonnes have quite large volume which will be carry over to 2007-08 crushing season. It is expected that current crop of 2007-08 will be significantly high than previous year and therefore the sugar production would be also higher. It is feared that if the stocks of sugar remain unlifted the crushing season 2007-08 may be delayed which will discourage the sugarcane growers and the financial burden on sugarmills will also increase. This situation will affect the miller grower relationship. In view of the foregoing supply and demand situation and allowance for carry over stocks for next year government would have to review its trade policy of sugar to meet the domestic requirements.

#### **7.5.2 Behaviour of sugar prices in domestic market**

87. The monthly average wholesale prices of sugar prevailing in major domestic markets of Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets during 2005, 2006 and 2007 are given in Annex-X. Monthly average wholesale prices of sugar during 2005 was recorded at a level of 2583 per 100 kgs but during 2006 a bullis trend in prices was recorded and had shown above 32 percent increase. Prices started declining during 2007 and up to June 2007 prices were reached to the level of Rs 2928 per 100 kgs and has shown a decrease of 16 percent and prices are expected to decrease further.

88. The prices of sugar showed a cyclical trend during the decade i.e. from 1995-96 to 2006-07 (Annex-XI). The average wholesale market price stood at Rs 1,625 per 100 kgs in 1995-96 in Hyderabad market which increased to Rs 3,359 per 100 kgs in Lahore market during 2006-07. Average wholesale sugar prices during the current year showed downward trend and remained below the last year prices. The cyclical behaviour has also been showed in Figure-9.

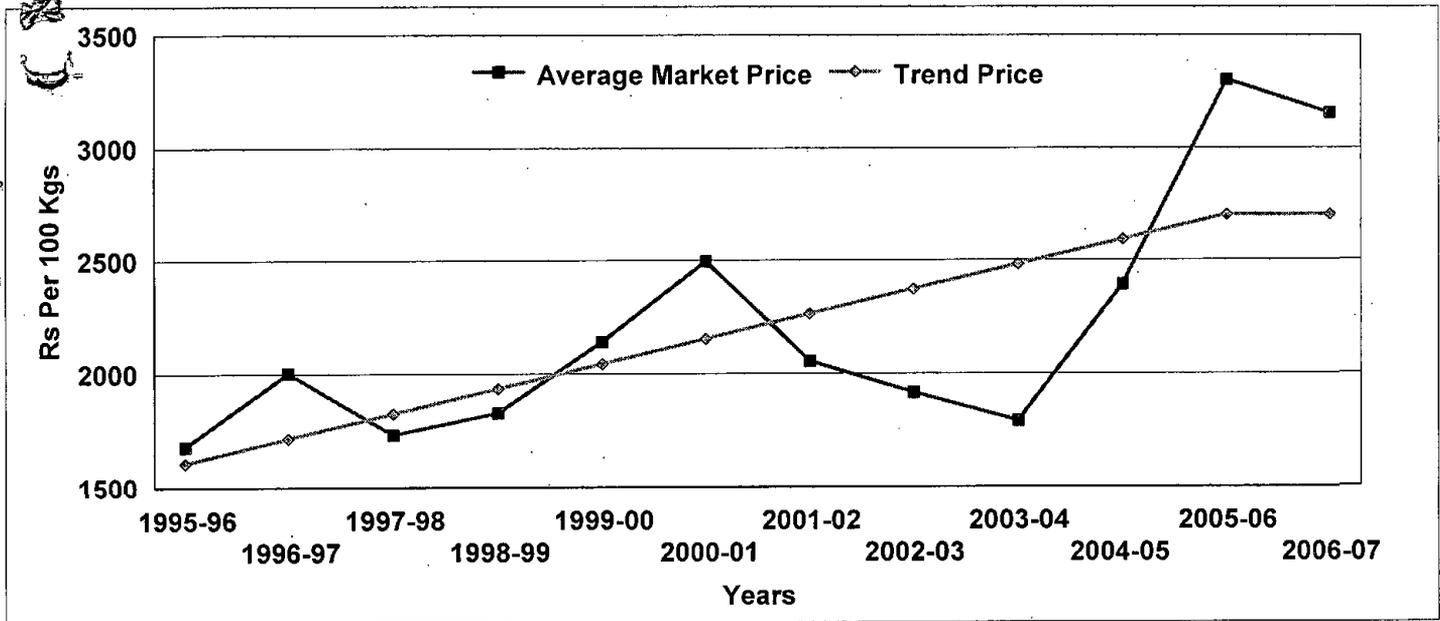


Figure-9: LONG TREND OF WHOLESALE PRICES OF SUGAR: 1995-96 TO 2006-07

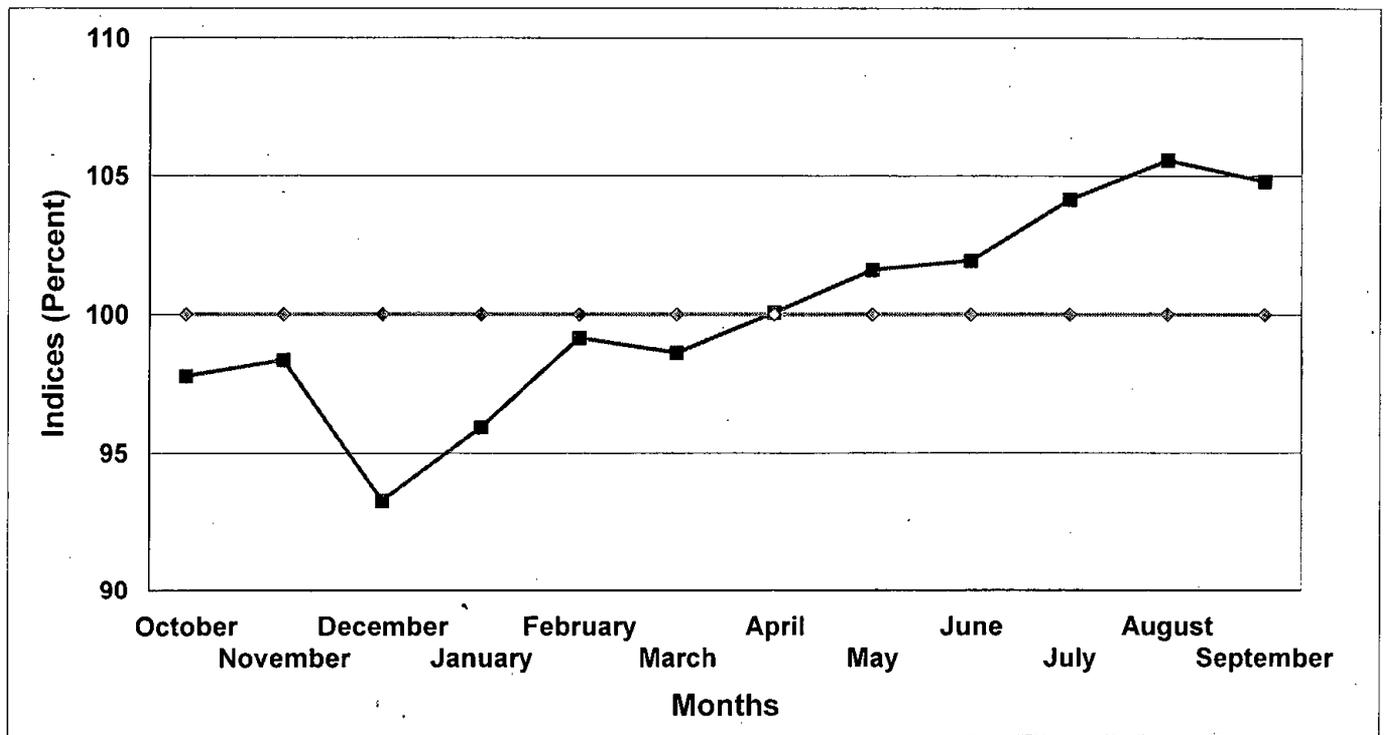


Figure-10 SEASONAL INDICES OF SUGAR PRICES: 1995-96 TO 2006-07

89. On the basis of monthly average wholesale prices of sugar during 1995-96 through 2006-07 seasonal indices have been calculated and depicted in Figure-10 with the start of crushing season in October/November a downward trend in prices of sugar sets in and continues upto March. Prices trended upward during April with the start of summer season and continue rising upto the start of new crushing season.

### **7.6 Comparative Economics of Sugarcane and Competing Crops**

90. Resource allocation among the competing enterprises is primarily governed by the economic considerations reflected in their gross cost, gross income, gross margin, net income, output-input ratio, etc. Sugarcane is planted in the irrigated regions of the country and being an annual crop, it competes for land, water and other farm resources with both the 'kharif' and 'rabi' crops as the land under sugarcane may not be available for growing other crops in a given year.

91. The economics of sugarcane and competing crops/combinations has been analyzed in terms of output-input prices paid and received by the growers during the 2006-07 crop year. Details of the analysis for the Punjab and Sindh are presented in Annex-XII. A summary of various economic indicators is provided in Tables-14 and 15. The results of the analysis are briefly discussed in the following paragraphs:

#### **i) Punjab**

92. The API's field survey revealed that sugarcane growers have generally received above the indicative price. It was also endorsed in the meeting of the standing committee on sugarcane. Resultantly, returns to overall investment on sugarcane crop are relatively better as compared to all the crop combinations. Sugarcane has also an edge over all crop combinations in terms of returns to purchased inputs.

93. Nevertheless, cotton combinations with wheat and sunflower have an edge over sugarcane in terms of returns to crop duration and irrigation water. Sugarcane out-competed the rice combinations in respect of returns to crop duration and irrigation water except the basmati and sunflower combination, which has an edge over sugarcane in terms of gross revenue per day of crop duration.

**Table-14: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in the Punjab: 2006-07 Crops**

| Crop/crop combination | Output-input ratio | Gross revenue per              |                      |                                    |
|-----------------------|--------------------|--------------------------------|----------------------|------------------------------------|
|                       |                    | rupee of purchased inputs cost | day of crop duration | acre-inch of irrigation water used |
| ----- Rupees -----    |                    |                                |                      |                                    |
| 1. Sugarcane          | 1.20               | 3.61                           | 77.10                | 632.85                             |
| 2. Cotton+wheat       | 1.08               | 2.50                           | 77.33                | 955.24                             |
| 3. Cotton+sunflower   | 1.16               | 3.06                           | 83.88                | 732.02                             |
| 4. Basmati+wheat      | 0.96               | 1.93                           | 71.76                | 369.07                             |
| 5. Basmati+sunflower  | 1.04               | 2.35                           | 78.91                | 319.57                             |
| 6. IRRI+wheat         | 0.92               | 1.90                           | 62.59                | 304.50                             |
| 7. IRRI+sunflower     | 1.00               | 2.38                           | 68.72                | 265.05                             |

**ii) Sindh**

94. The growers in Sindh have also received prices above the indicative price. Resultantly, the economic position of sugarcane has become quite good as compared to other crops. Sugarcane has a distinct edge over all the crop combinations in terms of all the criteria adopted for the economic analysis except irrigation water where cotton combinations with wheat and sunflower out-competed sugarcane with considerable margin.

**Table-15: Comparative Economics of Sugarcane and Competing Crops at Prices Realized by the Growers in Sindh: 2006-07 Crops**

| Crop/crop combination | Output-input ratio | Gross revenue per              |                      |                                    |
|-----------------------|--------------------|--------------------------------|----------------------|------------------------------------|
|                       |                    | rupee of purchased inputs cost | day of crop duration | acre-inch of irrigation water used |
| ----- Rupees -----    |                    |                                |                      |                                    |
| 1. Sugarcane          | 1.32               | 4.17                           | 84.06                | 577.76                             |
| 2. Cotton+wheat       | 1.12               | 2.95                           | 70.92                | 992.95                             |
| 3. Cotton+sunflower   | 1.19               | 3.06                           | 80.61                | 773.81                             |
| 4. IRRI+wheat         | 1.03               | 2.46                           | 59.52                | 315.10                             |
| 5. IRRI+sunflower     | 1.12               | 3.13                           | 69.73                | 289.63                             |

### 7.6.1 Economics of Sugarcane: Inter Provincial Comparison

95. The returns to overall investment in sugarcane farming, as reflected by the output/input ratio are higher in Sindh as compared to the Punjab primarily due to higher yields and relatively better price gains.

96. In view of its longer duration, the crop in Sindh requires more water and other inputs against the Punjab (Table-16). Chemical fertilizers in Sindh are used on higher side by 89 % nitrogenous and 15 % phosphates. Similarly, cost of purchased inputs is also higher in Sindh by 17 per cent.

97. In both the provinces, sugarcane excels the competing enterprises in all respects except gross returns to irrigation water where cotton combinations out-perform the earlier with a significant margin.

98. The higher yield in Sindh by 20% resulting from the greater use of inputs, compensates to a certain extent for the additional expenses. Overall returns to purchased inputs and crop duration have been relatively better in Sindh. However, despite of higher crop yield, sugarcane farming in terms of water use efficiency does not offer promising returns in Sindh as it lags behind the Punjab by almost 10 percent.

**Table-16: Inputs Use and Crop Yield in Sugarcane Cultivation in Sindh Versus Punjab: 2006-07 Crop**

| Item                   | Unit         | Sindh | Punjab | Difference/Edge in Sindh over Punjab (Per cent) |
|------------------------|--------------|-------|--------|---|
| Crop duration          | Crop days    | 488   | 394    | (+) 24  |
| Irrigation water       | Acre-inches  | 71    | 48     | (+) 48  |
| Inputs use (purchased) | Rs/acre      | 9836  | 8409   | (+) 17  |
| Fertilizer Use:        | Nutrient Kgs |       |        |   |
| N                      | "            | 104   | 55     | (+) 89  |
| P                      | "            | 39    | 34     | (+) 15  |
| Crop yield             | 40 kg units  | 676   | 565    | (+) 20  |

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

99. Gur making is an important cottage industry for processing of sugarcane into gur in some sugarcane producing areas of NWFP and Punjab. The working of this industry is influenced by the prices of gur, prices of cane offered by the mills and the problems faced by the growers in delivering cane to the mills. Thus, there is a need to compare the economics of supplying cane to the mills with the profitability of gur making. For this purpose, prices of cane have been worked out from the wholesale prices of gur. Details are given below:

### - NWFP

100. In the NWFP, the average wholesale market prices of gur during (October-January) 2006-07 crushing season, averaged at Rs 1324 per 40 kgs. After accounting for various expenses involved in gur making i.e. processing, marketing and chemicals used in the process, net value of 400 kgs of sugarcane required to produce 40 kgs of gur assuming recovery of 10 per cent comes to Rs 923.90. Since the economics of making is being compared with the cane supply to mill, development cess and transport cost of cane from the farm to the mill will also need to be added to this price. These costs are estimated at Rs 3.72 per 40 kgs. Adding these costs mill gate price of sugarcane calculates to Rs 96.11 per 40 kgs (Annex-XIII).

### - Punjab

101. The wholesale price of gur received by the growers in the Punjab during crushing season 2006-07 (October-January), averaged at Rs 1108 per 40 kgs. Accounting for the expenses involved in processing of sugarcane into gur including the cost of chemicals used in the process, net value of 400 kgs of sugarcane required to produce 40 kgs of gur assuming recovery of 10 per cent comes to Rs 891.11. Adding Rs 6.85 as transportation charges and development cess, mill gate price of sugarcane calculates to Rs 95.96 per 40 kgs (Annex-XIII).

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

102. 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 as well. Accordingly, price of cane can also be worked back from the average wholesale market price of sugar. Wholesale market price of sugar in different markets during current season (November-June) 2006-07 has averaged at Rs 28600 per tonne or Rs 28.60 per kg. After taking into account the whole-sellers margin @ 5 per cent or Rs 1292 per tonne and sales tax @ 15 per cent or Rs 3575 per tonne, net receipts to the sugar mills calculates to Rs 23833 per tonne. Ratio between the value of raw material (sugarcane) and processing cost has been estimated at 66:34. At this ratio processing cost comes to Rs 8103 per tonne. Using provincial bench mark recoveries of 8.50 per cent for Punjab and NWFP and 8.70 per cent for Sindh, mill gate prices of sugarcane in the Punjab and NWFP work to Rs 53.48 and Rs 54.74 per 40 kgs in Sindh. Details may be seen in Annex-XIV.

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

### **7.9.1 Supply, demand, stocks and trade**

103. The data on world balance sheet of sugar (raw equivalent), for the period of 2004-05 to 2006-07 are presented in Table-17:

**Table-17: World Balance Sheet of Sugar (Raw Equivalent): 2004-05 to 2006-07 (Oct-Sept)**

| S.No | Item                        | 2004-05                    | 2005-06<br>(Estimated) | 2006-2007<br>(Forecast) | Changes in<br>2006-07 over<br>2005-06 |
|------|-----------------------------|----------------------------|------------------------|-------------------------|---------------------------------------|
|      |                             | ----- Million tonnes ----- |                        |                         | Per cent                              |
| 1.   | Opening stocks              | 63.39                      | 57.17                  | 59.76                   | (+) 4.74                              |
| 2.   | Production                  | 140.79                     | 152.08                 | 162.62                  | (+) 3.82                              |
| 3.   | Total supply (1+2)          | 204.18                     | 209.25                 | 222.38                  | (+) 4.07                              |
| 4.   | Disappearance (consumption) | 146.99                     | 149.86                 | 153.51                  | (+) 1.82                              |
| 5.   | Stock Adjustment *          | (-) 0.02                   | -0.02                  | (-) 3.09                | 0.00                                  |
| 6.   | Ending stocks (3-4+5)       | 57.17                      | 59.76                  | 65.83                   | (+) 5.08                              |
| 7.   | Trade (export)              | 48.11                      | 46.68                  | 47.49                   | (+) 2.20                              |
| 8.   | Trade (import)              | 48.09                      | 46.67                  | 44.44                   | (-) 3.61                              |

Note: \* Including adjustment for unknown net trade.

Source: Sugar: International sugar organization, Quarterly Review, November 2006.

104. World sugar production during 2006-07 is estimated at 162.62 million tonnes, 10.54 million tonnes (6.93 per cent) higher than production of 152.08 during 2005-06. Accounting for opening stocks of 59.76 million tonnes, global supply of sugar in 2006-07 was reported at 222.38 million tonnes, higher by 13.13 million tonnes (6.27 per cent) over the corresponding supply of 209.25 million tonnes in 2005-06.

105. The world consumption reported at 153.51 million tonnes in 2006-07 is 3.65 million tonnes (2.43 per cent) higher than that of previous year. End year stocks in 2006-07 are estimated at 65.83 million tonnes. The projected surplus during 2006-07 has increased to 9.11 million tonnes.

### 7.9.2 International Prices of Sugar

106. The international prices of raw (fob Caribbean ports) and white (fob London) sugar from 1996-97 to 2006-07 are presented in Annex-XV. The movements in these prices are depicted in Figure-11.

107. The prices of both raw and white sugar have been fluctuating during the period under review. During 1996-97, the prices of raw sugar averaging at US \$ 244.71 per tonne had declined to \$ 146.20 in 1998-99. During the next two years, prices recovered and averaged at US \$ 205.91 per tonne in 2000-01, but declined to \$ 151.01 in the next year. During 2002-03 the prices staged some recovery and averaged at \$ 179.03 per tonne but decreased sharply in next year and averaged at 144.84 per tonne, the lowest level of price during the period under review. During 2004-05 prices showed increasing trend and sharply rose to \$ 327.14 per tonnes in 2005-06, the highest level of price during period under review. In the current season (2006-07) October and January the prices of raw sugar are showing significant decline and averaged at US \$ 253.20.

108. The prices of white sugar during the period under reference have followed a pattern similar to those of raw sugar.

109. The differential between prices of raw and white sugar has ranged between \$ 43.08 and \$ 115.51 per tonne i.e. 17.71 to 35.33 per cent of the white sugar price. crushing campaign. Growers will strive hard to reduce the cut to crush time. The average unit load will also get low, ensuring fresh cane supply.

110. Through adoption of above system, not only the recovery percent cane in the mills will improve but also the crushing campaign will be reasonably shortened as a result of supply fresh and clean cane. Once a scientific approach is followed the success is bound to come.

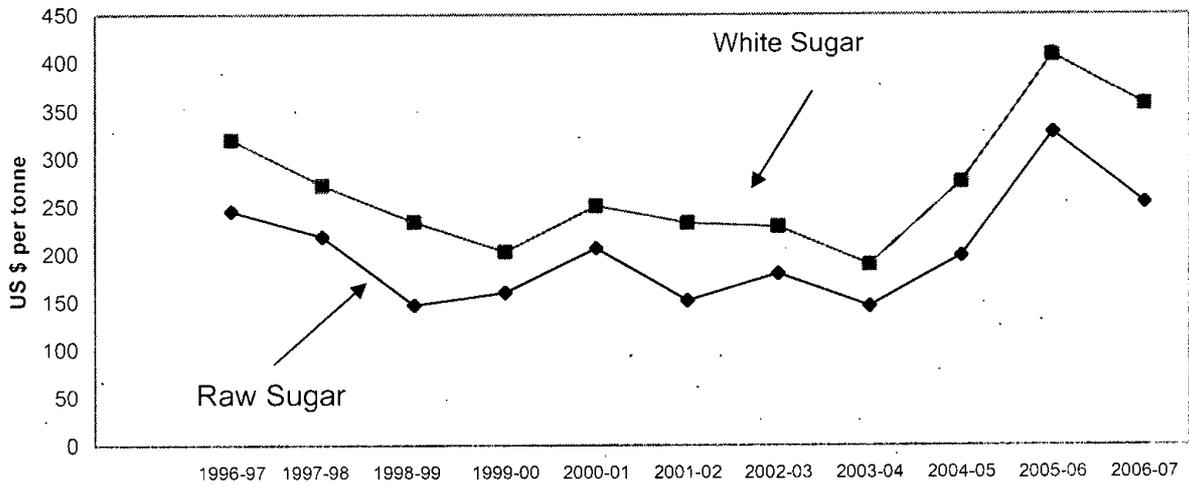


Fig-11: INTERNATRIONAL AND DOMESTIC PRICES OF SUGAR: 1996-97 TO 2006-07

## 7.10 Import and Export Parity Prices

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

112. Both the import and export parity prices have been calculated on the basis of white sugar price (fob London). However, financial and economic analysis has been carried out for working out import parity price, while calculations of export parity price are based on economic analysis only. Inter-bank exchange rate selling for import parity and buying for export parity prices have been used in the calculations. Detailed calculations in this connection are given at Annexes-XIII to XV while results are summarized in Table-16.

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

| Period                          | Base price                | Mill-gate prices of sugarcane in |                |                 |       |
|---------------------------------|---------------------------|----------------------------------|----------------|-----------------|-------|
|                                 |                           | Punjab and NWFP                  |                | Sindh           |       |
|                                 | Economic price            | Financial price                  | Economic price | Financial price |       |
| US \$/tonne                     | ----- Rs per 40 kgs ----- |                                  |                |                 |       |
| <b>Import Parity Prices</b>     |                           |                                  |                |                 |       |
| 1. During 2003-04 to 2005-06    | 302.00                    | 54.63                            | 56.02          | 55.92           | 57.34 |
| 2. During 2006-07 (Oct-Jan)     | 356.00                    | 62.49                            | 64.56          | 63.96           | 66.07 |
| 3. 13 <sup>th</sup> August 2007 | 282.00                    | 51.72                            | 52.98          | 52.94           | 54.22 |
| <b>Export Parity Prices</b>     |                           |                                  |                |                 |       |
| 1. During 2003-04 to 2005-06    | 302.00                    | 38.76                            | -              | 39.67           | -     |
| 2. During 2006-07 (Oct-Jan)     | 356.00                    | 46.00                            | -              | 47.08           | -     |
| 3. 13 <sup>th</sup> August 2007 | 282.00                    | 36.08                            | -              | 36.93           | -     |

Source: Annexes-XVI to XVIII.

## **7.11 Economic Efficiency in Sugarcane Production**

113. The economic efficiency in sugarcane production has been evaluated by estimating the most commonly used economic parameters, viz. Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost coefficient (DRC) through Policy Analysis Matrix (PAM). These parameters have been estimated under situation of both imports and exports of sugar, and are based on the cost of production of sugarcane data as used in APCoM's Sugarcane Policy Papers. To ascertain the impact of overtime changes in input-output prices, the analysis has been carried out for 2002-03 to 2006-07 crops. To capture regional variations in the resource use efficiency, the parameters have been calculated for major cane growing provinces of Punjab and Sindh. Numerics of these coefficients are summarized in Table-17 while the details of PAM estimation are given in Annexes-XVI and XVII.

### **7.11.1 Nominal Protection Coefficient (NPC)**

114. The NPCs estimated under sugar importing scenario for the Punjab have been less than one during the period 2002-03 to 2004-05. While in 2005-06 when it rose to 1.15, and become almost at par during 2006-07. The NPCs less than one imply that cane growers of Punjab have generally received prices less than the corresponding import parity prices. Accordingly, cane growers were implicitly taxed. However, magnitude of tax has ranged from 8-12 per cent during the period under review.

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

116. The NPCs estimated for Sindh suggest that prices of sugarcane received by the growers remained higher than the import parity prices during 2002-03 and 2006-07. However, the growers realized lower prices than the corresponding import parity prices

in the crop years of 2002-03 and 2004-05. In the crushing season of 2003-04, the cane price received by the growers was at par with the import parity price.

117. The estimation of the NPCs under exporting scenario reveals that like the cane growers of Punjab, growers in Sindh have received prices much higher than those warranted by the export parity prices of sugarcane. It implies that sugarcane cultivation is very uneconomic proposition in the export perspective. The overall situation suggests that production of sugar be restrained at domestic consumption level.

### **7.11.2 Effective Protection Coefficient (EPC)**

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

119. The analysis of the EPCs estimated for the Punjab under importing country scenario reveals that except crushing season of 2005-06 the EPCs have been less than one during the period under study. It implies that cane growers were implicitly taxed through input/output pricing policies. However, the EPCs estimated under the exporting scenario reveal a positive support to sugarcane in the Punjab (Table-19).

120. The EPCs estimated for Sindh reveal that under importing scenario the sugarcane farming enjoyed support during 2005-06 and 2006-07. However, during 2002-03 to 2004-05 EPCs reflect implicit taxation on sugarcane cultivation.

**Table-19: Economic Efficiency Coefficients for Sugarcane: 2002-03 to 2006-07**

| Province/Year | Based on             |      |      |                      |      |      |
|---------------|----------------------|------|------|----------------------|------|------|
|               | Import Parity Prices |      |      | Export Parity Prices |      |      |
|               | NPCs                 | EPCs | DRCs | NPCs                 | EPCs | DRCs |
| <b>PUNJAB</b> |                      |      |      |                      |      |      |
| 2002-03       | 0.88                 | 0.81 | 0.71 | 1.33                 | 1.28 | 1.08 |
| 2003-04       | 0.89                 | 0.80 | 0.81 | 1.99                 | 2.08 | 1.57 |
| 2004-05       | 0.92                 | 0.85 | 0.72 | 1.35                 | 1.35 | 1.02 |
| 2005-06       | 1.15                 | 1.12 | 0.61 | 1.70                 | 1.76 | 0.96 |
| 2006-07       | 1.01                 | 0.97 | 0.65 | 1.73                 | 1.93 | 1.28 |
| <b>SINDH</b>  |                      |      |      |                      |      |      |
| 2002-03       | 0.89                 | 0.80 | 0.65 | 1.33                 | 1.28 | 0.99 |
| 2003-04       | 1.00                 | 0.93 | 0.88 | 1.66                 | 1.65 | 1.42 |
| 2004-05       | 0.95                 | 0.88 | 0.66 | 1.35                 | 1.39 | 0.89 |
| 2005-06       | 1.58                 | 1.80 | 0.98 | 1.58                 | 1.80 | 1.04 |
| 2006-07       | 1.11                 | 1.11 | 0.72 | 1.80                 | 2.12 | 1.35 |

Source: Annexes-XVI and XVII.

121. The EPCs estimated under exporting scenario in Sindh are much higher than one for the entire period implying support to sugarcane related sectors. The policy option emerged from the analysis would be to discourage sugarcane cultivation and maintain the domestic production upto self-sufficiency level.

### 7.11.3 Domestic Resource Cost (DRC)

122. The DRC indicates the opportunity cost of domestic resources used per unit of the value-added at social prices in the production of a commodity. The numerator in these calculations is the opportunity cost of non-tradable factors used in domestic production while denominator is the value addition calculated at social prices. DRC coefficient of greater than one indicates a “comparative disadvantage” in domestic production as the cost associated with its domestic production is greater than the economic cost of corresponding imports. A situation of DRC less than one implies “comparative

advantage” in domestic production as it can save/generate foreign exchange at costs less than the corresponding cost of imports. It may however be pointed out that DRCs are sensitive to the changes in the opportunity cost of non-tradable inputs as well as the border prices of outputs and inputs.

123. The DRCs for sugarcane crop estimated at import parity prices are less than one, both in the Punjab and Sindh. It indicates that cane production in both the provinces is efficient in terms of its domestic resource cost. However, the DRC estimated under importing situation do not support the commonly held perception of comparative disadvantage in sugarcane cultivation in Pakistan.

124. Under the exporting scenario, the DRCs of sugarcane production in the Punjab were much higher than the corresponding coefficients estimated at import parity prices. As a result of the developments in the domestic/world inputs and output markets during 2002-03, 2004-05 and 2006-07 the DRCs have estimated greater than one. Thus, sugar export is not a viable proposition at the prevailing input - output relationships and the prices. In case of Sindh, the DRCs which even under exporting scenario were less than one upto the year 2002-03 and 2004-05 exceed one in 2003-04, 2005-06 and 2006-07 reflecting comparative disadvantage in exports of sugar in these years.

### **7.12 To sum up**

125. The likely pricing options for sugarcane, 2007-08 crop emerging from foregoing analysis of relevant factors are summarized in Table-20, followed by a brief discussion on the subject.

Table-20: Price Policy Options for Sugarcane: 2007-08 Crop

| S.No              | Basis   | Likely prices of sugarcane at mill gate |      |       |
|-------------------|---|---|------|-------|
|                   |   | Punjab                                  | NWPF | Sindh |
| Rupees per 40 Kgs |   |   |      |       |
| 1.                | Cost of production of sugarcane (Table-9 )  | 57                                      | 52   | 58    |
| 2.                | Market price realized by growers (2006-07)  | 60                                      | 60   | 67    |
| 3.                | Domestic parity prices worked back from:  |   |      |       |
|                   | i) Average wholesale price of "gur" during October-January, 2006-07 (Annex-XIII)                                | 96                                      | 96   | -     |
|                   | ii) Average wholesale prices of sugar during 2006-07 crushing season (Annex-XIV)                                | 54                                      | 54   | 55    |
| 4.                | If real value of cane price for 2006-07 crop were to be equated with the level of 2000-01                       | 60                                      | 60   | 67    |
| 5.                | Import parity prices (economic) as worked back from the average fob (London) price of white sugar (Annex-XVI):  |   |      |       |
|                   | i) During 2003-04 to 2005-06  | 55                                      | 55   | 56    |
|                   | ii) During 2006-07 (October – January)  | 62                                      | 62   | 64    |
|                   | iii) On 13 <sup>th</sup> August 2007  | 52                                      | 52   | 53    |
| 6.                | Export parity price (economic) as worked back from the average fob (London) price of white sugar (Annex- XVIII) |   |      |       |
|                   | i) During 2003-04 to 2005-06  | 39                                      | 39   | 40    |
|                   | ii) During 2006-07 (October – January)  | 46                                      | 46   | 47    |
|                   | iii) On 13 <sup>th</sup> August 2007  | 36                                      | 36   | 37    |
| 7.                | Cost of domestic resources (Table – 19 ) involved in:   |   |      |       |
|                   |   | <i>Rupees per US \$</i>                 |      |       |
|                   |   | (At exchange of Rs 61=one US \$)        |      |       |
|                   | i) Producing cane for sugar import substitution   |   |      |       |
|                   | - Based on 2006-07 prices of sugar  | 40                                      | -    | 44    |
|                   | ii) Producing cane for exports of sugar   |   |      |       |
|                   | - Based on 2006-07 prices of sugar  | 78                                      | -    | 82    |

126. The mill gate Cost of Production (COP) of sugarcane for the 2007-08 crop at prevailing inputs' prices is estimated at Rs 57 per 40 kg in the Punjab, Rs 52 in the NWFP and Rs 58 in Sindh. These costs are respectively higher by 9, 11.5 and 8.2 per cent than the corresponding costs in 2006-07. The market prices of sugarcane paid to the

growers in the beginning of current crushing season were reported at Rs 60 per 40 kgs in the Punjab & NWFP and Rs 67 in Sindh province.

127. Based on the average wholesale prices of 'gur' during the current crushing season 2006-07 (October-January), mill gate prices of sugarcane are estimated at Rs 96 per 40 kgs in the Punjab and NWFP. The prices of sugarcane worked back from the wholesale prices of sugar in the domestic market come to Rs 54 per 40 kgs in the Punjab & NWFP and Rs 55 in Sindh.

128. Under sugar importing scenario, the economic prices of sugarcane (import parity) come to 62 – 64 per 40 kgs when estimated from fob (London) price of sugar during 2006-07 (October–January). However, when estimated from the average price of white sugar 2004-06, the parity prices of sugarcane come to Rs 55 – 56 per 40 kgs.

129. Under sugar exporting situation, the economic prices of sugarcane (export parity) as calculated from fob (London) prices of white sugar come to Rs 46 - 47 during 2006-07 (Oct-Jan). On the basis of average price of 2003-04 to 2005-06 the parity prices worked out to be Rs 39 - 40 per 40 kgs.

130. The domestic resource cost of one US dollar's worth of sugar exports, at the current price through sugarcane cultivation, is estimated at Rs 78 - 82. However, for import substitution, costs of the domestic resources used in sugarcane production work out to Rs 40 - 44 per one US dollar against its current exchange rate of Rs 61.

131. The analysis of time series data on sugarcane area and production exhibits expansion/contraction phase every two years. This is primarily in view of the wide spread practice of ratooning. Area under the 2006-07 crop in response to the high prices in last year, favourable weather condition and better prospects of competing crops has increased by 14 per cent in the Punjab and 17 per cent in Sindh, accounting for about 89 per cent of the sugarcane area in the country.

132. In view of the foregoing situation, the pricing policy in the context of sugarcane should aim at consolidating the gains and restricting the sugarcane cultivation to the most suitable places. Given the current input-output relationship and the international prices, there is not much scope for increasing the price of sugarcane. In the given situation of: (i) high market prices of sugar, (ii) poor prospects for exports of sugar, (iii) recurring water shortages and high water requirements of sugarcane, the top priority of the government pricing policy should be to send the correct signal to farmers to improve crop yield through proper input use and improved crop practices. The farmers also need to be protected against the malpractices in marketing of sugarcane like purchases of CPRs at discount prices by the middlemen, under-weighment, delayed payments by the sugar mills etc as practiced in the past.

133. In the context of better prices for the growers, problems of the sugar industry like cash credit, stocks and imports regulation have assumed crucial importance. The Cost Accounts Organization or the Ministry of Industries should estimate the ex-mill cost of sugar keeping in view the cost of sugarcane, processing cost, sucrose recovery etc. The imports of sugar should be so regulated as to ensure the ex-mill price of sugar worked out by the M/o Industries to the sugar mills. The problems of liquidity faced by the industry also need to be addressed.

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

## 8. LINKING PRICES OF SUGARCANE TO ITS QUALITY

135. Sugarcane is sold by cane growers, middlemen and occasionally by big farms. Cane is purchased on flat rate system (cane weight basis) without paying any attention to the quality of the raw material. The existing system of payment of price to sugarcane growers in Pakistan is not related to the quality of their produce. When rubbish and good quality cane are purchased at the same price, the farmer has no incentive to deliver quality cane. So he grows the low sucrose/high yielding variety which may provide plenty of extraneous matter and does not worry about deterioration in sucrose content of cane. All advance sugar industries in the world pay on the basis of sucrose content. To improve the situation and enhance the efficiency both at farm and mill level, it is imperative that the price of cane be linked to its sucrose contents. Pakistan sugar industry has to find out a way of introducing sugarcane payment on quality. This is the only solution of the problem being faced by the sugar industry. By introducing this system, the incentive and quality payment above benchmarks be linked, to recovery of a particular cane load. Through this system only deserving cane supplier will get quality premium and the one supplying substandard cane could be refused this facility. Growers will also find incentive to supply only the mature cane. They will stop supplying late maturing varieties at early stage of the crushing campaign. Growers will strive hard to ensure fresh cane supply for better sucrose recovery.

136. Through adoption of the above system, not only the recovery percent cane in the mills will improve but also the crushing campaign will be reasonably shortened as a result of supply fresh and clean cane. No reason is seen to continue present cane purchase system as it leads the industry towards deterioration. Once a scientific approach is followed the success is bound to come.

## 9. MARKETING OF SUGARCANE

137. Sugarcane is one of the main cash crops of Pakistan has a large impact on the well being of the community. It is sown on vast areas throughout the country. It provides raw material to the Pakistan's second largest agro-based industry. It provides employment to

rural labour and supplies sugarcane tops as fodder for livestock. Its bagasse is also used to manufacture chipboard. As it cannot be stored after harvesting, so is to be processed either into gur at the farms or crushed by sugarmills for sugar manufacture. Its marketing plays an important role in this respect. For having an upto date information in this respect API conducted a mini field survey in the main sugarcane producing areas during the month of January 2007. The problems faced by the growers are discussed in the following paragraphs.

### 9.1 Underweighment

138. The underweighment of cane at purchase centres and the mills premises is a common phenomenon on the part of mills and their agents and the private purchase centres. The private purchase centers and the mills agents are very notorious in this respect. The weighbridges and scales installed at the purchase centers do not record the correct weighment. Mostly the farmers bringing cane remained unaware about the readings of these scales. The quantity of underweighed varies from place to place and for each mill area. In order to check the underweighment at weighbridges, the supervisory committees should be more effective. Moreover the use of private/temporary bridges may be banned and district governments should install their own weighbridges at the purchasing points.

### 9.2 Undue deductions

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

### **9.3 Delayed payments**

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

### **9.4 Presence of middlemen**

141. The presence of middlemen is considered necessary in marketing the agricultural produce. But since manufacturing of sugar is a chemical process, the presence of middlemen in sugarcane supply to the mills cause delay and hence reduction in sugarcane recovery. Therefore in such cases the role of middlemen needs to be eliminated by putting restrictions on their involvement through the use of administrative measures.

### **9.5 The purchase of CPRs**

142. Since growers are in need of immediate payments for their sale proceeds, they in order to avoid the delayed payments are compelled to sell their CPRs at discount rates varying from area to area, but mostly ranging between Rs 2 – 5 per 40 kgs of cane price. This practice had caused loss to the farming sector. It is therefore stressed that this practice of selling CPRs at discount rates may be discontinued or stopped altogether. In order to improve the situation the mills may be compelled to make the payments for sale proceeds at the earliest, so that need for selling CPRs may be minimized.

### **9.6 Use of sugarcane cess fund**

143. The sugarcane cess fund is to be utilized for the construction and improvement of roads in the sugarmills areas. It can also be utilized for research and development of

sugarcane crop. Huge amounts of sugarcane cess fund are lying unutilized with the provincial governments, due to lack of proper planning and decision. It is therefore recommended that the unutilized amounts may be used on construction of infrastructures and evolvement of new varieties of sugarcane.

### **9.7 Amendments in Sugar Factories Control Act**

144. After de-zoning many changes have occurred in the cane marketing system and the functioning of Sugar Factories Control Act, 1950 has become less effective. Keeping in view the current needs, it is essential that the Act may be amended accordingly.

## **10. VALUE-ADDITION AND VERTICAL INTEGRATION IN SUGAR INDUSTRY**

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

## 11. IMPROVING PRODUCTIVITY

146. Pakistan sugar industry has expanded considerably overtime. To generate raw material for the industry, sugarcane cultivation also expanded but different kind of problems involved in marketing of sugarcane discourage sugarcane cultivation. Furthermore, excessive water requirement of the crop also demands to discourage horizontal expansion and improve productivity of the crop.

147. Available statistics indicate that vast scope exists for yield improvement in sugarcane and its sucrose content. Currently both yield per acre of cane and recovery percentage lies much below in comparison with other sugarcane and sugar producing countries. Average type of sugarcane grower in Pakistan obtains 20-25 tonnes sugarcane per acre.

148. Likewise, sugarcane recovery is also low. For example, Australian sugar recovery percentage is five times more than Pakistan. Agricultural Prices Commission identifies a number of factors responsible for low cane yield and sugar recovery with the help of crop experts, progressive farmers etc. These are described below:

### 11.1 Varietal Development

149. Limited varietal base in sugarcane is one of the major sugarcane yield hindering factors in Pakistan. Pakistan's climatic conditions except at a few sites are not conducive for development of sugarcane varieties. Furthermore, research institutes mandated for the development of new varieties of sugarcane do not have sufficient funds due to which any significant breakthrough could not be made in this area. Considering the financial limitations of the sugarcane research institutes, the Sugar Board in its 39<sup>th</sup> Meeting held on 17<sup>th</sup> August, 1992 decided that provincial governments should earmark 5 per cent of the Cess Fund for research and development of sugarcane. But despite repeated requests of different stake-holders and directions of the ECC of the Cabinet, except the release of

a few lac rupees by the government of NWFP, funds have not been provided by the provincial governments for varieties development work in sugarcane. Thus, ~~APCom~~ <sup>API</sup> emphasize for implementation of the decisions about the allocation of funds and introduce a mechanism for periodic monitoring and review of the research work at sugarcane search stations.

### 11.2 Land Preparation

150. Sugarcane cultivation is generally followed by cotton and rice. As sugarcane is deep rooted crop, use of deep ploughing is necessary to provide better conditions beneath the surface layer of the soil for better development of the root system. The evidence from the field reveal that only 30-40 percent of the cane cultivators use deep tillage implements. Majority of the farmers are not aware of the usefulness of the deep tillage. Crop experts also give much importance to sowing methods to increase per acre yield of the crop. In the Agricultural Prices Commission 'Standing Committee Meeting on Sugarcane 2006-07 Crop' technical experts urged to increase row to row distance in the sowing of sugarcane as it helps increase yield of the crop. However, cost of machinery used in sugarcane cultivation has exorbitantly increased which discourages use of machinery. Amidst this state of affairs Department of Agriculture (Extension) needs to launch educational campaigns to apprise the farmers about proper methods of land preparation for sugarcane cultivation.

### 11.3 Provision of Seed of Approved Varieties

151. A number of high yielding varieties for early, mid and late sowing are available. However, their adoption among the sugarcane growers largely depends on availability of disease free seed of these varieties. Yield of these varieties obtained at the research stations ranges between 80-100 tonnes per hectare. These varieties include SPF-213, SPF-234, COJ-84, BF-162, CP-43-33, CP-77-400, CP-72-2086, CPF-237 and HSF-240. Sugar recovery from these varieties ranges between 10-12.5 per cent. For Sindh, BL-4, PR-1000 and BF-129 are the recommended varieties. Recommended varieties for NWFP

are CP-72-2086, CP-77-400, Mardan-92 and Mardan-93. All of these varieties if cultivated according to their recommended seasons, can give yield upto 1000 maunds per acre and sucrose recovery more than 10 per cent.

152. Farmers generally get next crop seed from their commercial crop without treating it for fungal diseases because no institutional arrangements are available for production, multiplication and distribution of quality seed of potential varieties. Sugar mills' initiative for cane development activities is also very limited. Thus APCom reiterate it's recommendations on the subject as below:

- i) Provincial Agriculture Departments should launch an aggressive campaign for educating sugarcane growers regarding sowing of approved varieties and discouraging the cultivation of un-approved varieties.
- ii) The sugar industry must offer price incentive to farmers on the basis of high sucrose content.
- iii) Sugar industry owe rigorous role in the production, multiplication and distribution of certified seed of sugarcane as they are the main beneficiaries of increased production of sugarcane. For this purpose sugar mills should establish their cane development centres either individually or collectively. These centres may coordinate efforts of the progressive growers, crop researchers and sugar mills.
- iv) The sugar mills should provide the facilities of Hot Water Treatment of cane setts to the growers and technical guidance for using the technique.

#### **11.4 Low Plant Population**

153. Less number of plants per acre is an important productivity hindering factor in sugarcane. This is general observation that even good quality seed do not yield more than 60 per cent germination in case of sugarcane. So it is necessary to adjust the seed appropriately to get optimum crop stand and ultimately optimum crop yield. Generally 80-100 maunds seed of thin and 100-120 maunds seed of thick varieties of cane is recommended for cultivation of one acre. However, for getting 100 per cent germination this quantity must be increased by adopting double sett sowing method as advised by the

experts. Each seed sett must have two buds and should be placed in furrows by joining their ends and be covered with 2-3 inches thick layer of soil. Also seed of fresh crop 6-8 months old gives better results. Gaps must be filled. Provincial Agricultural Extension Departments need to extend necessary advice and guidance to the farmers on sowing techniques of sugarcane.

### **11.5 Balanced Use of Fertilizer**

154. Timely and balanced use of chemical fertilizers play important role in enhancing yield of sugarcane. Though fertilizer use has increased overtime but N:P:K combination has not been optimal. This imbalance use of fertilizers undermines yield and quality of the sugarcane crop. Role of nitrogeous fertilizers with plant growth is to stimulate vegetative growth, that of potassic fertilizers to help nourish roots and strengthening of plant and potassic fertilizers to improve/enhance recovery of sugar and create resistance against drought and some diseases. Research experiments have shown that average yield level of cane removes 72 kgs of (N), 36 kgs of (P) and 136 kgs of (K) from the soil. Thus, according to expert advice double of the above quantity of N,P and K fertilizers needs to be applied to sustain the fertility of the soil. However, this also depends on the quantity of nutrients already available in the soil. Our soils though not weak in potassic elements but are in need of some application of potash to promote efficiency of other fertilizers. Currently on an average, 3 kgs of potash are applied per acre which is too low to get good results. Thus optimal combination of important fertilizers is essential to increase per acre yield of sugarcane and the sugar content.

### **11.6 Use of Press Mud/Organic Matter**

155. Due to excessive cultivation our soils have exhausted. Organic matter has decreased there-of. Consequently, yield performance is affected adversely.

156. Organic matter and ultimately texture of the soil can be improved by adding compost and green manures. Findings are also suggestive of use of press mud to improve organic content of the soil. However, its availability due to its off-farm uses is becoming

a problem. Chemical composition of the press mud contains all the three elements i.e. nitrogen, phosphorus and potash which strengthen the need to increase use of press mud to improve soil fertility. So measures need to be taken by the sugar mills to supply press mud to farmers free of cost. Furthermore, admixing of sugarcane trash into the soil is also suggested by the experts as a very useful source of organic matter to the soil.

157. Provincial Extension Departments must aware cane growers on the subject.

## **11.7 Plant Protection Measures**

### **11.7.1 Weed Control**

158. Weeds in early stages of plant growth competes for nutrients available in the soil and thus takes a considerable share to reduce the yield of sugarcane. Therefore, weed eradication within 60-80 days after sowing of the crop bear good results to increase per acre yield of the crop. Use of weedicides needs to be promoted for increasing quantity and quality of the crop.

### **11.7.2 Control of Diseases**

159. Sugarcane crop is attacked by a number of diseases. Major diseases are whip smut of sugarcane, mosaic, red-rot and ratoon stunting. These diseases may reduce cane yield considerably. Farmers generally do not give due care for their treatment.

160. Most of these diseases are seed born and Hot-Water Treatment for disease like red-rot has proved successful but is not widely practiced by the sugarcane growers. Earthing up of plants two months after sprouting of setts may help against lodging and borer attack. It also helps attain uniform growth at later stages.

### 11.7.3 Biological Control of Sugarcane Pests

161. A number of insects like borers, termites, pyrilla and bugs etc. attack sugarcane crop. Yield loss on account of their damage is recorded between 10-35 per cent and sucrose content loss between 0.25-1.25 per cent. Generally these insects are controlled by using chemicals but chemicals' spray becomes a problem when plants have grown in size and height. Furthermore, new research developments have shown that chemicals' effects do not restrain to harmful insects only rather they kill useful predators as well. Therefore, experts now suggest Integrated Pest Management (IPM) technology which is based on cultural methods and biological measures to control the pests and diseases.

162. The concept of biological control is based on the fact that each insect/pest has a predator as a natural measure of check and balance. Common parasites/predators are Epi-pyropes for sugarcane pyrilla and cotesia flavipes and trichagrama for sugarcane borers. Though considerable research has been done on biological measures of insect/pest control but still the methodology remains confined only to the research stations and some selected progressive farmers. There is dire need to run extensive campaign for its diffusion among the common sugarcane growers. A biggest constraint in the extension of this technology is artificial production/rearing of predators.

163. As research institutes have financial limitations, sugar mills owe a responsibility to set up laboratories for this purpose. Some of the sugar mills have already taken initiative on this but the others should also be motivated towards this end. Provincial Departments of Agriculture (Extension) also need to launch awareness campaigns to educate sugarcane growers about benefits of IPM techniques.

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PROVINCE-WISE AREA, PRODUCTION AND YIELD OF SUGARCANE  
IN PAKISTAN : 1996-97 TO 2006-07

| YEAR              | PUNJAB                         | SINDH   | NWFP   | BALOCH | PAKISTAN |
|-------------------|--------------------------------|---------|--------|--------|----------|
| <b>AREA</b>       | ----- 000 hectares -----       |         |        |        |          |
| 1996-97           | 604.2                          | 251.2   | 108.4  | 0.7    | 964.5    |
| 1997-98           | 685.3                          | 261.6   | 108.6  | 0.7    | 1056.2   |
| 1998-99           | 780.3                          | 270.8   | 103.3  | 0.7    | 1155.1   |
| 1999-00           | 672.1                          | 230.6   | 106.3  | 0.8    | 1009.8   |
| 2000-01           | 615.5                          | 238.8   | 105.9  | 0.6    | 960.8    |
| 2001-02           | 656.8                          | 240.7   | 101.5  | 0.7    | 999.7    |
| 2002-03           | 735.3                          | 258.6   | 104.9  | 0.8    | 1099.6   |
| 2003-04           | 709.0                          | 259.9   | 104.8  | 0.8    | 1074.5   |
| 2004-05           | 644.7                          | 214.9   | 106.4  | 0.4    | 966.4    |
| 2005-06           | 625.2                          | 183.2   | 98.6   | 0.3    | 907.3    |
| 2006-07           | 711.8                          | 214.7   | 101.8  | 0.5    | 1028.8   |
| <b>YIELD</b>      | ----- Tonnes per hectare ----- |         |        |        |          |
| 1996-97           | 39.7                           | 52.2    | 44.7   | 51.4   | 43.5     |
| 1997-98           | 46.9                           | 61.2    | 45.6   | 53.6   | 50.3     |
| 1998-99           | 42.8                           | 63.0    | 45.7   | 54.4   | 47.8     |
| 1999-00           | 40.3                           | 62.0    | 46.3   | 54.3   | 45.9     |
| 2000-01           | 43.4                           | 50.5    | 45.2   | 53.7   | 45.4     |
| 2001-02           | 48.4                           | 47.4    | 47.2   | 50.0   | 48.1     |
| 2002-03           | 45.1                           | 53.4    | 48.1   | 50.8   | 47.3     |
| 2003-04           | 48.0                           | 56.2    | 45.3   | 48.3   | 49.7     |
| 2004-05           | 51.3                           | 43.5    | 45.3   | 56.3   | 48.9     |
| 2005-06           | 46.3                           | 61.4    | 45.0   | 51.6   | 49.2     |
| 2006-07           | 52.7                           | 58.4    | 45.6   | 50.6   | 53.2     |
| <b>PRODUCTION</b> | ----- 000 Tonnes -----         |         |        |        |          |
| 1996-97           | 24010.2                        | 13110.6 | 4841.6 | 36.0   | 41998.4  |
| 1997-98           | 32110.6                        | 15999.6 | 4956.5 | 37.5   | 53104.2  |
| 1998-99           | 33382.8                        | 17050.7 | 4719.5 | 38.1   | 55191.1  |
| 1999-00           | 27081.3                        | 14290.8 | 4917.1 | 43.4   | 46332.6  |
| 2000-01           | 26740.0                        | 12049.7 | 4784.4 | 32.2   | 43606.3  |
| 2001-02           | 31803.1                        | 11416.3 | 4787.2 | 35.0   | 48041.6  |
| 2002-03           | 33168.6                        | 13797.6 | 5049.0 | 40.6   | 52055.8  |
| 2003-04           | 34023.0                        | 14611.8 | 4745.6 | 38.6   | 53419.0  |
| 2004-05           | 33048.0                        | 9357.4  | 4816.2 | 22.5   | 47244.1  |
| 2005-06           | 28968.6                        | 11243.4 | 4439.0 | 14.5   | 44665.5  |
| 2006-07           | 37542.0                        | 12529.1 | 4645.4 | 25.3   | 54741.4  |

**Sources:**

1. For 1996-97 to 2005-06: Agricultural Statistics of Pakistan 2005-06, MINFAL, Islamabad.
2. For Final estimates provided by Provincial Agriculture Departments.

Area, Yield and Production of Sugarcane :Average 1996-97 - 1998-99 Vs Average 2004-05 - 2006-07

| Province/<br>Country | Area                  |                       | Change  | Yield                 |                       | Change   | Production            |                       | Change   |
|----------------------|-----------------------|-----------------------|---------|-----------------------|-----------------------|----------|-----------------------|-----------------------|----------|
|                      | 1996-97 to<br>1998-99 | 2004-05 to<br>2006-07 |         | 1996-97 to<br>1998-99 | 2004-05 to<br>2006-07 |          | 1996-97 to<br>1998-99 | 2004-05 to<br>2006-07 |          |
|                      | 000/ha                |                       | Percent | Tonnes/ha             |                       | Percent  | Million tonnes        |                       | Percent  |
| Pakistan             | 1058.6                | 967.5                 | (-) 8.6 | 47.3                  | 50.4                  | (+) 6.6  | 50.1                  | 48.9                  | (-) 2.4  |
| Punjab               | 689.9                 | 660.6                 | (-) 4.2 | 43.2                  | 50.1                  | (+) 16.0 | 29.8                  | 33.2                  | (+) 11.4 |
| Sindh                | 261.2                 | 204.2                 | (-)21.8 | 58.9                  | 54.5                  | (-) 7.5  | 15.4                  | 11.0                  | (-) 28.6 |
| NWFP                 | 106.8                 | 102.2                 | (-) 4.3 | 45.3                  | 45.1                  | (-) 0.4  | 4.8                   | 4.6                   | (-) 4.2  |

Note: Cultivation of Sugarcane in Balochistan is negligible.

Source: Annex-I.

## COMPARISON OF CANE CRUSHED BY PROVINCE

| Province/<br>Country | Cane<br>production               | Cane<br>crushed | Percent<br>Cane Crushed | Share in<br>Cane crushed |
|----------------------|----------------------------------|-----------------|-------------------------|--------------------------|
|                      | <b>Million tonnes</b>            |                 | <b>Per cent</b>         |                          |
|                      | <b><u>1996-97 TO 1998-99</u></b> |                 |                         |                          |
| <b>Pakistan</b>      | <b>50.1</b>                      | <b>37.1</b>     | <b>74.1</b>             | <b>100</b>               |
| Punjab               | 29.8                             | 22.7            | 76.2                    | 61.2                     |
| Sindh                | 15.4                             | 13.1            | 85.1                    | 35.3                     |
| NWFP                 | 4.8                              | 1.3             | 27.1                    | 3.5                      |
|                      | <b><u>2003-04 to 2005-06</u></b> |                 |                         |                          |
| <b>Pakistan</b>      | <b>48.4</b>                      | <b>35.3</b>     | <b>72.9</b>             | <b>100.0</b>             |
| Punjab               | 32.0                             | 23.6            | 73.8                    | 66.9                     |
| Sindh                | 11.7                             | 10.0            | 85.5                    | 28.3                     |
| NWFP                 | 4.7                              | 1.7             | 36.2                    | 4.8                      |

**Sources:** 1. Agriculture Statistics of Pakistan, MINFAL, Islamabad.  
2. PSMA, Islamabad.



## COMPARISON OF SUGAR PRODUCED BY PROVINCE:

| Province/<br>Country             | Cane<br>crushed | Sugar<br>made   | Recovery   | Share in<br>sugar production |
|----------------------------------|-----------------|-----------------|------------|------------------------------|
| <b>Million tonnes</b>            |                 | <b>Per cent</b> |            |                              |
| <b><u>1996-97 TO 1998-99</u></b> |                 |                 |            |                              |
| <b>Pakistan</b>                  | <b>37.1</b>     | <b>3.2</b>      | <b>8.5</b> | <b>100.0</b>                 |
| Punjab                           | 22.7            | 1.8             | 7.9        | 57.0                         |
| Sindh                            | 13.1            | 1.3             | 9.5        | 39.6                         |
| NWFP                             | 1.3             | 0.1             | 8.5        | 3.5                          |
| <b><u>2003-04 to 2005-06</u></b> |                 |                 |            |                              |
| <b>Pakistan</b>                  | <b>35.3</b>     | <b>3.2</b>      | <b>9.0</b> | <b>100.0</b>                 |
| Punjab                           | 23.6            | 2.1             | 8.8        | 65.3                         |
| Sindh                            | 10.1            | 1.0             | 9.5        | 30.0                         |
| NWFP                             | 1.7             | 0.1             | 8.2        | 4.4                          |

**Source:** PSMA, Islamabad.

## District-wise Area and Production of Sugarcane: Average of 2004-05 TO 2006-07

Area = 000 hectares  
Production = 000 tonnes

| S.No.                  | District         | Area          | %            | Production      | %            | S.No.              | District       | Area          | %             | Production      | %             |
|------------------------|------------------|---------------|--------------|-----------------|--------------|--------------------|----------------|---------------|---------------|-----------------|---------------|
| <b>PUNJAB</b>          |                  |               |              |                 |              | <b>NWFP</b>        |                |               |               |                 |               |
| 1                      | Faisalabad       | 109.93        | 11.36        | 5959.77         | 12.19        | 1                  | Charsada       | 32.41         | 3.35          | 1443.90         | 2.95          |
| 2                      | Jhang            | 87.77         | 9.07         | 4312.93         | 8.82         | 2                  | Mardan         | 29.60         | 3.06          | 1421.60         | 2.91          |
| 3                      | R.Y.Khan         | 60.28         | 6.23         | 3704.37         | 7.58         | 3                  | Peshawar       | 11.90         | 1.23          | 612.40          | 1.25          |
| 4                      | Sargodha         | 67.85         | 7.01         | 3157.69         | 6.46         | 4                  | D.I.Khan       | 10.90         | 1.13          | 438.50          | 0.90          |
| 5                      | Kasur            | 47.61         | 4.92         | 2279.20         | 4.66         | 5                  | Nowshera       | 5.10          | 0.53          | 257.40          | 0.53          |
| 6                      | T.T.Singh        | 36.82         | 3.81         | 2048.60         | 4.19         | 6                  | Malakand       | 4.79          | 0.49          | 196.30          | 0.40          |
| 7                      | M.B.Din          | 32.66         | 3.38         | 1466.47         | 3.00         | 7                  | Swabi          | 3.60          | 0.37          | 145.80          | 0.30          |
| 8                      | M.Garh           | 29.79         | 3.08         | 1460.60         | 2.99         | 8                  | Bannu          | 0.80          | 0.08          | 29.10           | 0.06          |
| 9                      | Okara            | 22.13         | 2.29         | 1061.57         | 2.17         | 9                  | Mohmand Agency | 0.60          | 0.06          | 25.80           | 0.05          |
| 10                     | Vehari           | 17.43         | 1.80         | 970.30          | 1.98         | 10                 | Bunner         | 0.60          | 0.06          | 16.10           | 0.03          |
| 11                     | Bahawalnagar     | 19.82         | 2.05         | 900.93          | 1.84         | 11                 | Khyber Agency  | 0.70          | 0.07          | 10.50           | 0.02          |
| 12                     | Sheikhupura      | 21.46         | 2.22         | 868.87          | 1.78         | 12                 | Tank           | 0.40          | 0.04          | 8.10            | 0.02          |
| 13                     | Bhakkar          | 13.50         | 1.40         | 608.43          | 1.24         | 13                 | Dir            | 0.10          | 0.01          | 6.30            | 0.01          |
| 14                     | Layyah           | 12.56         | 1.30         | 593.92          | 1.21         | 14                 | Haripur        | 0.10          | 0.01          | 4.70            | 0.01          |
| 15                     | Khanewal         | 9.28          | 0.96         | 507.73          | 1.04         | 15                 | Kohat          | 0.10          | 0.01          | 4.60            | 0.01          |
| 16                     | Bahawalpur       | 8.76          | 0.91         | 468.27          | 0.96         | 16                 | F.R. Bannu     | 0.00          | 0.00          | 3.30            | 0.01          |
| 17                     | Sahiwal          | 11.45         | 1.18         | 462.60          | 0.95         | 17                 | Lakki          | 0.06          | 0.01          | 2.50            | 0.01          |
| 18                     | Pakpatan         | 8.36          | 0.86         | 431.00          | 0.88         | 18                 | N/Waziristan   | 0.10          | 0.01          | 2.10            | 0.00          |
| 19                     | Rajanpur         | 6.75          | 0.70         | 382.32          | 0.78         | 19                 | F.R.D.I.Khan   | 0.10          | 0.01          | 2.00            | 0.00          |
| 20                     | Khushab          | 9.03          | 0.93         | 365.23          | 0.75         | 20                 | Bajour "       | 0.10          | 0.01          | 1.80            | 0.00          |
| 21                     | Hafizabad        | 6.21          | 0.64         | 282.83          | 0.58         | 21                 | S/Waziristan   | 0.00          | 0.00          | 0.30            | 0.00          |
| 22                     | Mianwali         | 3.64          | 0.38         | 164.89          | 0.34         | 22                 | Karak          | 0.00          | 0.00          | 0.30            | 0.00          |
| 23                     | D.G.Khan         | 2.54          | 0.26         | 138.03          | 0.28         | 23                 | Shanglapar     | 0.00          | 0.00          | 0.20            | 0.00          |
| 24                     | Gujrat           | 3.12          | 0.32         | 135.59          | 0.28         | 24                 | F.R.Peshawar   | 0.10          | 0.01          | 0.20            | 0.00          |
| 25                     | Multan           | 2.42          | 0.25         | 103.97          | 0.21         | 25                 | Swat           | 0.00          | 0.00          | 0.10            | 0.00          |
| 26                     | Narowal          | 2.69          | 0.28         | 82.40           | 0.17         | 26                 | Manshera       | 0.10          | 0.01          | 0.10            | 0.00          |
| 27                     | Gujranwala       | 2.01          | 0.21         | 74.73           | 0.15         |                    |                |               |               |                 |               |
| 28                     | Sialkot          | 2.14          | 0.22         | 72.77           | 0.15         |                    |                |               |               |                 |               |
| 29                     | Lodhran          | 1.34          | 0.14         | 66.70           | 0.14         |                    |                |               |               |                 |               |
| 30                     | Lahore           | 0.80          | 0.08         | 36.80           | 0.08         |                    |                |               |               |                 |               |
| 31                     | Jhelum           | 0.20          | 0.02         | 8.57            | 0.02         |                    |                |               |               |                 |               |
| 32                     | Attock           | 0.20          | 0.02         | 8.07            | 0.02         |                    |                |               |               |                 |               |
| 33                     | Chakwal          | 0.00          | 0.00         | 4.28            | 0.01         |                    |                |               |               |                 |               |
| <b>Sub-total</b>       |                  | <b>660.59</b> | <b>68.27</b> | <b>33186.20</b> | <b>67.90</b> | <b>Sub-total</b>   |                | <b>102.26</b> | <b>10.57</b>  | <b>4633.80</b>  | <b>9.48</b>   |
| <b>SINDH</b>           |                  |               |              |                 |              | <b>Balochistan</b> |                |               |               |                 |               |
| 1                      | Hyderabad        | 56.00         | 5.79         | 3076.90         | 6.29         | 1                  | Sibi           | 0.20          | 0.02          | 11.90           | 0.02          |
| 2                      | Badin            | 38.10         | 3.94         | 1965.10         | 4.02         | 2                  | Nasirabad      | 0.10          | 0.01          | 4.80            | 0.01          |
| 3                      | Nawab shah       | 23.60         | 2.44         | 1336.10         | 2.73         | 3                  | Lasbela        | 0.10          | 0.01          | 4.00            | 0.01          |
| 4                      | Thatta           | 23.70         | 2.45         | 1298.60         | 2.66         |                    |                |               |               |                 |               |
| 5                      | N.Feroze         | 17.00         | 1.76         | 1001.10         | 2.05         |                    |                |               |               |                 |               |
| 6                      | Khairpur         | 16.40         | 1.70         | 844.00          | 1.73         |                    |                |               |               |                 |               |
| 7                      | Mirpurkhas       | 11.00         | 1.14         | 574.80          | 1.18         |                    |                |               |               |                 |               |
| 8                      | Sanghar          | 10.20         | 1.05         | 542.70          | 1.11         |                    |                |               |               |                 |               |
| 9                      | Ghotki           | 2.40          | 0.25         | 132.50          | 0.27         |                    |                |               |               |                 |               |
| 10                     | Dadu             | 2.40          | 0.25         | 111.00          | 0.23         |                    |                |               |               |                 |               |
| 11                     | Sukkur           | 2.10          | 0.22         | 100.60          | 0.21         |                    |                |               |               |                 |               |
| 12                     | Larkana          | 0.60          | 0.06         | 26.60           | 0.05         |                    |                |               |               |                 |               |
| 13                     | Tharparkar/Umerl | 0.60          | 0.06         | 25.60           | 0.05         |                    |                |               |               |                 |               |
| 14                     | Shikarpur        | 0.10          | 0.01         | 4.20            | 0.01         |                    |                |               |               |                 |               |
| 15                     | Jacobabad        | 0.10          | 0.01         | 3.50            | 0.01         |                    |                |               |               |                 |               |
| <b>Sub-total</b>       |                  | <b>204.30</b> | <b>21.12</b> | <b>11043.30</b> | <b>22.59</b> | <b>Sub-total</b>   |                | <b>0.40</b>   | <b>0.05</b>   | <b>20.90</b>    | <b>0.05</b>   |
| <b>Total Pakistan:</b> |                  |               |              |                 |              |                    |                | <b>967.55</b> | <b>100.00</b> | <b>48884.20</b> | <b>100.00</b> |

- Notes:**
1. Data have been arranged in descending order of production.
  2. Percentage share calculated on the basis of country total.
  3. Districts in which sugarcane is not grown or for which the data are not available, are excluded.
- Sources** 1. Ministry of Food, Agriculture and Livestock, Islamabad.  
2. Respective Provincial Agriculture Departments.

**AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN THE PUNJAB:  
2006-07 AND 2007-08 CROPS**

| Sr. No.          | Operations / inputs  | Avg No. of<br>oprs/units/<br>acre | 2006 - 07 Crop   |                  | 2007 - 08 Crop   |                  | Change in<br>2007-08 over<br>2006-07 |
|------------------|--|-----------------------------------|------------------|------------------|------------------|------------------|--------------------------------------|
|                  |  |                                   | Cost per<br>unit | Cost per<br>acre | Cost per<br>unit | Cost per<br>acre |                                      |
| 1                | 2  | 3                                 | 4                | 5=3*4            | 6                | 7=3*6            | 8=7-5                                |
| -----Rupees----- |  |                                   |                  |                  |                  |                  |                                      |
| 1                | Land preparation:  |                                   |                  |                  |                  |                  |                                      |
|                  | 1.1 Deep ploughing   | 0.476                             | 575.00           | 273.70           | 600.00           | 285.60           | 11.90                                |
|                  | 1.2 Rotavator  | 0.152                             | 630.00           | 95.76            | 660.00           | 100.32           | 4.56                                 |
|                  | 1.3 Ploughing  | 7.847                             | 210.00           | 1647.87          | 220.00           | 1726.34          | 78.47                                |
|                  | 1.4 Planking   | 3.309                             | 105.00           | 347.45           | 110.00           | 363.99           | 16.55                                |
|                  | 1.5 Levelling  | 0.561                             | 275.00           | 154.28           | 290.00           | 162.69           | 8.42                                 |
| 2                | Seed bed preparation:  |                                   |                  |                  |                  |                  |                                      |
|                  | 2.1 Ploughing/Furrow making  | 0.467                             | 210.00           | 49.04            | 220.00           | 51.37            | 2.34                                 |
|                  | 2.2 Planking   | 0.193                             | 105.00           | 10.13            | 110.00           | 10.62            | 0.48                                 |
|                  | 2.3 Trench/Ridge making  |                                   |                  |                  |                  |                  |                                      |
|                  | 2.3.1 Manual (m.days)  | 0.106                             | 125.00           | 6.63             | 130.00           | 6.89             | 0.27                                 |
|                  | 2.3.2 Tractor  | 0.7                               | 210.00           | 73.50            | 220.00           | 77.00            | 3.50                                 |
|                  | 2.4 Bund making  |                                   |                  |                  |                  |                  |                                      |
|                  | 2.4.1 Manual (m.days)  | 1.655                             | 125.00           | 103.44           | 130.00           | 107.58           | 4.14                                 |
|                  | 2.4.2 Tractor  | 0.158                             | 210.00           | 16.59            | 220.00           | 17.38            | 0.79                                 |
| 3                | Seed and Sowing operations:  |                                   |                  |                  |                  |                  |                                      |
|                  | 3.1 40 kg units  | 6.578                             | 65.00            | 213.79           | 87.00            | 286.14           | 72.36                                |
|                  | 3.2 Marlas   | 10.64                             | 325.00           | 1729.00          | 433.00           | 2303.56          | 574.56                               |
|                  | 3.3 Harvesting, stripping and<br>making of set (m.days)                    | 4.796                             | 125.00           | 299.75           | 130.00           | 311.74           | 11.99                                |
|                  | 3.4 Transport  | -                                 | -                | 145.00           | -                | 150.00           | 5.00                                 |
|                  | 3.5 Sowing of sets (m.days)  | 0.781                             | 125.00           | 48.81            | 130.00           | 50.77            | 1.95                                 |
|                  | 3.6 Contract sowing  | -                                 | -                | 150.00           | -                | 155.00           | 5.00                                 |
| 4                | Interculture and Earthing up:  |                                   |                  |                  |                  |                  |                                      |
|                  | 4.1 Manual/binding of plants   | 0.609                             | 495.00           | 301.46           | 515.00           | 313.64           | 12.18                                |
|                  | 4.2 Bullock/tractor  | 2.008                             | 210.00           | 421.68           | 220.00           | 441.76           | 20.08                                |
| 5                | Plant Protection:  |                                   |                  |                  |                  |                  |                                      |
|                  | 5.1 Weedicides   | 0.124                             | 230.00           | 28.52            | 232.00           | 28.77            | 0.25                                 |
|                  | 5.2 Granules   | 0.07                              | 225.00           | 15.75            | 227.00           | 15.89            | 0.14                                 |
|                  | 5.3 Sparys   | 0.331                             | 205.00           | 67.86            | 208.00           | 68.85            | 0.99                                 |
|                  | 5.4 Others   | 0.161                             | 470.00           | 75.67            | 473.00           | 76.15            | 0.48                                 |
| 6                | Irrigation:  |                                   |                  |                  |                  |                  |                                      |
|                  | 6.1 Canal  | 8.9                               | -                | 250.00           | -                | 250.00           | 0.00                                 |
|                  | 6.2 Private tubewell   | 4.44                              | 530.00           | 2353.20          | 541.00           | 2402.04          | 48.84                                |
|                  | 6.3 Mixed  | 2.16                              | 120.00           | 259.20           | 123.00           | 265.68           | 6.48                                 |
|                  | 6.4 Labour for irrigation and water course<br>cleaning (m.days)            | 4.86                              | 125.00           | 607.50           | 130.00           | 631.80           | 24.30                                |
| 7                | Farm Yard Manure:  |                                   |                  |                  |                  |                  |                                      |
|                  | 7.1 Material   | -                                 | -                | 560.00           | -                | 560.00           | 0.00                                 |
|                  | 7.2 Transport & application  | -                                 | -                | 490.00           | -                | 500.00           | 10.00                                |
| 8                | Fertilizers: (bags)  |                                   |                  |                  |                  |                  |                                      |
|                  | 8.1 DAP  | 1.28                              | 1073.00          | 1373.44          | 908.00           | 1162.24          | -211.20                              |
|                  | 8.2 Urea   | 1.73                              | 517.00           | 894.41           | 532.00           | 920.36           | 25.95                                |
|                  | 8.3 Nitrophos  | 0.35                              | 699.00           | 244.65           | 628.00           | 219.80           | -24.85                               |
|                  | 8.4 SSP  | 0.01                              | 370.00           | 3.70             | 259.00           | 2.59             | -1.11                                |
|                  | 8.5 CAN  | 0.01                              | 375.00           | 3.75             | 391.00           | 3.91             | 0.16                                 |
|                  | 8.6 SOP  | 0.07                              | 1191.00          | 83.37            | 956.00           | 66.92            | -16.45                               |
|                  | 8.7 Gypsum   | 0.44                              | 40.00            | 17.60            | 40.00            | 17.60            | 0.00                                 |
|                  | 8.8 Fert. transport and application  | 3.89                              | 30.00            | 116.70           | 32.00            | 124.48           | 7.78                                 |
| 9                | Mark up @ 12.0 % per annum for 13 months<br>on items 1 to 8 minus item 6.1 | -                                 | -                | 1295.11          | -                | 1818.63          | 523.52                               |
| 10               | Land rent for 13 months  | -                                 | 5500.00          | 5958.33          | 6000.00          | 6500.00          | 541.67                               |
| 11               | Average weighted land tax @ Rs 131/acre/<br>annum for 13 months            | -                                 | -                | 142.00           | -                | 142.00           | 0.00                                 |
| 12               | Management charges for 13 months   | -                                 | -                | 657.00           | -                | 732.00           | 75.00                                |
| 13               | Harvesting & stripping (40 kg units)                                       | 565.15                            | 6.50             | 3636.74          | 7.00             | 3916.49          | 279.75                               |
| 14               | Expected escalation in cost of selected items                              | -                                 | -                | 1046.00          | -                | 1470.00          | 424.00                               |
| 15               | Total cost (items 1 to 14)   | -                                 | -                | 26268.35         | -                | 28818.57         | 2550.22                              |
| 16               | Yield (40 kg units)  | -                                 | -                | 565.15           | -                | 565.15           | 0.00                                 |
| 17               | Cost of production at farm level: (Rs/40 kgs)                              |                                   |                  |                  |                  |                  |                                      |
|                  | 17.1 including land rent   | -                                 | -                | 46.48            | -                | 50.99            | 4.51                                 |
|                  | 17.2 excluding land rent   | -                                 | -                | 35.94            | -                | 39.49            | 3.55                                 |
| 18               | Marketing expenses: (Rs/40 kgs)  |                                   |                  |                  |                  |                  |                                      |
|                  | 18.1 Transport, etc.   | -                                 | -                | 6.00             | -                | 6.25             | 0.25                                 |
|                  | 18.2 Development cess  | -                                 | -                | 0.25             | -                | 0.25             | 0.00                                 |
| 19               | Cost of production at mill-gate: (Rs/40 kgs)                               |                                   |                  |                  |                  |                  |                                      |
|                  | 19.1 including land rent   | -                                 | -                | 52.73            | -                | 57.49            | 4.76                                 |
|                  | 19.2 excluding land rent   | -                                 | -                | 42.19            | -                | 45.99            | 3.80                                 |

Note: Mark-up for 2006-07 crop has worked out @ 9 per cent per annum.

**AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN SINDH:  
2006-07 AND 2007-08 CROPS**

| Sr. No.          | Operations / inputs  | Avg No. of oprs/units/acre | 2006 - 07 Crop |               | 2007 - 08 Crop |               | Change in 2007-08 over 2006-07 |
|------------------|--|----------------------------|----------------|---------------|----------------|---------------|--------------------------------|
|                  |  |                            | Cost per unit  | Cost per acre | Cost per unit  | Cost per acre |                                |
| 1                | 2  | 3                          | 4              | 5=3*4         | 6              | 7=3*6         | 8=7-5                          |
| -----Rupees----- |  |                            |                |               |                |               |                                |
| 1                | Land preparation :   |                            |                |               |                |               |                                |
|                  | 1.1 Deep ploughing   | 0.523                      | 670.00         | 350.41        | 710.00         | 371.33        | 20.92                          |
|                  | 1.2 Ploughing  | 5.606                      | 340.00         | 1906.04       | 360.00         | 2018.16       | 112.12                         |
|                  | 1.3 Planking   | 1.577                      | 170.00         | 268.09        | 180.00         | 283.86        | 15.77                          |
|                  | 1.4 Levelling  | 0.972                      | 340.00         | 330.48        | 360.00         | 349.92        | 19.44                          |
| 2                | Seed bed preparation:  |                            |                |               |                |               |                                |
|                  | 2.1 Ploughing/Furrow making  | 1.136                      | 340.00         | 266.51        | 360.00         | 282.18        | 15.68                          |
|                  | 2.2 Planking   | 1.34                       | 170.00         | 157.18        | 180.00         | 166.43        | 9.25                           |
|                  | 2.3 Trench/ridge making  |                            |                |               |                |               |                                |
|                  | 2.3.1 manual (m.days)  | 0.074                      | 125.00         | 6.38          | 130.00         | 6.64          | 0.26                           |
|                  | 2.3.2 tractor (hrs)  | 0.174                      | 280.00         | 33.62         | 295.00         | 35.42         | 1.80                           |
|                  | 2.4 Bund making (m.days)   |                            |                |               |                |               |                                |
|                  | 2.4.1 manual (m.days)  | 0.403                      | 125.00         | 34.76         | 130.00         | 36.15         | 1.39                           |
|                  | 2.4.2 tractor (hrs)  | 0.812                      | 280.00         | 156.88        | 295.00         | 165.28        | 8.40                           |
| 3                | Seed and Sowing operations:  |                            |                |               |                |               |                                |
|                  | 3.1 40 kg units  | 64.118                     | 70.00          | 3096.90       | 78.00          | 3450.83       | 353.93                         |
|                  | 3.2 Ghuntas  | 0.685                      | 1700.00        | 803.51        | 1898.00        | 897.09        | 93.58                          |
|                  | 3.3 Harvesting, stripping and making of set (m.days)                   | 4.42                       | 125.00         | 381.23        | 130.00         | 396.47        | 15.25                          |
|                  | 3.4 Transportation   | -                          | -              | 260.00        | -              | 270.00        | 10.00                          |
|                  | 3.5 Sowing of sets (m.days)  | 0.588                      | 125.00         | 50.72         | 130.00         | 52.74         | 2.03                           |
|                  | 3.6 Contract sowing  | -                          | -              | 245.00        | -              | 255.00        | 10.00                          |
| 4                | Interculture and Earthing up:  |                            |                |               |                |               |                                |
|                  | 4.1 Manual   | 1.762                      | 475.00         | 836.95        | 495.00         | 872.19        | 35.24                          |
|                  | 4.2 Bullock/tractor  | 1.725                      | 340.00         | 586.50        | 360.00         | 621.00        | 34.50                          |
| 5                | Plant Protection :   |                            |                |               |                |               |                                |
|                  | 5.1 Weedicides   | 0.344                      | 310.00         | 106.64        | 313.00         | 107.67        | 1.03                           |
|                  | 5.2 Granules   | 0.342                      | 215.00         | 73.53         | 217.00         | 74.21         | 0.68                           |
|                  | 5.3 Sprays   | 0.398                      | 220.00         | 87.56         | 222.00         | 88.36         | 0.80                           |
| 6                | Irrigation   |                            |                |               |                |               |                                |
|                  | 6.1 Canal  | 20.88                      | -              | 181.87        | -              | 181.87        | 0.00                           |
|                  | 6.2 Private tubewell   | 2.45                       | 257.00         | 629.65        | 267.00         | 654.15        | 24.50                          |
|                  | 6.3 Labour for irrigation and water course cleaning (m.days)           | 5.859                      | 125.00         | 732.38        | 130.00         | 761.67        | 29.30                          |
| 7                | Farm Yard Manure:  |                            |                |               |                |               |                                |
|                  | 7.1 Material   | -                          | -              | 840.00        | -              | 840.00        | 0.00                           |
|                  | 7.2 Transport & application  | -                          | -              | 445.00        | -              | 455.00        | 10.00                          |
| 8                | Fertilizers: (bags)  |                            |                |               |                |               |                                |
|                  | 8.1 DAP  | 1.512                      | 1070.00        | 1617.84       | 848.00         | 1282.18       | -335.66                        |
|                  | 8.2 Urea   | 3.625                      | 507.00         | 1837.88       | 542.00         | 1964.75       | 126.88                         |
|                  | 8.3 Nitrophos  | 0.376                      | 723.00         | 271.85        | 608.00         | 228.61        | -43.24                         |
|                  | 8.4 CAN  | 0.185                      | 402.00         | 74.37         | 385.00         | 71.23         | -3.15                          |
|                  | 8.5 AS   | 0.046                      | 750.00         | 34.50         | 780.00         | 35.88         | 1.38                           |
|                  | 8.6 SOP  | 0.085                      | 1185.00        | 100.73        | 875.00         | 74.38         | -26.35                         |
|                  | 8.7 Fert. transport and application                                    | 5.829                      | 30.00          | 174.87        | 32.00          | 186.53        | 11.66                          |
| 9                | Mark up @ 12.0 % per annum for 16 months on item 1 to 8 minus item 6.1 | -                          | -              | 2015.75       | -              | 2776.85       | 761.10                         |
| 10               | Land rent for 16 months  | -                          | 5000.00        | 6666.67       | 5500.00        | 7333.33       | 666.67                         |
| 11               | Land tax @ Rs 200/acre/annum for 16 months                             | -                          | -              | 266.67        | -              | 266.67        | 0.00                           |
| 12               | Drainage cess  | -                          | -              | 24.00         | -              | 24.00         | 0.00                           |
| 13               | Management charges for 16 months                                       | -                          | -              | 810.00        | -              | 901.00        | 91.00                          |
| 14               | Harvesting & stripping (40 kg units)                                   | 676.02                     | 6.50           | 4394.13       | 7.00           | 4732.14       | 338.01                         |
| 15               | Expected escalation in the cost of selected items                      | -                          | -              | 997.00        | -              | 1401.00       | 404.00                         |
| 16               | Total cost (items 1 to 15)   | -                          | -              | 32154.01      | -              | 34972.16      | 2818.15                        |
| 17               | Yield (40 kg units)  | -                          | -              | 676.02        | -              | 676.02        | 0.00                           |
| 18               | Cost of production at farm level: (Rs/40 kgs)                          |                            |                |               |                |               |                                |
|                  | 18.1 including land rent   | -                          | -              | 47.56         | -              | 51.73         | 4.17                           |
|                  | 18.2 excluding land rent   | -                          | -              | 37.70         | -              | 40.88         | 3.18                           |
| 19               | Marketing expenses: (Rs/40 kgs)  |                            |                |               |                |               |                                |
|                  | 19.1 Transport, etc.   | -                          | -              | 6.00          | -              | 6.25          | 0.25                           |
|                  | 19.2 Development cess  | -                          | -              | 0.32          | -              | 0.32          | 0.00                           |
| 20               | Cost of production at mill-gate: (Rs/40 kgs)                           |                            |                |               |                |               |                                |
|                  | 20.1 including land rent   | -                          | -              | 53.88         | -              | 58.30         | 4.42                           |
|                  | 20.2 excluding land rent   | -                          | -              | 44.02         | -              | 47.45         | 3.43                           |

Note: Mark-up for 2006-07 crop has worked out @ 9 per cent per annum.

**AVERAGE FARMERS' COST OF PRODUCTION OF SUGARCANE IN NWFP:  
2006-07 AND 2007-08 CROPS**

| Sr. No. | Operations / inputs   | Avg No. of oprs/units/acre | 2006 - 07 Crop   |               | 2007 - 08 Crop |               | Change in 2007-08 over 2006-07 |
|---------|---|----------------------------|------------------|---------------|----------------|---------------|--------------------------------|
|         |   |                            | Cost per unit    | Cost per acre | Cost per unit  | Cost per acre |                                |
| 1       | 2   | 3                          | 4                | 5=3*4         | 6              | 7=3*6         | 8=7-5                          |
|         |   |                            | -----Rupees----- |               |                |               |                                |
| 1       | Land preparation:   |                            |                  |               |                |               |                                |
|         | 1.1 Deep ploughing/Rotavator  | 0.665                      | 645.00           | 428.93        | 680.00         | 452.20        | 23.28                          |
|         | 1.2 Ploughing   | 2.776                      | 260.00           | 721.76        | 275.00         | 763.40        | 41.64                          |
|         | 1.3 Planking  | 0.435                      | 130.00           | 56.55         | 140.00         | 60.90         | 4.35                           |
|         | 1.4 Levelling   | 0.344                      | 260.00           | 89.44         | 275.00         | 94.60         | 5.16                           |
| 2       | Seed bed preparation:   |                            |                  |               |                |               |                                |
|         | 2.1 Ploughing/Furrow making   | 0.982                      | 260.00           | 132.77        | 275.00         | 140.43        | 7.66                           |
|         | 2.2 Planking  | 0.027                      | 130.00           | 1.83          | 140.00         | 1.97          | 0.14                           |
|         | 2.3 Trech/Ridge making (tractor hrs)  | 0.039                      | 260.00           | 5.27          | 275.00         | 5.58          | 0.30                           |
|         | 2.4 Bund making (m.days)  | 1.274                      | 125.00           | 82.81         | 130.00         | 86.12         | 3.31                           |
| 3       | Seed and Sowing operations:   |                            |                  |               |                |               |                                |
|         | 3.1 40 kg units   | 76.337                     | 70.00            | 2778.67       | 95.00          | 3771.05       | 992.38                         |
|         | 3.2 Harvesting, stripping and making of set (m.days)                          | 3.671                      | 125.00           | 238.62        | 130.00         | 248.16        | 9.54                           |
|         | 3.3 Transport   | -                          | -                | 235.00        | -              | 240.00        | 5.00                           |
|         | 3.4 Sowing of sets (m.days)   | 4.097                      | 125.00           | 266.31        | 130.00         | 276.96        | 10.65                          |
| 4       | Interculture and Earthing up :  |                            |                  |               |                |               |                                |
|         | 4.1 Manual/binding of plants  | 1.642                      | 575.00           | 944.15        | 600.00         | 985.20        | 41.05                          |
|         | 4.2 Bullock/tractor   | 1.859                      | 260.00           | 483.34        | 275.00         | 511.23        | 27.89                          |
| 5       | Plant Protection:   |                            |                  |               |                |               |                                |
|         | 5.1 Weedicides  | 0.336                      | 310.00           | 104.16        | 315.00         | 105.84        | 1.68                           |
|         | 5.2 Granules  | 0.094                      | 275.00           | 25.85         | 280.00         | 26.32         | 0.47                           |
|         | 5.3 Sprays  | 0.306                      | 195.00           | 59.67         | 200.00         | 61.20         | 1.53                           |
|         | 5.4 Others  | 0.261                      | 265.00           | 69.17         | 270.00         | 70.47         | 1.30                           |
| 6       | Irrigation:   |                            |                  |               |                |               |                                |
|         | 6.1 Canal   | 15.19                      | -                | 624.00        | -              | 863.00        | 239.00                         |
|         | 6.2 Private tubewell  | 2.61                       | 250.00           | 652.50        | 271.00         | 707.31        | 54.81                          |
|         | 6.3 Private canal (manual labour)   | 2.43                       | 15.00            | 36.45         | 20.00          | 48.60         | 12.15                          |
|         | 6.4 Labour for irrigation and water course cleaning (m.days)                  | 7.953                      | 125.00           | 994.13        | 130.00         | 1033.89       | 39.77                          |
| 7       | Farm Yard Manure:   |                            |                  |               |                |               |                                |
|         | 7.1 Material  | -                          | -                | 890.00        | -              | 890.00        | 0.00                           |
|         | 7.2 Transport & application   | -                          | -                | 650.00        | -              | 665.00        | 15.00                          |
| 8       | Fertilizers: (bags)   |                            |                  |               |                |               |                                |
|         | 8.1 DAP   | 0.83                       | 1130.00          | 937.90        | 920.00         | 763.60        | -174.30                        |
|         | 8.2 Urea  | 1.97                       | 535.00           | 1053.95       | 530.00         | 1044.10       | -9.85                          |
|         | 8.3 Nitrophos   | 0.33                       | 735.00           | 242.55        | 650.00         | 214.50        | -28.05                         |
|         | 8.4 CAN   | 0.13                       | 420.00           | 54.60         | 420.00         | 54.60         | 0.00                           |
|         | 8.5 Fert. transport and application   | 3.26                       | 30.00            | 97.80         | 32.00          | 104.32        | 6.52                           |
| 9       | Mark up @ 12.0 % per annum for 15 months months on item 1 to 8 minus item 6.1 | -                          | -                | 1387.59       | -              | 2014.13       | 626.54                         |
| 10      | Land rent for 15 months   | -                          | 5500.00          | 6875.00       | 6000.00        | 7500.00       | 625.00                         |
| 11      | Average weighted land tax @ Rs 75/acre/ annum for 15 months                   | -                          | -                | 93.75         | -              | 93.75         | 0.00                           |
| 12      | Management charges for 15 months  | -                          | -                | 760.00        | -              | 845.00        | 85.00                          |
| 13      | Harvesting & stripping (40 kg units)  | 585.46                     | 6.50             | 875.26        | 7.00           | 942.59        | 67.33                          |
| 14      | Expected escalation in cost of selected items                                 | -                          | -                | 780.00        | -              | 1048.00       | 268.00                         |
| 15      | Total cost (items 1 to 14)  | -                          | -                | 23729.75      | -              | 26734.00      | 3004.25                        |
| 16      | Yield (40 kg units)   | -                          | -                | <u>585.46</u> | -              | <u>585.46</u> | 0.00                           |
| 17      | Cost of production at farm level: (Rs/40 kgs)                                 |                            |                  |               |                |               |                                |
|         | 17.1 including land rent  | -                          | -                | 40.53         | -              | 45.66         | 5.13                           |
|         | 17.2 excluding land rent  | -                          | -                | 28.79         | -              | 32.85         | 4.06                           |
| 18      | Marketing expenses: (Rs/40 kgs)   |                            |                  |               |                |               |                                |
|         | 18.1 Transport, etc.  | -                          | -                | 6.00          | -              | 6.25          | 0.25                           |
|         | 18.2 Development cess   | -                          | -                | 0.27          | -              | 0.27          | 0.00                           |
| 19      | Cost of production at mill-gate: (Rs/40 kgs)                                  |                            |                  |               |                |               |                                |
|         | 19.1 including land rent  | -                          | -                | 46.80         | -              | 52.18         | 5.38                           |
|         | 19.2 excluding land rent  | -                          | -                | 35.06         | -              | 39.37         | 4.31                           |

Note: Mark-up for 2006-07 crop has worked out @ 9 per cent per annum.

### Notes for Annex- VI to VIII

1. The input-output parameters for estimating cost of production for sugarcane 2007-08 Crop have been adopted from the Support Price Policy for sugarcane 2006-07 Crop, APCom's Series No. 218.
2. The custom hire rates of farm operations, farm inputs prices, wage rate and land rentals have been revised in the light of data obtained through field surveys conducted by the APCom in the major sugarcane growing areas of the Punjab, Sindh and NWFP during January 2007 and discussion in the meeting of the Standing Committee on sugarcane, held on 23<sup>rd</sup> January 2007 at Islamabad and other sources as narrated below.
3. Seed and related costs (items 2 and 3) for the fresh planted crop have been estimated @ 50, 69 and 52 per cent of their original values for the Punjab, Sindh and NWFP respectively in view of the incidence of ratooning reported @ 50, 31 and 48 per cent during sugarcane's large field survey for 1999-00 crop.
4. The increasing trend in the prices of pesticides, insecticides etc. has been arrested on account of new generic and low cost pesticides and insecticides. Therefore, the material cost (90 per cent) of plant protection has not been revised. However, the cost of labour component (10 per cent of the total cost) has been revised in light of new wage rate.
5. The cost of supplementary irrigation has been revised in view of the increases in the prices of diesel @ 1.48 per cent and power tariff 10 per cent during January 2006 to March 2007. Based on the ratios of electric and diesel tube-wells of 08:92 in the Punjab, 24:76 in Sindh and 79:21 in NWFP as reported in the Agriculture Statistics of Pakistan, 2004-05, MINFAL (Economic Wing), Islamabad, the average weighted increase has been estimated as 2.08 per cent in the Punjab, 3.89 per cent in Sindh and 8.40 per cent in the NWFP.
6. Transportation costs have been adjusted in view of increases in the prices of diesel.
7. The prices of chemical fertilizers have been revised in view of the fertilizers prices published by the Federal Bureau of Statistics, Islamabad for the week ending on 1<sup>st</sup> March 2007 and supplemented with the data obtained through the field survey and information provided by the representatives of the farmers' in the meeting of Standing Committee on sugarcane.
8. The management charges for a manager looking after a 25-acre farm and devoting one-fourth of his time to the managerial activities have been worked at Rs 5633 per month salary for a Field Assistant at the 10<sup>th</sup> stages in BPS-6,

8. including special additional allowance @ 25 per cent and 15 per cent ad-hoc relief each announced in the budgets of 2004-05, 2005-06 and 2006-07.
9. In view of the 1999-00 Crop survey, about 1 per cent of the acreage under sugarcane was harvested in lieu of sugarcane tops in the Punjab and 77 per cent in NWFP. The expenditure on account of harvesting and stripping has been adjusted accordingly.
10. The likely escalation in the cost of operations like interculture, plant protection, supplementary irrigation, nitrogenous fertilizer, harvesting/stripping and marketing during 2007-08 crop year has been estimated as 11 per cent in the Punjab, 9 per cent in Sindh and 11 per cent in the NWFP on the basis of average weighted annual increase in their costs for the last 4 years.
11. Mark-up rate for 2007-08 crop has worked out @ 12 per cent on the basis of the average weighted mark-up on agriculture loans disbursed by different banks. However, the mark-up for 2006-07 crop has been worked out @ 9 per cent per annum.
12. Wide variations in land rentals were reported during the aforesaid field survey. There is no precise measure available at hand to update land rentals. However, land rentals have been adjusted in view of the observations obtained during the field survey and discussion made in the meeting of the APro's Standing Committee on sugarcane accordingly.

**PER CAPITA AVAILABILITY (CONSUMPTION) OF SUGAR:  
1996-97 TO 2006-07 (OCTOBER - SEPTEMBER)**

| S.No. | ITEM                                    | 1996-97 | 1997-98 | 1998-99 | 1999-00 | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06      | 2006-07 (P) |
|-------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------|-------------|
| 1     | Opening stocks as on 1st October        | 104     | 413     | 513     | 371     | 27      | 621     | 637     | 759     | 809     | 578          | 1311        |
| 2     | Production                              | 2393    | 3555    | 3542    | 2429    | 3016    | 3249    | 3677    | 4021    | 3115    | 2999         | 3527        |
| 3     | Imports                                 | 729     | 26      | 4       | 421     | 633     | 27      | 9       | 12      | 622     | 1593         | 91          |
| 4     | Exports                                 | ---     | 447     | 648     | 22      | ---     | 8       | 80      | 132     | 28      | 47           | 12          |
| 5     | Closing stocks as on 30 September, 2006 | 413     | 513     | 371     | 27      | 621     | 637     | 759     | 809     | 578     | 1311         | 760         |
| 6     | Net availability (item 1+2+3-4-5)       | 2813    | 3034    | 3040    | 3172    | 3055    | 3262    | 3484    | 3851    | 3941    | 5123<br>3912 | 4066        |
| 7     | Population as on first April (a)        | 132.96  | 136.19  | 139.07  | 142.34  | 145.64  | 149.16  | 152.87  | 156.86  | 160.11  | 163.152      | 166.09      |
| 8     | Per capita availability (consumption)   | 21.16   | 22.28   | 21.66   | 22.28   | 20.98   | 21.80   | 22.79   | 24.55   | 24.61   | 31.40        | 24.48       |
| 9     | Average per capita availability         |         |         |         |         |         |         |         |         |         | 23.37        |             |
|       | i) Average (1996-97 to 2006-07)         |         |         | 23.47   |         |         |         |         |         |         |              |             |
|       | ii) Forecast for 2007-08                |         |         | 24.71   |         |         |         |         |         |         |              |             |

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

**Sources:**

1. For Stocks and Production: Pakistan Sugar Mills Association, Islamabad.
2. For Imports and Exports: Federal Bureau of Statistics, Karachi and PSMA.
3. For Population of Pakistan: Economic Survey, 2006-07
4. For Population of AJ&K and NAs: Population Census Organization, Islamabad.
5. For Population of Afghan refugees: Kashmir Affairs, Northern Areas, States and Frontier Regions Division, Government of Pakistan, Islamabad.

MONTHLY AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR  
DOMESTIC MARKETS: 2005 To 2007

| Year/Month                     | Lahore      | Faisalabad  | Karachi     | Hyderabad   | Peshawar    | Average     |
|--------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ----- Rupees per 100 kgs ----- |             |             |             |             |             |             |
| <b>2005</b>                    |             |             |             |             |             |             |
| January                        | 2343        | 2337        | 2222        | 2222        | 2194        | 2263        |
| February                       | 2589        | 2565        | 2521        | 2483        | 2574        | 2547        |
| March                          | 2551        | 2499        | 2474        | 2456        | 2536        | 2503        |
| April                          | 2534        | 2507        | 2431        | 2434        | 2525        | 2486        |
| May                            | 2509        | 2485        | 2421        | 2413        | 2531        | 2472        |
| June                           | 2580        | 2554        | 2495        | 2474        | 2525        | 2526        |
| July                           | 2811        | 2814        | 2751        | 2721        | 2830        | 2786        |
| August                         | 2770        | 2774        | 2675        | 2693        | 2759        | 2734        |
| September                      | 2619        | 2611        | 2588        | 2538        | 2636        | 2598        |
| October                        | 2540        | 2543        | 2488        | 2435        | 2563        | 2514        |
| November                       | 2824        | 2799        | 2638        | 2623        | 2772        | 2731        |
| December                       | 2890        | 2895        | 2745        | 2761        | 2903        | 2839        |
| <b>Average</b>                 | <b>2630</b> | <b>2615</b> | <b>2537</b> | <b>2521</b> | <b>2612</b> | <b>2583</b> |
| <b>2006</b>                    |             |             |             |             |             |             |
| January                        | 3101        | 3050        | 2944        | 2903        | 3024        | 3004        |
| February                       | 3688        | 3640        | 3564        | 3516        | 3677        | 3617        |
| March                          | 3668        | 3649        | 3520        | 3547        | 3659        | 3609        |
| April                          | 3811        | 3808        | 3709        | 3705        | 3817        | 3770        |
| May                            | 3748        | 3733        | 3633        | 3618        | 3751        | 3697        |
| June                           | 3584        | 3574        | 3425        | 3401        | 3568        | 3510        |
| July                           | 3601        | 3588        | 3499        | 3497        | 3615        | 3560        |
| August                         | 3526        | 3539        | 3519        | 3464        | 3538        | 3517        |
| September                      | 3331        | 3291        | 3227        | 3201        | 3303        | 3271        |
| October                        | 3285        | 3271        | 3175        | 3148        | 3268        | 3229        |
| November                       | 3258        | 3231        | 3242        | 3203        | 3268        | 3240        |
| December                       | 2903        | 2856        | 2845        | 2828        | 2925        | 2871        |
| <b>Average</b>                 | <b>3459</b> | <b>3436</b> | <b>3359</b> | <b>3336</b> | <b>3451</b> | <b>3408</b> |
| <b>2007</b>                    |             |             |             |             |             |             |
| January                        | 3023        | 2993        | 2955        | 2883        | 3025        | 2976        |
| February                       | 2923        | 2888        | 2883        | 2783        | 2920        | 2879        |
| March                          | 2890        | 2865        | 2785        | 2768        | 2898        | 2841        |
| April                          | 2880        | 2835        | 2820        | 2740        | 2863        | 2828        |
| May                            | 2900        | 2855        | 2808        | 2778        | 2868        | 2842        |
| June                           | 2668        | 2613        | 2594        | 2538        | 2638        | 2610        |
| July                           |             |             |             |             |             |             |
| <b>Average</b>                 | <b>2881</b> | <b>2842</b> | <b>2808</b> | <b>2748</b> | <b>2869</b> | <b>2928</b> |

Source: ALMA, Karachi.

ANNUAL AVERAGE WHOLESALE PRICES OF SUGAR IN  
MAJOR DOMESTIC MARKETS: 1995-96 TO 2006-07

( October - September )

| Year     | Lahore                         | Faisalabad | Karachi | Hyderabad | Peshawar | Average | Increase (+)<br>decrease (-)<br>in average<br>price over |
|----------|--------------------------------|------------|---------|-----------|----------|---------|--|
|          | ----- Rupees per 100 kgs ----- |            |         |           |          |         | <u>Percent</u>   |
| 1995-96  | 1695                           | 1705       | 1650    | 1625      | 1718     | 1679    | -  |
| 1996-97  | 1988                           | 2020       | 1975    | 1923      | 2110     | 2003    | 19.33  |
| 1997-98  | 1745                           | 1713       | 1720    | 1643      | 1835     | 1731    | -13.58   |
| 1998-99  | 1865                           | 1861       | 1823    | 1726      | 1864     | 1828    | 5.59   |
| 1999-00  | 2179                           | 2168       | 2087    | 2082      | 2183     | 2140    | 17.06  |
| 2000-01  | 2551                           | 2524       | 2482    | 2353      | 2566     | 2495    | 16.62  |
| 2001-02  | 2069                           | 2042       | 2063    | 2022      | 2073     | 2054    | -17.69   |
| 2002-03  | 1939                           | 1906       | 1892    | 1872      | 1972     | 1916    | -6.70  |
| 2003-04  | 1813                           | 1769       | 1788    | 1743      | 1853     | 1793    | -6.43  |
| 2004-05  | 2417                           | 2410       | 2373    | 2345      | 2411     | 2391    | 33.38  |
| 2005-06  | 3359                           | 3342       | 3243    | 3223      | 3349     | 3303    | 38.13  |
| 2006-07* | 2970                           | 2934       | 2901    | 2852      | 2963     | 2924    | -11.48   |

**Note\*** Prices up to 15th June 2007.

**Source:** ALMA, Karachi.

ECONOMICS OF SUGARCANE AND COMPETING CROPS AT  
PRICES REALIZED BY THE GROWERS: 2006-07 CROPS

ANNEX - XII

| Province/crops/ crop combination | Crop duration | Water used | Gross cost | Cost of purchased inputs | Gross revenue | Gross margin | Net income | Output-input ratio | Revenue per               |          |                          |
|----------------------------------|---------------|------------|------------|--------------------------|---------------|--------------|------------|--------------------|---------------------------|----------|--------------------------|
|                                  |               |            |            |                          |               |              |            |                    | Rupee of purchased inputs | Crop day | Acres 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                   |
| .....Rupees per acre.....        |               |            |            |                          |               |              |            |                    | .....Rupees.....          |          |                          |
| <b>Punjab</b>                    |               |            |            |                          |               |              |            |                    |                           |          |                          |
| 1 Sugarcane                      | 394           | 48         | 25300      | 8409                     | 30377         | 21968        | 5077       | 1.20               | 3.61                      | 77.10    | 633                      |
| 2 Seed cotton                    | 240           | 22         | 17099      | 7712                     | 19999         | 12287        | 2900       | 1.17               | 2.59                      | 83.33    | 909                      |
| 3 Basmati paddy                  | 180           | 58         | 13881      | 8056                     | 13355         | 5299         | -525       | 0.96               | 1.66                      | 74.20    | 230                      |
| 4 IRR1 paddy                     | 180           | 62         | 11582      | 6562                     | 10054         | 3492         | -1528      | 0.87               | 1.53                      | 55.86    | 162                      |
| 5 Wheat                          | 180           | 12         | 12945      | 5304                     | 12479         | 7175         | -466       | 0.96               | 2.35                      | 69.33    | 1040                     |
| 6 Sunflower (spring)             | 144           | 22         | 10672      | 2800                     | 12210         | 9411         | 1538       | 1.14               | 4.36                      | 84.79    | 555                      |
| 7 Seed cotton + wheat            | 420           | 34         | 30044      | 13017                    | 32478         | 19462        | 2434       | 1.08               | 2.50                      | 77.33    | 955                      |
| 8 Seed cotton + sunflower        | 384           | 44         | 27771      | 10512                    | 32209         | 21697        | 4438       | 1.16               | 3.06                      | 83.88    | 732                      |
| 9 Basmati paddy+wheat            | 360           | 70         | 26826      | 13361                    | 25835         | 12474        | -991       | 0.96               | 1.93                      | 71.76    | 369                      |
| 10 Basmati paddy+sunflower       | 324           | 80         | 24553      | 10856                    | 25565         | 14710        | 1013       | 1.04               | 2.35                      | 78.91    | 320                      |
| 11 IRR1 paddy + wheat            | 360           | 74         | 24528      | 11867                    | 22533         | 10667        | -1994      | 0.92               | 1.90                      | 62.59    | 305                      |
| 12 IRR1 paddy+sunflower          | 324           | 84         | 22254      | 9362                     | 22264         | 12902        | 10         | 1.00               | 2.38                      | 68.72    | 265                      |
| <b>Sindh</b>                     |               |            |            |                          |               |              |            |                    |                           |          |                          |
| 1 Sugarcane                      | 488           | 71         | 31171      | 9836                     | 41021         | 31184        | 9850       | 1.32               | 4.17                      | 84.06    | 578                      |
| 2 Seed cotton                    | 240           | 18         | 15857      | 5806                     | 18743         | 12937        | 2886       | 1.18               | 3.23                      | 78.09    | 1041                     |
| 3 IRR1 paddy                     | 180           | 56         | 10084      | 4420                     | 10381         | 5961         | 298        | 1.03               | 2.35                      | 57.67    | 185                      |
| 4 Wheat                          | 180           | 12         | 10767      | 4293                     | 11046         | 6752         | 278        | 1.03               | 2.57                      | 61.37    | 920                      |
| 5 Sunflower (spring)             | 144           | 22         | 10157      | 2802                     | 12210         | 9409         | 2053       | 1.20               | 4.36                      | 84.79    | 555                      |
| 6 Seed cotton + wheat            | 420           | 30         | 26624      | 10099                    | 29788         | 19689        | 3164       | 1.12               | 2.95                      | 70.92    | 993                      |
| 7 Seed cotton + sunflower        | 384           | 40         | 26014      | 10099                    | 30953         | 20853        | 4939       | 1.19               | 3.06                      | 80.61    | 774                      |
| 8 IRR1 paddy+ wheat              | 360           | 68         | 20851      | 8713                     | 21427         | 12714        | 576        | 1.03               | 2.46                      | 59.52    | 315                      |
| 9 IRR1 paddy+sunflower           | 324           | 78         | 20241      | 7221                     | 22591         | 15370        | 2351       | 1.12               | 3.13                      | 69.73    | 290                      |



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**Notes for Annex - XII**

1. The economic analysis presented in the above exercise is based on the input-output prices applicable for 2006-07 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, 2006-07 crops. However, the relevant data for sunflower and canola were adopted from the last support price policy for non-traditional oilseeds, 2000-01 crops with necessary adjustments in input prices for updating costs and incomes for the 2006-07 crops. To incorporate the escalations in input prices, which occurred during the growing period of 2006-07 crops, some marginal revisions have been made as under:
  - 2.1 The cost of supplementary irrigation has been adjusted in view of rise in power tariff and diesel prices and ratio of electric and diesel tubewells at 09:91 in the Punjab and at 31:69 in Sindh. Accordingly, the weighted average increase in energy charges works to 3.79 per cent in Punjab and 2.87 per cent in Sindh for sugarcane, rice paddy and seed cotton.
  - 2.2 The cost of fertilizers has been revised in view of their prices prevailed at the time of application for the respective crops in 2006-07 season.
3. Water use has been estimated from the number of irrigations as reported in the cost of production estimates of the respective crops assuming each irrigation of 3 inches and 'rauni' of 4 inches.
4. The following prices as realized by the growers for different crops are adopted for the analysis:
  - 4.1 As the wheat crop is yet to be harvested, the support price of Rs 425 per 40 kgs for 2006-07 crop has been adopted for the current analysis.
  - 4.2 The wholesale market prices of basmati paddy and IRRI paddy during the post harvest period in major producer area markets reported by the Directorate of Agriculture (E&M), Lahore have averaged at Rs 567 and Rs 298 per 40 kgs, respectively. While, the average price of IRRI paddy in Sindh is reported at Rs 280 per 40 kgs by the Joint Director, Directorate of Agriculture Extension, Hyderabad.
  - 4.3 The wholesale market prices of seed cotton during the post-harvest months of Sep - Feb 2006-07 in the main producer area markets have averaged at Rs 1157 per 40 kgs in the Punjab as reported by the Directorate of Agriculture (E&M), Lahore. In Sindh, the corresponding prices are reported by the PCCC, Karachi during September and October to average at Rs 1075 per 40 kgs.

- 4.4 The sunflower 2006-07 crop is yet to be harvested. However, it was reported by the PODB Islamabad that All Pakistan Solvent Extraction Association would purchase sunflower at Rs 830 per 40 kgs during the season.
- 4.5 The market prices of sugarcane at mill-gate in the major cane producing areas are reported to hover around Rs 60 per 40 kgs in the Punjab and Rs 67 in Sindh.
5. The market prices have been adjusted for the marketing expenses to make them effective at the farm level. These expenses amount to Rs 6.00 per 40 kgs in Punjab and Sindh for sugarcane, Rs 22 in Punjab and Rs 24 in Sindh for seed cotton, Rs 16 for rice paddy, wheat and oilseeds.
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.

**MILL - GATE PRICES OF SUGARCANE WORKED BACK FROM  
THE AVERAGE WHOLESALE PRICES OF GUR DURING 2006-07  
CRUSHING SEASON (OCTOBER - JANUARY)**

| S.NO | ITEM  | UINT       | NWFP           | PUNJAB         |
|------|---|------------|----------------|----------------|
|      |   |            | (a)            | (a)            |
| 1    | Gur produced from 400 kgs of cane                           | Kgs        | 40             | 40             |
| 2    | Sale value of gur produced                                  | Rs./40 kgs | 1324.00        | 1108.00        |
| 3    | Marketing cost of gur including transport, commission, etc. | Rupees     | 69.26          | 66.71          |
| 4    | Net value of gur at farm level (item 2 minus item 3)        | Rupees     | <b>1254.74</b> | <b>1041.29</b> |
| 5    | Processing cost including cane crushing                     | Rupees     | 302.00         | 147.00         |
| 6    | Cost of chemicals   | Rupees     | 28.84          | 3.18           |
| 7    | Net value of 400 kgs of cane (items 4 minus 5 minus 6)      | Rupees     | <b>923.90</b>  | <b>891.11</b>  |
| 8    | Value of 40 kgs of sugarcane                                | Rupees     | 92.39          | 89.11          |
| 9    | Marketing cost of cane i.e., transport and development cess | Rupees     | 3.72           | 6.85           |
| 10   | Mill-gate price per 40 kgs of cane (item 8 plus 9)          | Rupees     | <b>96.11</b>   | <b>95.96</b>   |

(a) 10 per cent recovery has been taken

Source: Directorate of Agriculture (E&M), Government of Punjab and NWFP

**MILL - GATE PRICES OF SUGARCANE WORKED BACK FROM  
THE AVERAGE WHOLESALE MARKET PRICES OF SUGAR DURING 2006-07  
CRUSHING SEASON (NOVEMBER - AUGUST)**

| S.NO | ITEM  | RUPEES PER TONNE                |              |
|------|---|---------------------------------|--------------|
| 1    | Average wholesale market price of sugar (a)                                   | 28600                           |              |
| 2    | Wholesale dealer margin @ 5 % on net price                                    | 1192                            |              |
| 3    | Sales tax @ 15 per cent on net price  | 3575                            |              |
| 4    | Net price (item 1 minus 2 minus 3)  | 23833                           |              |
|      |   | <b>PUNJAB &amp;<br/>N.W.F.P</b> | <b>SINDH</b> |
| 5    | Processing cost of sugar (b)  | 8103                            | 8103         |
| 6    | Value of cane to produce one tonne of sugar (item 4 minus 5)                  | 15730                           | 15730        |
| 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)  | 1337.05                         | 1368.51      |
| 10   | Mill - gate price of sugarcane (Rs. per 40 kgs)                               | 53.48                           | 54.74        |

- Notes**
- a) Average price of Lahore, Faisalabad and Hyderabad market during current crushing season i.e., November to 1st week of August 2007
  - b) Ratio between costs of cane and its processing into sugar has been estimated at 66:34 from publication "Cost of Production of Sugar" jointly prepared in 1996 by Agricultural Prices Commission and Business and Consultancy Services.

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

## AVERAGE INTERNATIONAL PRICES OF SUGAR: 1996-97 TO 2006-07 (OCT - SEP)

| Years    | ISA Daily price of Raw sugar<br>(Fob and stowed<br>Caribbean ports in bulk) |             | London Daily price of White sugar<br>( fob and stowed European<br>ports in bags of 50 kgs) |             | Difference between White and raw<br>sugar prices |             |                            |
|----------|---|-------------|--|-------------|--|-------------|----------------------------|
|          | US Cents/ lb  | US\$/ tonne | US Cents/ lb   | US\$/ tonne | US Cents/ lb                                     | US\$/ tonne | Per cent of<br>White Sugar |
| 1996-97  | 11.10   | 244.71      | 14.48  | 319.23      | 3.38   | 74.52       | 23.34                      |
| 1997-98  | 9.89  | 218.03      | 12.33  | 271.83      | 2.44   | 53.80       | 19.79                      |
| 1998-99  | 6.63  | 146.20      | 9.79   | 215.83      | 3.16   | 69.63       | 32.25                      |
| 1999-00  | 7.23  | 159.30      | 9.18   | 202.38      | 1.95   | 43.08       | 21.29                      |
| 2000-01  | 9.34  | 205.91      | 11.35  | 250.29      | 2.01   | 44.38       | 17.71                      |
| 2001-02  | 6.85  | 151.01      | 10.59  | 232.48      | 3.74   | 81.47       | 35.32                      |
| 2002-03  | 8.12  | 179.03      | 10.36  | 228.35      | 2.24   | 49.32       | 21.59                      |
| 2003-04  | 6.57  | 144.84      | 10.16  | 223.93      | 3.59   | 79.09       | 35.33                      |
| 2004-05  | 8.97  | 197.75      | 12.48  | 275.06      | 3.51   | 77.31       | 28.13                      |
| 2005-06  | 14.84   | 327.14      | 18.34  | 407.75      | 3.50   | 80.61       | 19.10                      |
| 2006-07  | 11.49   | 253.20      | 16.16  | 356.30      | 4.68   | 103.10      | 28.94                      |
| October  | 11.64   | 256.61      | 17.06  | 376.09      | 5.42   | 119.47      | 31.77                      |
| November | 11.78   | 259.70      | 16.84  | 371.24      | 5.06   | 111.54      | 30.05                      |
| December | 11.57   | 255.07      | 15.79  | 348.04      | 4.22   | 92.97       | 26.73                      |
| January  | 10.95   | 241.40      | 14.96  | 329.82      | 4.01   | 88.42       | 26.80                      |

Source: International Sugar Organization, London "Monthly Market Reports and Press Summaries" (various reports).

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

| S.No | Item   | 2003-04 to 2005-06          |          | 2006- 07 (Oct-Jan) |          | (13th August2007) |  |
|------|--|-----------------------------|----------|--------------------|----------|-------------------|--|
|      |  | .... US \$ per tonne ....   |          |                    |          |                   |  |
| 1.   | Average fob (London) price   | 302                         |          | 356.00             |          | 282.00            |  |
| 2.   | Freight charges upto Karachi   | 50                          |          | 50                 |          | 50.00             |  |
| 3.   | C & f cost at Karachi port   | 352                         |          | 406.00             |          | 332.00            |  |
|      |  | OR ... Rs. per tonne (a)... |          |                    |          |                   |  |
|      |  | 21289                       |          | 24555              |          | 20079             |  |
| 4.   | Marine insurance @0.35 of c&f price  | 75                          |          | 86                 |          | 70                |  |
| 5.   | Landing charges @1% of c&f price   | 213                         |          | 246                |          | 201               |  |
| 6.   | <b>Import value (items 3+items 4+5)</b>  | <b>21576</b>                |          | <b>24886</b>       |          | <b>20350</b>      |  |
| 7.   | L/C opening charges @ 0.2% of c&f cost   | 432                         |          | 498                |          | 407               |  |
| 8.   | Mark up on retirement of documents by bank for 30 days @ 9.75% per annum of c&f cost | 171                         |          | 197                |          | 161               |  |
| 9.   | Wharfage, handling and stevedoring charges   | 229                         |          | 229                |          | 229               |  |
| 10.  | Allowance for shortage and unforeseen expenses @ 1% of c&f cost                      | 213                         |          | 246                |          | 201               |  |
| 11.  | TCP's commission @ 2% of c&f cost  | 426                         |          | 491                |          | 402               |  |
| 12.  | Transport charges from Karachi to Lahore (b) including loading/unloading             | 1300                        |          | 1300               |          | 1300              |  |
| 13.  | Landed cost at Lahore (items 6+ items 6 to 12)                                       | 24346                       |          | 27847              |          | 23050             |  |
|      |  | Punjab & NWFP               | Sindh    | Punjab & NWFP      | Sindh    | Punjab & NWFP     |  |
| 14.  | Processing cost of sugar (c)   | 8277.69                     | 8277.69  | 9467.82            | 9467.82  | 7836.91           |  |
| 15.  | Value of cane to produce one tonne of sugar (item 13 minus item 14)                  | 16068.47                    | 16068.47 | 18378.70           | 18378.70 | 15212.82          |  |
| 16.  | Provincial base recovery level (%)   | 8.50                        | 8.70     | 8.50               | 8.70     | 8.50              |  |
| 17.  | Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 16)    | 11.76                       | 11.49    | 11.76              | 11.49    | 11.76             |  |
| 18.  | Price of one tonne of sugarcane (item 15 / item 17) (Rs per tonne)                   | 1365.82                     | 1397.96  | 1562.19            | 1598.95  | 1293.09           |  |
| 19.  | Price of 40 kgs of cane (item 18/25)   | 54.63                       | 55.92    | 62.49              | 63.96    | 51.72             |  |

## Sources:

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

## Notes:

- Worked out at the selling exchange rate of one US \$ = 60.48 Pak rupees, announced by State Bank of Pakistan as on July, 16, 2007.
- Assuming that imported sugar will be consumed at Lahore.
- 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.

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

| S.No | Item  | 2003-04 to 2005-06        |          | 2006- 07 (Oct-Jan) |              | (13th August 2007) |              |
|------|---|---------------------------|----------|--------------------|--------------|--------------------|--------------|
|      |   | .... US \$ per tonne .... |          |                    |              |                    |              |
| 1.   | Average fob (London) price  |                           |          |                    |              |                    |              |
| 2.   | Freight charges upto Karachi  |                           |          |                    | 356.00       |                    | 282.00       |
| 3.   | C & f cost at Karachi port  |                           |          |                    | 50.00        |                    | 50.00        |
|      |   |                           |          |                    | 406.00       |                    | 332.00       |
|      |   | OR -----Rs per tonne----- |          |                    |              |                    |              |
|      |   |                           |          |                    | 21289        |                    | 20079        |
| 4.   | Marine insurance @0.35 of c&f price   |                           |          |                    | 75           |                    | 70           |
| 5.   | Landing charges @1% of c&f price  |                           |          |                    | 213          |                    | 201          |
| 6.   | <b>Import value (items 3+items 4+5)</b>   |                           |          |                    | <b>21576</b> |                    | <b>20350</b> |
| 7.   | Sales tax @ 15% of import value   |                           |          |                    | 3236         |                    | 3053         |
| 8.   | <b>Sales tax value ( STV )(items 6+7)</b>   |                           |          |                    | <b>24813</b> |                    | <b>23403</b> |
| 9.   | L/C opening charges @ 0.2% of c&f cost  |                           |          |                    | 43           |                    | 40           |
| 10.  | Mark up on retirement of documents by bank for 30 days @ 9.75% per annum of c&f cost        |                           |          |                    | 2076         |                    | 1958         |
| 11.  | Wharfage, handling and stevedoring charges  |                           |          |                    | 229          |                    | 229          |
| 12.  | Allowance for shortage and unforeseen expenses @ 1% of c&f cost                             |                           |          |                    | 213          |                    | 201          |
|      |   |                           |          |                    | 147          |                    | 126          |
| 13.  | Sindh Govt excise duty @ 0.5% of STV  |                           |          |                    | 124          |                    | 117          |
| 14.  | TCP's commission @ 2% of c&f cost   |                           |          |                    | 426          |                    | 402          |
| 15.  | Transport charges from Karachi to Lahore (b) including loading/unloading                    |                           |          |                    | 1300         |                    | 1300         |
| 16.  | Landed cost at Lahore (item 8+items 9 to 15)  |                           |          |                    | 29370        |                    | 27775        |
| 17.  | Less sales tax @ 15% on domestic production   |                           |          |                    | 4406         |                    | 4166         |
| 18.  | Cost of one tonne of imported sugar after deducting sale tax @ 15% of landed cost at Lahore |                           |          |                    | 24965        |                    | 23609        |
|      |   |                           |          |                    |              |                    |              |
|      |   | Punjab & NWFP             | Sindh    | Punjab & NWFP      | Sindh        | Punjab & NWFP      | Sindh        |
| 19.  | Processing cost of sugar (c)  | 8487.95                   | 8487.95  | 9781.07            | 9781.07      | 8026.93            | 8026.93      |
| 20.  | Value of cane to produce one tonne of sugar (item 18 minus item 19)                         | 16476.60                  | 16476.60 | 18986.79           | 18986.79     | 15581.69           | 15581.69     |
| 21.  | Provincial base recovery level (%)  | 8.50                      | 8.70     | 8.50               | 8.70         | 8.50               | 8.70         |
| 22.  | Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 21)           | 11.76                     | 11.49    | 11.76              | 11.49        | 11.76              | 11.49        |
| 23.  | Price of one tonne of sugarcane (item 20 / item 22) (Rs per tonne)                          | 1400.51                   | 1433.46  | 1613.88            | 1651.85      | 1324.44            | 1355.61      |
| 24.  | Price of 40 kgs of cane (item 23/25)  | 56.02                     | 57.34    | 64.56              | 66.07        | 52.98              | 54.22        |

## Sources:

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

## Notes:

- Worked out at the selling exchange rate of one US \$ = 60.48 Pak rupees, announced by State Bank of Pakistan as on July, 16, 2007.
- Assuming that imported sugar will be consumed at Lahore.
- 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**

| S.N | Item   | 2003-04 to 2005-06 |          | 2006- 07 (Oct-Jan)           |          | 13th August 2007 |          |
|-----|--|--------------------|----------|------------------------------|----------|------------------|----------|
| 1.  | Average fob (London) price   | 302                |          | US \$ per tonne ..... 356.00 |          | 282              |          |
| 2.  | Average fob Karachi price ( assuming equivalent to fob London price)   | OR 18316           |          | Rs. per tonne (a)..... 21591 |          | 17103            |          |
| 3.  | Transport charges from interior Sindh to port, special packing, inspection transit insurance, loading and unloading, clearing and forwarding agents commission (b) | 720                |          | 720                          |          | 720              |          |
| 4.  | Wharfage   | 50                 |          | 50                           |          | 50               |          |
| 5.  | Bank commission @ 1 % of fob price   | 183                |          | 216                          |          | 171              |          |
| 6.  | Pre- shipment inspection charges@ 0.5 of fob price   | 92                 |          | 108                          |          | 86               |          |
| 7.  | Ex-mill price of sugar ( item 2 minus items 3 through 6)   | 17272              |          | 20498                        |          | 16077            |          |
|     |  | Punjab & NWFP      | Sindh    | Punjab & NWFP                | Sindh    | Punjab & NWFP    | Sindh    |
| 8.  | Processing cost of sugar (c)   | 5872.33            | 5872.33  | 6969.16                      | 6969.16  | 5466.10          | 5466.10  |
| 9.  | Value of cane to produce one tonne of sugar (item 7 minus item 8)  | 11399.23           | 11399.23 | 13528.37                     | 13528.37 | 10610.66         | 10610.66 |
| 10. | Provincial base recovery level (%)   | 8.50               | 8.70     | 8.50                         | 8.70     | 8.50             | 8.70     |
| 11. | Quantity of cane in tonnes required to produce one tonne of sugar (100 / item 10)  | 11.76              | 11.49    | 11.76                        | 11.49    | 11.76            | 11.49    |
| 12. | Price of one tonne of sugarcane (item 9 / item 11) (Rs per tonne)  | 968.93             | 991.73   | 1149.91                      | 1176.97  | 901.91           | 923.13   |
| 13. | Price of 40 kgs of cane (item 12/25)   | 38.76              | 39.67    | 46.00                        | 47.08    | 36.08            | 36.93    |

## Sources:

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

## Notes:

- a) Worked out the buying exchange rate of one US \$ = 60.65 Pak rupees, announced by State Bank of Pakistan as on July, 16, 2007.
- b) Assuming that the surplus sugar will be exported from Sindh province.
- c) Ratio of cost of cane to processing cost has been estimated at 66:34 from publication " Cost of Production of Sugar " jointly prepared in 1996 by APCoM and Business & Consultancy Services.

**ECONOMIC EFFICIENCY OF RESOURCE USE IN SUGARCANE PRODUCTION IN PUNJAB**  
**POLICY ANALYSIS MATRIX (PAM)**  
 Based on import parity prices

| Description                         | Revenues | Traded cos | Domestic     |         |
|-------------------------------------|----------|------------|--------------|---------|
|                                     |          |            | Factors Cost | Profits |
| ----- Rupees per acre -----         |          |            |              |         |
| <b>1999-00</b>                      |          |            |              |         |
| Private Prices                      | 19393    | 5034       | 9399         | 4960    |
| Social Prices                       | 19687    | 4767       | 9193         | 5728    |
| Transfers                           | -294     | 267        | 207          | -768    |
| <b>2000-01</b>                      |          |            |              |         |
| Private Prices                      | 25309    | 5070       | 9862         | 10377   |
| Social Prices                       | 23818    | 4792       | 9595         | 9432    |
| Transfers                           | 1491     | 278        | 267          | 946     |
| <b>2001-02</b>                      |          |            |              |         |
| Private Prices                      | 20239    | 5946       | 11337        | 2956    |
| Social Prices                       | 21885    | 5339       | 11019        | 5528    |
| Transfers                           | -1646    | 608        | 318          | -2572   |
| <b>2002-03</b>                      |          |            |              |         |
| Private Prices                      | 19474    | 6060       | 12233        | 1180    |
| Social Prices                       | 21929    | 5437       | 11848        | 4644    |
| Transfers                           | -2455    | 623        | 385          | -3464   |
| <b>2003-04</b>                      |          |            |              |         |
| Private Prices                      | 19048    | 6604       | 12945        | -501    |
| Social Prices                       | 21725    | 5892       | 12522        | 3312    |
| Transfers                           | -2677    | 712        | 423          | -3812   |
| <b>2004-05</b>                      |          |            |              |         |
| Private Prices                      | 22436    | 7004       | 13654        | 1778    |
| Social Prices                       | 26454    | 6259       | 13058        | 7137    |
| Transfers                           | -4018    | 745        | 596          | -5359   |
| <b>2005-06</b>                      |          |            |              |         |
| Private Prices                      | 34016    | 7539       | 14642        | 11836   |
| Social Prices                       | 29908    | 6759       | 14525        | 8624    |
| Transfers                           | 4109     | 780        | 117          | 3212    |
| <b>2006-07</b>                      |          |            |              |         |
| Private Prices                      | 34042    | 9556       | 16622        | 7864    |
| Social Prices                       | 33724    | 8495       | 16385        | 8844    |
| Transfers                           | 318      | 1061       | 237          | -980    |
| <b>Average (1999-00 to 2006-07)</b> |          |            |              |         |
| Private Prices                      | 22845    | 6179       | 12115        | 4550    |
| Social Prices                       | 23630    | 5999       | 11680        | 5951    |
| Transfers                           | -784     | 181        | 435          | -1400   |

**ECONOMIC EFFICIENCY OF RESOURCE USE IN SUGARCANE PRODUCTION IN SINDH**  
**POLICY ANALYSIS MATRIX (PAM)**  
 Based on import parity prices

| Description                         | Revenues | Traded<br>Cost | Domestic<br>Factors'<br>Cost | Profits |
|-------------------------------------|----------|----------------|------------------------------|---------|
| ----- Rupees per acre -----         |          |                |                              |         |
| <b>1999-00</b>                      |          |                |                              |         |
| Private Prices                      | 28176    | 7493           | 10396                        | 10287   |
| Social Prices                       | 24360    | 7080           | 12592                        | 4689    |
| Transfers                           | 3815     | 413            | -2196                        | 5598    |
| <b>2000-01</b>                      |          |                |                              |         |
| Private Prices                      | 33753    | 7581           | 10945                        | 15227   |
| Social Prices                       | 29264    | 7152           | 13212                        | 8900    |
| Transfers                           | 4489     | 429            | -2267                        | 6327    |
| <b>2001-02</b>                      |          |                |                              |         |
| Private Prices                      | 31556    | 8543           | 11761                        | 11252   |
| Social Prices                       | 27399    | 7493           | 14032                        | 5874    |
| Transfers                           | 4156     | 1050           | -2272                        | 5378    |
| <b>2002-03</b>                      |          |                |                              |         |
| Private Prices                      | 23951    | 8793           | 12294                        | 2865    |
| Social Prices                       | 26837    | 7737           | 14701                        | 4399    |
| Transfers                           | -2887    | 1056           | -2408                        | -1534   |
| <b>2003-04</b>                      |          |                |                              |         |
| Private Prices                      | 23444    | 9323           | 13418                        | 703     |
| Social Prices                       | 26586    | 8211           | 15956                        | 2418    |
| Transfers                           | -3142    | 1112           | -2538                        | -1716   |
| <b>2004-05</b>                      |          |                |                              |         |
| Private Prices                      | 27838    | 9700           | 13636                        | 4502    |
| Social Prices                       | 32717    | 8507           | 16268                        | 7942    |
| Transfers                           | -4879    | 1193           | -2631                        | -3440   |
| <b>2005-06</b>                      |          |                |                              |         |
| Private Prices                      | 40682    | 10359          | 17238                        | 13085   |
| Social Prices                       | 45822    | 9020           | 20822                        | 15980   |
| Transfers                           | -5140    | 1339           | -3584                        | -2895   |
| <b>2006-07</b>                      |          |                |                              |         |
| Private Prices                      | 45414    | 12887          | 19019                        | 13508   |
| Social Prices                       | 41247    | 12108          | 22964                        | 6175    |
| Transfers                           | 4167     | 779            | -3944                        | 7332    |
| <b>Average (1999-00 to 2006-07)</b> |          |                |                              |         |
| Private Prices                      | 28119    | 8572           | 12075                        | 7472    |
| Social Prices                       | 27861    | 7697           | 14460                        | 5704    |
| Transfers                           | 259      | 875            | -2385                        | 1769    |

**ECONOMIC EFFICIENCY OF RESOURCE USE IN SUGARCANE PRODUCTION IN PUNJAB**  
**POLICY ANALYSIS MATRIX (PAM)**

Based on export parity prices

| Description                         | Revenues | Traded cost | Domestic<br>Factors Cost | Profits |
|-------------------------------------|----------|-------------|--------------------------|---------|
| ----- Rupees per acre -----         |          |             |                          |         |
| <b>1999-2000</b>                    |          |             |                          |         |
| Private Prices                      | 19393    | 5034        | 8939                     | 5420    |
| Social Prices                       | 12604    | 4219        | 8757                     | -371    |
| Transfers                           | 6789     | 815         | 182                      | 5791    |
| <b>2000-01</b>                      |          |             |                          |         |
| Private Prices                      | 25309    | 5070        | 9301                     | 10938   |
| Social Prices                       | 11890    | 4022        | 9079                     | -1211   |
| Transfers                           | 13419    | 1047        | 222                      | 12150   |
| <b>2001-02</b>                      |          |             |                          |         |
| Private Prices                      | 20239    | 5946        | 10772                    | 3521    |
| Social Prices                       | 11115    | 4354        | 10467                    | -3706   |
| Transfers                           | 9125     | 1593        | 305                      | 7227    |
| <b>2002-03</b>                      |          |             |                          |         |
| Private Prices                      | 19474    | 6060        | 11662                    | 1751    |
| Social Prices                       | 11236    | 4474        | 11295                    | -4532   |
| Transfers                           | 8237     | 1586        | 367                      | 6284    |
| <b>2003-04</b>                      |          |             |                          |         |
| Private Prices                      | 22439    | 6626        | 12307                    | 3506    |
| Social Prices                       | 14616    | 5057        | 11943                    | -2384   |
| Transfers                           | 7823     | 1569        | 364                      | 5890    |
| <b>2004-05</b>                      |          |             |                          |         |
| Private Prices                      | 22436    | 7004        | 13645                    | 1787    |
| Social Prices                       | 22360    | 5897        | 13004                    | 3458    |
| Transfers                           | 77       | 1107        | 641                      | -1671   |
| <b>2005-06</b>                      |          |             |                          |         |
| Private Prices                      | 34016    | 7539        | 14512                    | 11966   |
| Social Prices                       | 26737    | 6338        | 14461                    | 5938    |
| Transfers                           | 7279     | 1201        | 51                       | 6028    |
| <b>2006-07</b>                      |          |             |                          |         |
| Private Prices                      | 34296    | 9556        | 16480                    | 8261    |
| Social Prices                       | 25639    | 8058        | 14808                    | 2773    |
| Transfers                           | 8657     | 1498        | 1672                     | 5487    |
| <b>Average (1999-00 to 2006-07)</b> |          |             |                          |         |
| Private Prices                      | 23330    | 6183        | 11591                    | 5556    |
| Social Prices                       | 15794    | 4909        | 11287                    | -401    |
| Transfers                           | 7535     | 1274        | 305                      | 5957    |

**ECONOMIC EFFICIENCY OF RESOURCE USE IN SUGARCANE PRODUCTION IN SINDH**  
**POLICY ANALYSIS MATRIX (PAM)**  
 Based on export parity prices

| Description                         | Revenues | Traded cost | Domestic     | Profits |
|-------------------------------------|----------|-------------|--------------|---------|
|                                     |          |             | Factors Cost |         |
| ----- Rupees per acre -----         |          |             |              |         |
| <b>1999-2000</b>                    |          |             |              |         |
| Private Prices                      | 28176    | 7001        | 10396        | 10779   |
| Social Prices                       | 12149    | 6588        | 12592        | -7030   |
| Transfers                           | 16026    | 413         | -2196        | 17809   |
| <b>2000-01</b>                      |          |             |              |         |
| Private Prices                      | 33753    | 7059        | 10945        | 15749   |
| Social Prices                       | 15493    | 6630        | 13212        | -4349   |
| Transfers                           | 18260    | 429         | -2267        | 20098   |
| <b>2001-02</b>                      |          |             |              |         |
| Private Prices                      | 31556    | 8312        | 11760        | 11484   |
| Social Prices                       | 14153    | 6315        | 13856        | -6017   |
| Transfers                           | 17403    | 1997        | -2095        | 17501   |
| <b>2002-03</b>                      |          |             |              |         |
| Private Prices                      | 23951    | 8348        | 12293        | 3310    |
| Social Prices                       | 13712    | 7292        | 14701        | -8281   |
| Transfers                           | 10238    | 1056        | -2408        | 11591   |
| <b>2003-04</b>                      |          |             |              |         |
| Private Prices                      | 23444    | 8631        | 13083        | 1729    |
| Social Prices                       | 13591    | 7519        | 15638        | -9567   |
| Transfers                           | 9853     | 1112        | -2555        | 11296   |
| <b>2004-05</b>                      |          |             |              |         |
| Private Prices                      | 27838    | 9703        | 13638        | 4497    |
| Social Prices                       | 17804    | 8510        | 16336        | -7042   |
| Transfers                           | 10034    | 1193        | -2698        | 11538   |
| <b>2005-06</b>                      |          |             |              |         |
| Private Prices                      | 40682    | 10359       | 17807        | 12515   |
| Social Prices                       | 27070    | 9020        | 20342        | -2291   |
| Transfers                           | 13612    | 1339        | -2535        | 14807   |
| <b>2005-06</b>                      |          |             |              |         |
| Private Prices                      | 45414    | 12887       | 19691        | 12836   |
| Social Prices                       | 31975    | 12108       | 22364        | -2497   |
| Transfers                           | 13439    | 779         | -2672        | 15332   |
| <b>Average (1999-00 to 2004-05)</b> |          |             |              |         |
| Private Prices                      | 28296    | 8488        | 12846        | 6963    |
| Social Prices                       | 14661    | 7546        | 15240        | -8125   |
| Transfers                           | 13636    | 942         | -2393        | 15087   |

