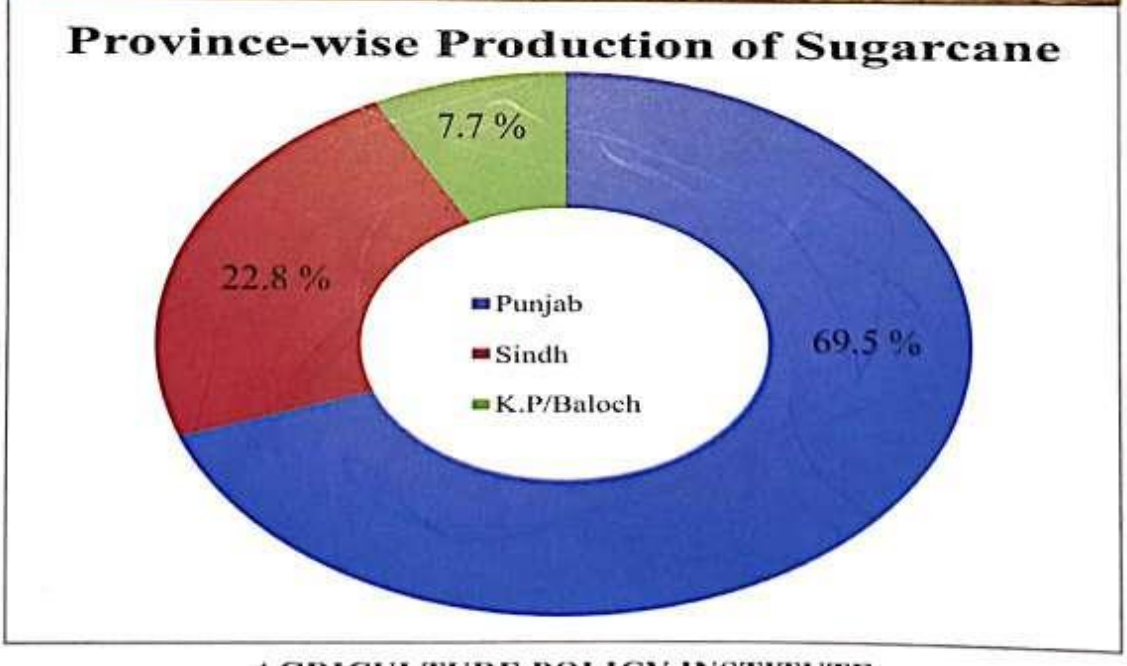
API SERIES NO. 278

SUGARCANE POLICY ANALYSIS FOR 2021-22 CROP



AGRICULTURE POLICY INSTITUTE
MINISTRY OF NATIONAL FOOD SECURITY AND RESEARCH
GOVERNMENT OF PAKISTAN
ISLAMABAD

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Preface

The fundamental objective of this report is to provide information on various economic aspects of the sugarcane crop. In this context for dynamic agricultural cost and price environment, price policy is increasingly becoming concern with anticipating future movements in agricultural production and prices and facilitating the adjustment process to those movements.

The Principal product of this institute is the economic analysis, which culminates in the recommendations to the Government with respect to minimum support price and other relevant aspects of price policy. These reports, in general, and this report, in particular, is the product of substantial background study; compilation of cost of production, widespread enquiry into markets, both at home and abroad; detailed analysis of international price data; technical studies (NPC, EPC, DRC); interviews of the farmers, including field visits; and consideration of a large number of non-price factors.

We as API, collectively owe thanks to all the committee members and participants of the various meetings, for their valuable discussion and input, Federal and Provincial Governments for sharing of information, without all that it would have not been possible to complete.

API greatly appreciates feedback and suggestions ranging from policy makers to planners, academia, researches, student community, growers/farmers associations, chambers of agriculture, traders etc. We are looking forward for a continued partnership in the formulation of price policy analysis and producing effective and applicable reports akin to agriculture and food security.

(Abdul Karim)
Director General

CONTENTS

ABBREVIATIONS

AARI	:	Ayub Agricultural Research Institute
API	:	Agriculture Policy Institute
BCR	:	Benefit Cost Ratio
C&R	:	Cost and Freight
CIF	:	Cost, Insurance and Freight
COP	:	Cost of Production
CPI	:	Consumer Price Index
DRC	:	Domestic Resource Cost
ECC	:	Economic Coordination Committee
E&M	:	Economics & Marketing
EPC	:	Effective Protection Coefficient
FAO	:	Food and Agriculture Organization
FOB	:	Free on Board
FSC&RD	:	Federal Seed Certification and Registration Department
FYM	:	Farm Yard Manure
HIES	:	Household Integrated Economic Survey
GDP	:	Gross Domestic Product
NARC	:	National Agricultural Research Centre
NFS&R	:	National Food Security and Research
NPC	:	Nominal Protection Coefficient
NSC	:	National Seed Council
OLS	:	Ordinary Least Squares
PARC	:	Pakistan Agricultural Research Council
PBS	:	Pakistan Bureau of Statistics
PSMA	:	Pakistan Sugar Mills Association
SRDB	:	Sugarcane Research and Development Board
TCP	:	Trading Corporation of Pakistan
WTO	:	World Trade Organization

SUMMARY FOR THE PROVINCES – SUGARCANE PRICE POLICY OPTIONS FOR 2021-22 CROP

Sugarcane enjoy a vital place in the economy of the country. Being a major cash crop, economy of the sugarcane is well integrated with cropping patterns in the main growing area of Punjab, Sindh and Khyber Pakhtunkhwa. The Agriculture Policy Institute (API) is providing technical input based on a number of economic factors including cost of production estimating to work out the indicative price of sugarcane every year for implementation by the Provincial Governments of Punjab, Sindh and Khyber Pakhtunkhwa. The provinces approve the indicative price of sugarcane in consultation with provincial stakeholders while the Provincial Sugarcane Commissioners implement the announced price of sugarcane in their respective provinces.

- **Likely Price Policy Options**

2. The API has carried out economic analysis for determining Indicative Price for Sugarcane 2021-22 Crop. Results of the analysis are summarized as below:-

Indicative Price Policy Options Based on	Sugarcane Price at Mill-gate (Rs per 40 kgs)	
	Punjab	Sindh
1. Cost of production of sugarcane	204.32	208.13
2. Indicative price for 2020-21 crop	200.00	202.00
3. Sugarcane prices worked back from average prices of sugar assumed for different slabs:		
a) Rs 85,000 per ton	231.51	239.24
b) Rs 90,000 per ton	245.13	253.31
c) Rs 95,000 per ton	258.75	267.38
d) Rs 100,000 per ton	272.37	281.45
4. Average price received by cane growers for 2020-21 Crop	250.00	272.00
5. Import Parity based on average fob London price of white sugar at US $ 500.61 /ton (September 2021).	344.59	356.08
6. Export Parity based on average fob London price of white sugar at US $ 500.61 /ton (September 2021).	218.02	225.29

- **Price Recommendations**

3. During 2020-21, the growers of sugarcane got higher prices than the indicative price announced by the Provincial Governments. The main reason of this remunerative price is short supply of cane to sugar mills in the initial days of crushing. Despite shrinking of area the production in Sindh has been increased due to improvement in yield. Production at country level has been surpassed by 16% of the target due to increase in area and production in Punjab.

availability for 2020-21 is estimated to 5.86 million tons. On the basis of domestic balance sheet, (HIES) 2018-19, consumption of sugar and World average sugar consumption at 24.60, 15.36 and 22.60 kgs per annum respectively, the domestic requirement for a population of 226.52 million has been worked at 5.57, 3.48 and 5.12 million tons for 2020-21. Based on the analysis, there would be an estimated surplus stocks of 0.28 million 2.38 and 0.75 million tons available during 2020-21.

5. Based on field survey major producing districts of Punjab and Sindh, the cost of production of estimates are worked out as following:

Province	2020-21	2021-22	Change (%)
Punjab	194.02	204.32	5.31
Sindh	194.46	208.13	7.03

6. This increase in COP estimates is mainly attributed to sharp increase in the price of fertilizer input, wage rate and custom hire rates, etc. However it is worth concerning that the price of sugar has increased much higher (19.33%) over the last one year.

7. The monthly average wholesale prices of sugar prevailing in major domestic markets of Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets during 2020 and 2021 (Jan - Aug) have shown upward trend. In case of average monthly wholesale prices lowest price observed in Hyderabad Market in the month of January 2021 to Rs 8,300 per 100 kgs and the highest price were reported in Lahore market during months of May-Jun to Rs 9,500 per 100 kgs The overall average of sugar price at country level ranged between Rs 7,217 to Rs 9,361 per 100 kgs during 2020-21.

8. Keeping in view the prevailing scenario and the analysis of different economic parameters such as cost of production, parity prices of sugar, prices of sugarcane realized by the growers during 2021-21, domestic and international market prices of sugar concludes that the prices of sugarcane are moving upward in the country.

9. The consistent increase in CPI during 2015-16 to 2020-21, which indicates that the real value of the commodity whether at indicative or the Market price is declining. Hence, it may be concluded that to ensure flow of smooth returns to farmer, the inflationary trend needs to be controlled/slowed down.

SUGARCANE POLICY ANALYSIS 2021-22 CROP

EXECUTIVE SUMMARY AND RECOMENDATIONS

INTRODUCTION

Sugarcane is a high-valued second largest agro industrial based cash crop which is mostly used for producing refined sugar. Its production accounts for 3.4 percent in agriculture's value addition and 0.7 percent in GDP. During 2020-21, the crop was cultivated on 1,165 thousand hectares, an increase of 12.0 percent compared to last year's sown area of 1,040 thousand hectares. Production increased by 22.0 percent to 81.009 million tons against 66.380 million tons last year.

It is cultivated in the tropical and subtropical regions, in Pakistan sugarcane is cultivated mainly in all over the country. However, main producing provinces are Punjab and Sindh. Sugarcane is also cultivated in K.P Along with sugar beet. Climatic conditions of lower Sindh are more favorable having hot and semi-humid climate.

Sugarcane provides raw material to second largest agro based sugar industry located in the country side provides employment opportunities for rural labours. The sugar industry also provides raw material to allied industries like, sugar mills also provide electricity to WAPDA during winter.

The sugarcane production, marketing and processing, continue to be confronted with a host of problems. The Government and sugar mills have to work together and resolve the problems in production and marketing, because a healthy industry is in the interest of national economy while a sick industry cannot play effective role in the crop development.

Because of inefficiency in the delivery system, especially, in the normal/ bumper crop, sugarcane loses weight upto 21 per cent with a time lag of 6 days between harvest and crushing. Five to ten per cent sucrose may be lost if cane is crushed with 60 hours delay. The recovery of sugar can be improved by reducing the time lag between harvesting and crushing of cane. For further improvement Gur may also be manufactured in sugar factory to avoid the juice losses which occurred in ordinary juice extractor for gur making.

The major problem of the sugarcane sector in Pakistan is low sugarcane yield and low sucrose content. The role of sugarcane planter and harvester in production of sugarcane as well as in cost of production is important elements. The development of sugarcane planters and harvesters on cheap prices may be initiated at the country level for improvement in sugarcane and sugar production.

- ECONOMICS OF SUGARCANE AND COMPETING CROPS

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.

PUNJAB

Sugarcane growers' returns to overall investment, based on the market prices, remained higher for sugarcane, which performed better than the entire crop combinations. Only cotton combinations can compete with Sugarcane and performed better in terms of returns to irrigation water. In terms of returns to crop duration, Basmati+sunflower combination could show the nearest level while rest of combinations remained far behind the sugarcane. IRRI combinations, however, remained far below the sugarcane in rest of entire criteria analyzed in this case.

SINDH

Sugarcane observed performing better than the cotton combinations with wheat and sunflower, specifically in terms of output-input ratio and returns to purchased inputs. However, cotton combinations remained better than the earlier crop in giving returns to grower in terms of crop duration and irrigation water used. Sugarcane also performed better than IRRI combinations in terms of returns to purchased inputs and irrigation water, but its performance remained low in context of output-input ratio and crop duration notably.

- **MARKETING OF SUGARCANE**

Sugarcane, the second largest agro based crop sown on all the provinces throughout the country and plays a key role in the national economy. But both in production and processing sugarcane is portraying a number of distortions and inefficiencies. Resultantly, the production of sugarcane and sugar not sustained.

- **DELAYED PAYMENTS**

As per law the payments to cane should be made within two weeks but as the season progresses to the end, the payments are delayed by months and in some cases by seasons. During 2020-21 crop, demand was higher, therefore, the sugar mills made payments timely even than number of farmers have supplied cane through middlemen for prompt payment and also due to fear that the payment could be delayed at the end of season. However in Upper Sindh farmer reported that mills have deducted Rs 5/40kgs for prompt payment, locally it was called "Gati".

- **UNDERWEIGHMENT**

Underweighment is used to be a complaint of farmers during normal and bumper crop that there was underweighment of cane at the purchase centers and mills gates. The sugar mills are making deductions on the plea that poor quality cane with high trash contents is being supplied by the farmers. However during the current season due to above mentioned reason, these complaints were not reported widely by the farmers.

- **PRESENCE OF MIDDLEMEN**

Due to mistrust between farmers and sugar mills and all above mentioned reason, the role of middleman becomes stronger and increasing day by day in sugarcane business. Although mills have paid cane price promptly even than farmers especially small farmers supplied cane to middlemen.

- **USE OF SUGARCANE CESS FUND**

On the repeated suggestion of Agriculture Prices Commission presently Agriculture Policy Institute in the Sugarcane Policy Reports that the sugarcane cess fund which was utilized for the construction and improvement of roads in the sugar mills areas may be used for sugarcane research also. The Government of Punjab has allocated 10 per cent of cess fund for research and development of sugarcane.

- **IMPROVING PRODUCTIVITY**

The raw material requirement of sugar industry comprising 89 sugar mills, with crushing capacity of about 350 thousand tons per day, has been met through expanding acreage under sugarcane crop

- **VARIETAL DEVELOPMENT**

Development of new varieties of sugarcane is a lengthy process requiring primarily the sugarcane fuzz either through its local production or imports from abroad.

- **SUGARCANE SEED CERTIFICATION PROCESS IN PUNJAB**

The Government of Punjab has started a process of newly approved sugarcane seed certification process (Seed Standards, tagging process) of FSC & RD by involving government intuitions, PSC, Sugar Mills, private seed companies etc, The implementation of the concept of certified seed (healthy, pure, true to type and site specific) sugarcane seed production, multiplication and distributions) has been assigned to the Sugarcane Research Institute (SRI), Faisalabad.

- **BALANCED USE OF FERTILIZERS**

Chemical fertilizers play an important role in enhancing crop productivity but real key for getting maximum returns from the investment on fertilizers is their balanced and timely application.

SUGARCANE POLICY ANALYSIS FOR 2021-22 CROP

INTRODUCTION

Sugarcane is a high valued cash crop which contains high concentration of sucrose and grown for its sucrose contents which mostly used as refined sugar. It is second largest agro-industry sector after textile. Its production accounts for 3.4 percent in agriculture's value addition and 0.7 percent in GDP. During 2020-21, the crop was cultivated on 1,165 thousand hectares, an increase of 12.0 percent compared to last year's sown area of 1,040 thousand hectares. Production increased by 22.0 percent to 81.009 million tons against 66.380 million last year. The crop experienced a significant increase in area under cultivation and yield. It was mainly due to favourable weather conditions, better management, timely availability of quality inputs and higher economic returns.

2. It is cultivated in the tropical and subtropical regions of the World. In Pakistan sugarcane is cultivated mainly in the districts of Jhang, Faisalabad, Sargodha, Kasur, and T.T Singh of Punjab; Hyderabad, Badin and Thatta of Sindh; and Charsadda and Mardan of KP Climatic conditions of lower Sindh are more favorable having hot and semi-humid climate.

3. Sugar industry located in the country side provides employment opportunities for rural labours, skilled and semi- skilled. It generates revenue for government through taxes and levies. The industry also provides raw material to allied industries like, molasses to distilleries for ethanol, organic fertilizer cheap board industry etc. Besides these products, sugar mills also provide electricity to WAPDA during winter.

4. The sugarcane crop and sugar industry play an important role in the economy, however the production of sugarcane and sugar host a number of problems. The Government and sugar mills have to work together and resolve the problems in production and marketing. To meet the emerging issues in sugar sector, the mills can promote production of sugarcane through research and development efforts and technical guidance to the farmers and the farmers at the same time must appreciate that a healthy industry is in their own interest while a sick industry cannot play effective role in the crop development.

5. Because of inefficiency in the delivery system, especially, in the normal/bumper crop, sugarcane loses weight upto 21 per cent with a time lag of 6 days between harvesting and crushing. Five to ten per cent sucrose may be lost if cane is crushed with 60 hours delay. The problem of long waiting time is strengthening due to presence of middlemen. At middlemen's purchase centers, small growers bring their produce in small quantities, the middlemen wait to fill a large size trolly and also wait for good price offered from sugar mills. The situation went more worst when cane supplied from Punjab to Lower Sindh as reported during the current season.

6. In order to improve recovery of sugar, the time lag between harvesting and crushing of cane should be reduced. This will require reduction in the waiting time at mill gate. The mills should be obliged to pay compensation to the growers beyond fixed time duration. This compensation may also be consider in delayed payments.

7. The Gur is being produced in Punjab, Sindh at small scale and Khyber Pakhtunkhwa at large scale. Some studies have shown that 30 to 50 per cent juice is wasted in ordinary crusher in the Gur making process which is a national loss. About 50 per cent more Gur can be produced if manufactured in sugar factories.

8. The major problem of the sugarcane sector in Pakistan is low sugarcane yield and low sucrose content. The sucrose and production also varies area wise mainly due to cane verities, soil types, canal water availability and climate. This indicates that more emphasis should be given to research and development of high yielding verities in terms of sucrose and yield. The role of sugarcane planter and harvester in production of sugarcane as well as in cost of production is important element. The Pakistan Agriculture Research Council may carried out research on the development of sugarcane planters and harvesters on cheap price.

9. In view of the importance of the sugarcane and sugar for the economy, the indicative price of sugarcane is annually reviewed by the Agriculture Policy Institute (API), Ministry of National Food Security and Research and shown with provinces for fixation and implementation of price. For the formulation of policy proposals for 2021-22 sugarcane crop, the following steps were taken by the API.

i) To update the cost of inputs and cultural operations, a field survey was conducted in the important sugarcane regions of Punjab and Sindh. During the course of survey detailed discussions were also held with the growers, crop experts and mill management on issues relating to production and marketing of sugarcane.

ii) Annual meeting of API Committee on sugarcane was held. The meeting attended by researchers, progressive growers, representative of farmers associations, sugar industry and senior officers of provincial agriculture extension departments. The participants discussed at length issues concerning with cultivation and marketing of sugarcane, current crises of sugar industry and future prospectus. The views expressed in the meeting have been dully considered in formulating proposal contained in this report.

iii) The data on area, yield, production and prices of sugarcane; domestic as well as world production, demand, stocks, prices and trade of sugar were collected from various relevant sources and analyzed.

2. SUGARCANE PLANTING AND HARVESTING SEASONS

10. Sugarcane is a tropical crop which requires temperature 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. The recommended times of planting the spring and autumn crops of sugarcane, by province are given in Table-1.

Table-1: Planting and Harvesting Times of Sugarcane by Province

Province	Planting Time	
	Spring Crop	**Autumn Crop**
Punjab	15th February to 3rd week of March	September
Sindh	1st February to 15th March	September to 15th October
K.P	15th February to 3rd week of March	September
	Harvesting Time	
Punjab, Sindh, KP	15th October to 1st March	

Source: Sugarcane Coordinator, NARC, Islamabad.

3. PROVINCIAL SHARES IN AREA AND PRODUCTION OF SUGARCANE

11. Provincial shares in area and production of sugarcane have been discussed below:

3.1 Area and Production

12. Shares of area and production of sugarcane during the periods 2010-11 to 2012-13 and 2018-19 to 2020-21 and changes therein are presented in Table-2 below:

Table-2: Comparison of Provincial Shares in Area and Production of Sugarcane: 2010-11 to 2012-13 and 2018-19 to 2020-21

Country/Province	Area			Production		
	Average 2010-11 to 2012-13	**Average 2018-19 to 2020-21**	**Change**	**Average 2010-11 to 2012-13**	**Average 2018-19 to 2020-21**	**Change**
	---------- Percent ----------					
Pakistan	**100.00**	**100.00**	**-**	**100.00**	**100.00**	**-**
Punjab	69.35	64.43	-7.1	69.51	67.67	-2.7
Sindh	21.11	25.56	21.1	22.83	24.35	6.6
KPK/Balochistan	9.54	10.02	5.0	7.65	7.98	4.3

Source: Worked out from Annex-I.

13. The change in area in Punjab, Sindh and KPK/Balochistan share 64, 26 and 10 percent respectively and 68, 24 and 8 percent in production respectively. Over time share of Punjab has gone down by 7.1 percent in area and 2.7 percent in production. While in Sindh both share of area and production has been increased by 21.1 and 6.6 percent respectively. In the KPK/Balochistan, area and production is also up by 5.0 and 4.3 percent. The graphical presentation of provincial shares are also depicted in Figures 1 to 4.

FIG-1: SHARES IN AREA

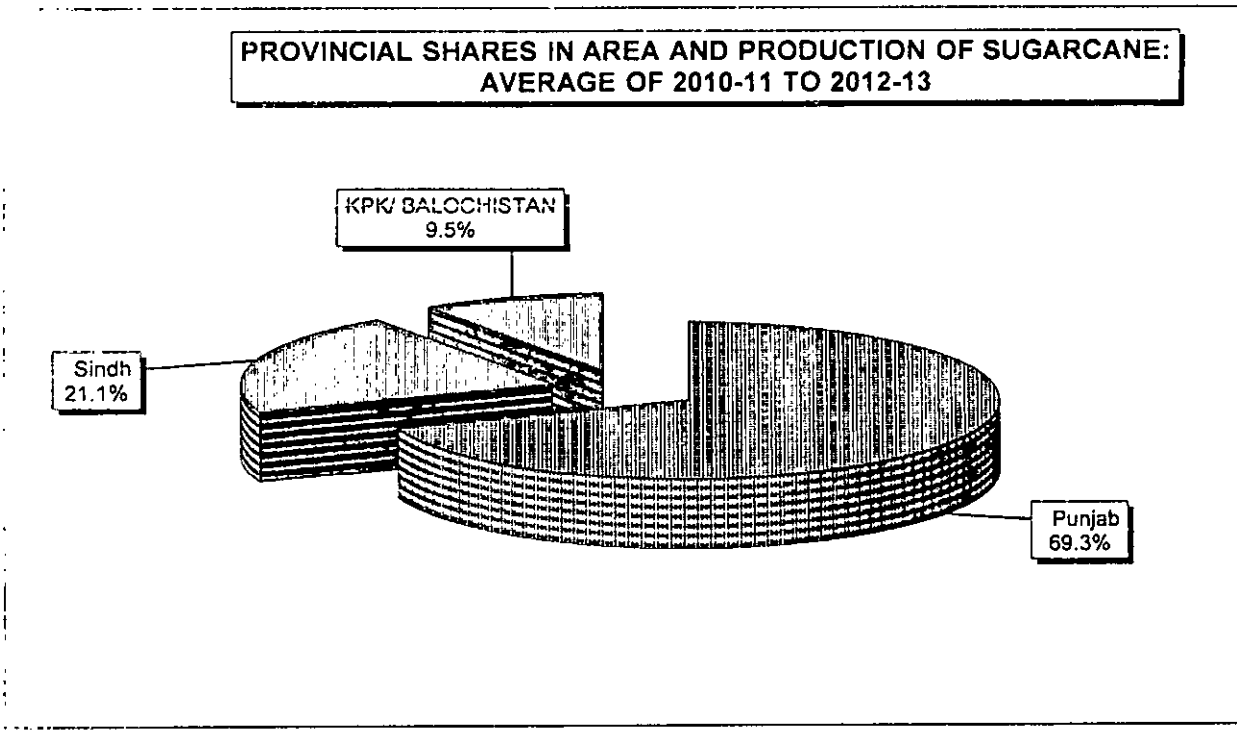
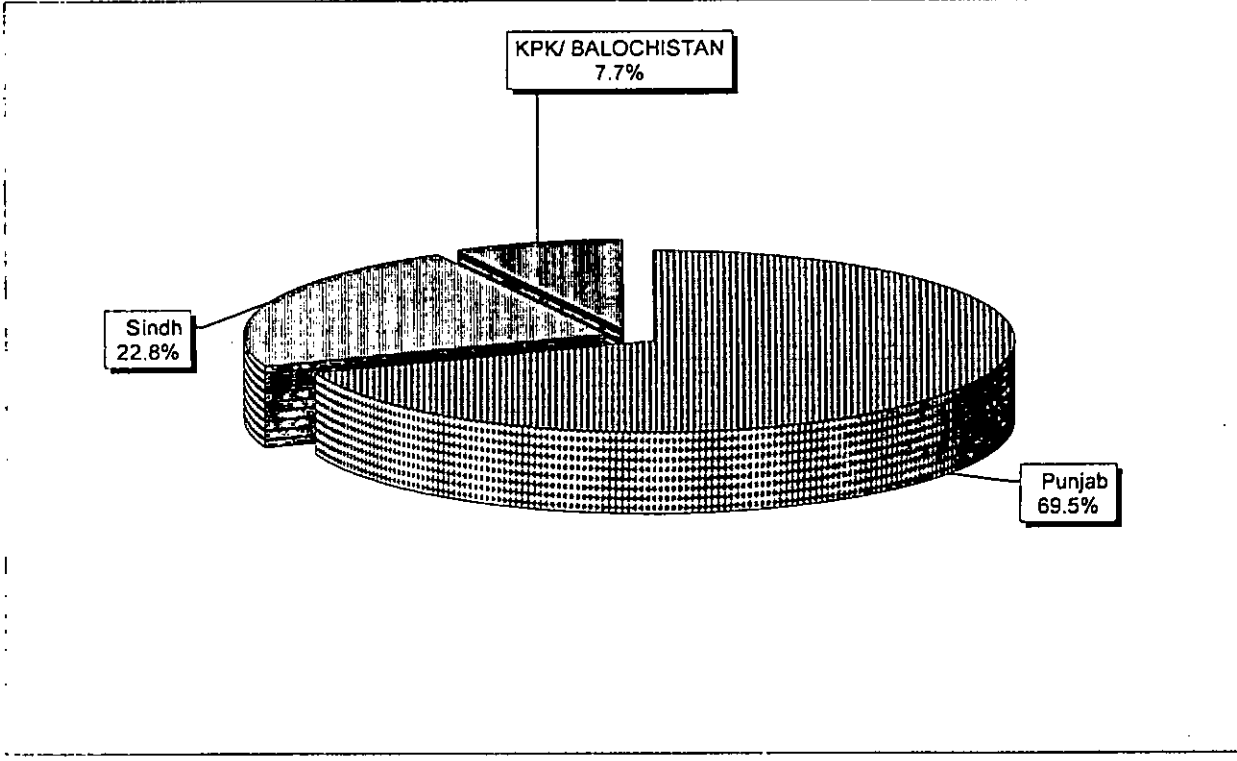


FIG-2: SHARES IN PRODUCTION



SOURCE: TABLE-2

FIG-3: SHARES IN AREA

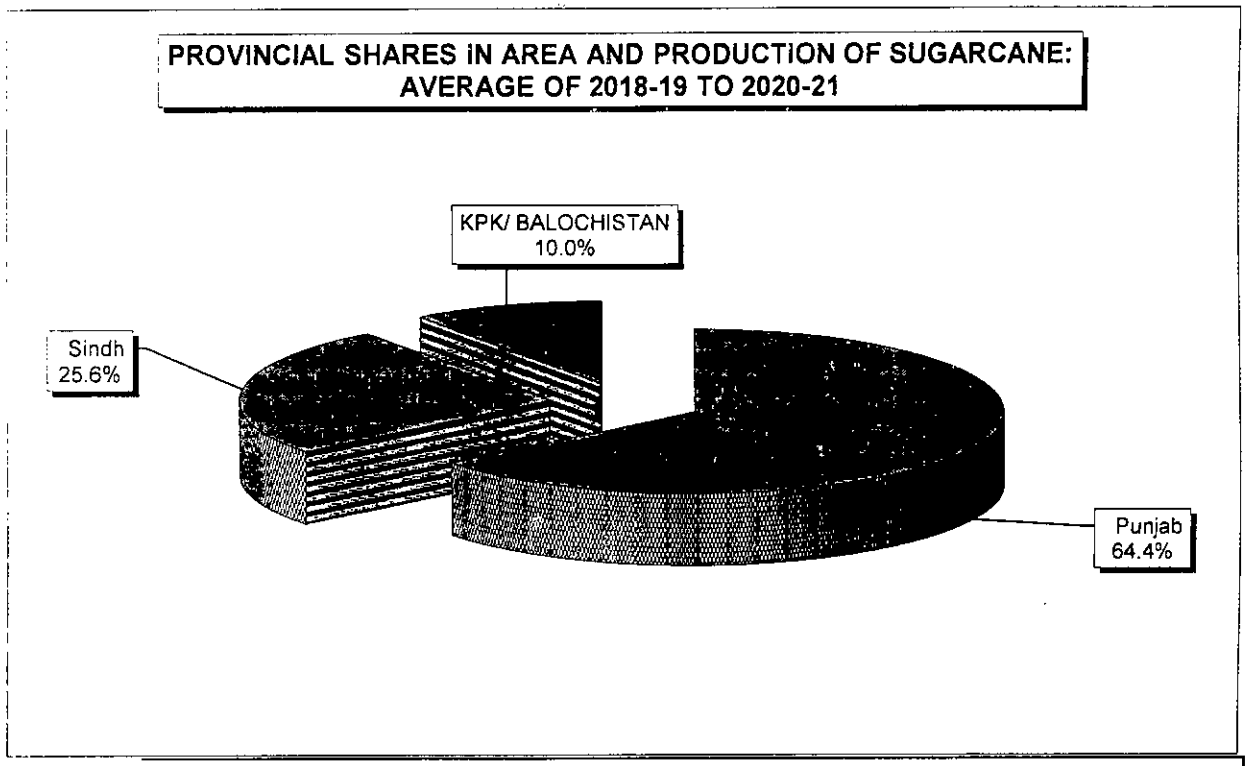
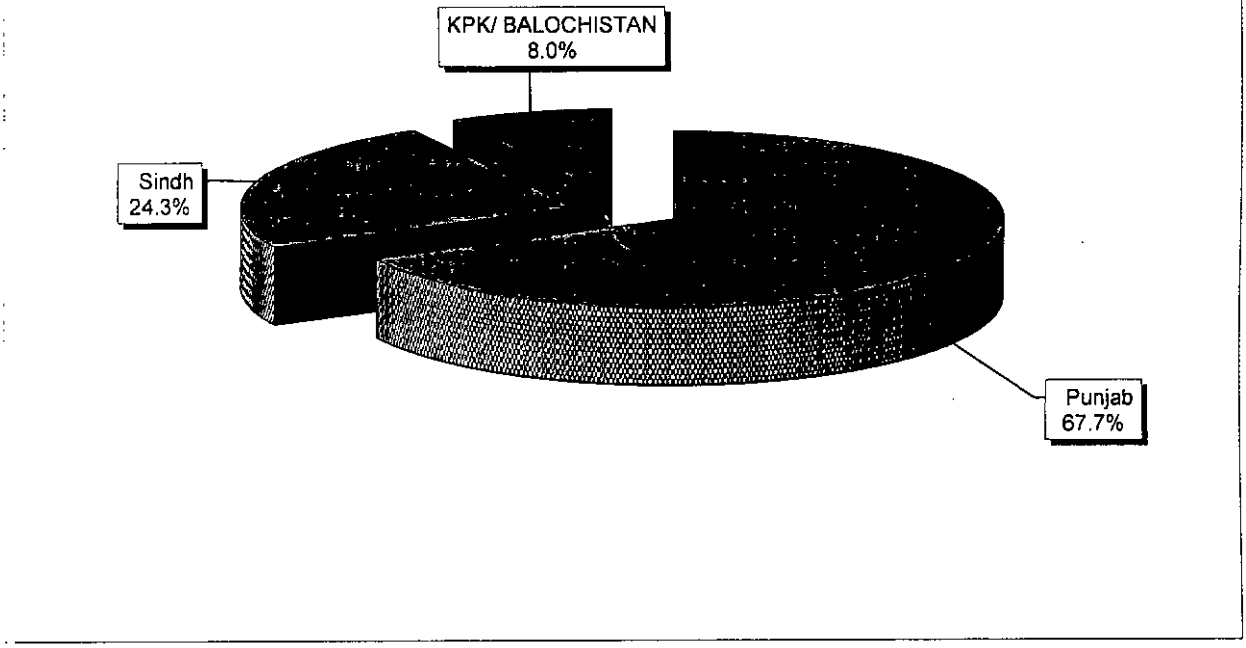


FIG-4: SHARES IN PRODUCTION



SOURCE: TABLE-2

4. IMPORTANT SUGARCANE PRODUCING DISTRICTS

14. Sugarcane is a high delta crop, grown in irrigated conditions. Districts which grow 100 thousand tons or more of sugarcane are R.Y.Khan, Faisalabad, Sargodha, Muzaffargarh, Rajanpur, Jhang, Chiniot, T.T Singh, Bhakkar, Kasur, M.B Din, Bahawalpur, Layyah, Vehari, Bahawalnagar, D.G.Khan, Nankana Sahib, Okara, Khanewal, Khushab, Hafizabad, Lodhran, Multan, Mianwali, Sahiwal, Sheikhpura, and Gujrat in Punjab and Ghotki, Thatta, Nawabshah, N.Feroze, Khairpur, Badin, Tando Allahyar, Tando Muhammad Khan, Mirpur Khas, Matiari, Sanghar, Badin, Sukkur, Dadu and Hyderabad in Sindh while Charsadda, D.I Khan, Mardan, Peshawar, Malakand and Nowshera, from KP. These 47 districts; 27 from the Punjab, 14 from Sindh and 6 from KP collectively account for 99 per cent of the sugarcane area and production (Annex-III).

15. However, 23 districts, namely, R.Y.Khan, Faisalabad, Sargodha, Muzaffargarh, Rajanpur, Jhang, Chiniot, T.T Singh, Bhakkar, Kasur, M.B Din, Bahawalpur, Layyah, Ghotki, Thatta, Nawabshah, N.Feroze, Khairpur, Badin, Tando Allahyar, Charsadda, D.I Khan and Mardan collectively produce 83 per cent of the total sugarcane production in the country.

5 CHANGES IN AREA, YIELD AND PRODUCTION

16. Throughout the decade ending 2020-21 area under sugarcane at country level ranged between 987.7 to 1,341.8 thousand hectares (2,440.7 and 3,315.6 thousand acres) and production from 55.309 to 83.333 million tons. Yield of sugarcane fluctuated between 55.09 to 69.53 per tons per hectares (Annex-II and III).

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

5.1 Long-term Changes (Growth rates): 2010-11 to 2020-21

18. During the above mentioned period sugarcane production in Pakistan increased by 2.9 per cent per annum mainly due to improvement in yield by 2.0 per cent and area expansion by 0.9 per cent (Table-3).

Table-3: Average Annual Growth Rate of Area, Yield and Production of Sugarcane: 2010-11 to 2020-21

Country/Province	Area	Yield	Production
	Percent per annum		
Pakistan	**0.9**	**2.0**	**2.9**
Punjab	0.1	2.5	2.7
Sindh	3.0	0.6	3.6
KP	1.6	1.8	3.5
Balochistan	4.1	0.6	4.8

Source: Worked out from Annex-I.

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

19. The area, yield and production has been increased in all province during the period under review. Sugarcane production in Punjab during the period under reference has increased by 2.7 per cent per annum as a result of 2.5 per cent improvement in yield and 0.1 per cent expansion in area. Sugarcane production in Sindh has also increased mainly due to expansion in area by 3.0 per cent and 0.6 per cent improvement in yield. While in K.P area and production has also been increased by 1.6 and 3.5 per cent respectively followed by 1.8 per cent improvement in yield.

20. As far as Balochistan is concerned the area and production has been increased significantly by 4.1 and 4.8 per cent respectively while improvement in yield is stagnant at 0.6 per cent.

5.2 Short-term Changes: 2019-20 and 2020-21 Crops

21. According to final estimates of Provincial Crop Reporting Services, sugarcane production at country level for 2020-21 crop is reported at 81.010 million tons reflecting an increase of 22.0 per cent over last year production of 66.380 million tons. Increase in production is attributed by 12.0 and 8.9 per cent rise in area and yield respectively (Table-4).

Table-4: Area, Yield and Production of Sugarcane: 2019-20 versus 2020-21 Crops

Country/ Province	Area		Changes	Yield		Changes	Production		Changes
	2019-20	2020-21		2019-20	2020-21		2019-20	2020-21	
	000 ha		Per cent	tons per ha		Per cent	000 tons		Per cent
Pakistan	**1,039.8**	**1,165.0**	**12.0**	**63.8**	**69.5**	**8.9**	**66,379.6**	**81,009.6**	**22.0**
Punjab	643.4	777.0	20.8	67.4	73.4	8.9	43,346.6	57,000.0	31.5
Sindh	286.1	279.7	-2.2	60.2	65.6	8.8	17,233.8	18,335.5	6.4
KP	109.4	107.4	-1.8	52.6	52.4	-0.4	5,754.0	5,627.5	-2.2
Baloch.	0.89	0.92	3.4	50.8	50.7	-0.3	45.2	46.6	3.1

Source: Annex-I.

22. Sugarcane production for 2020-21 in Punjab is reported at 57.000 million tons which shows a significant increase of 31.5 per cent over the last year. The increase mainly arisen due to 20.8 and 8.9 per cent increase in area and yield.

23. Sindh sugarcane production for 2020-21 crop, increased by 6.4 per cent over the previous year. This escalation is attributed only due to 8.8 per cent rise in yield, because area has reduced by 2.2 per cent against last year.

24. In KP, production decreased by 2.2 per cent due to 1.8 and 0.4 per cent declined in area and yield respectively.

25. Balochistan production is also increased 3.1 per cent due to expansion in area by 3.4 per cent in area and yield has decreased slightly by 0.3 per cent.

6. TARGETS VS ACHIEVEMENTS: 2020-21 CROP

26. The Federal Committee for Agriculture (FCA) fixed sugarcane production target for 2020-21 crop at 69.802 million tons. As per final estimates of the Provincial Departments sugarcane production from 2020-21 crop is reported at 81.010 million tons (16.1 per cent higher than the target). This is achievement 17.6 per cent is only due to improvement in yield inspite of reduction of area by 1.3 per cent (Table-5).

Table-5: Targets and Estimated Achievements of Area, Yield and Production of Sugarcane: 2020-21 Crop

Country/ Province	Area		Deviation from the target	Yield		Deviation from the target	Production		Deviation from the target
	Target	Achieve-ment		Target	Achiev e-ment		Target	Achieve-ment	
	--- 000 hec ----		Per cent	Tons/hec		Per cent	-- 000 tons --		Per cent
Pakistan	**1,180.6**	**1,165.0**	**-1.3**	**59.1**	**69.5**	**17.6**	**69,801.5**	**81,009.6**	**16.1**
Punjab	752.7	777.0	3.2	59.7	73.4	23.0	44,906.0	57,000.0	26.9
Sindh	310.0	279.7	-9.8	61.3	65.6	7.0	19,000.0	18,335.5	-3.5
KP	117.0	107.4	-8.2	50.0	52.4	4.8	5,850.0	5,627.5	-3.8
Baluchistan	0.9	0.9	2.2	50.6	50.7	0.2	45.5	46.6	2.4

Sources:

1. For Targets FCA, NFS&R, Islamabad
2. For Achievements: Annex-II.

27. In Punjab province, sugarcane area and production surpassed the targets by 3.2 per cent and 26.9 per cent respectively. In case of Sindh could not achieve the area and production target by 9.8 and 3.5 per cent respectively inspite of improvement in yield by 7 per cent. K.P has followed the same pattern as of Sindh and could achieved the target of area and production by 8.2 and 3.8 per cent although yield has been improved by 4.8 per cent. Balochistan successful improve the target in area, production and yield by 2.2, 2.4 and 0.2 per cent against the targets fixed by FCA.

7. COST OF PRODUCTION OF SUGARCANE

28. Cost of production is an important factor in evolving suggestions for indicative price of the sugarcane crop. Its importance is well acknowledged due to wide spread impact of government policies on input prices. Different government policy initiatives may effect inflation and alter subsidy and tax structure for agricultural inputs which eventually tend to change cost of production of crops.

29. Agriculture Policy Institute every year collects field data on different elements to assess cost of production of the concerned crop. These estimates provide guidance in determining indicative price of the concerned crop.

30. Cost of production estimates of sugarcane for 2021-22 crop in Punjab and Sindh are determined using customary input-output parameters adopted within API.

31. In this section, different inputs like seed, fertilizer, number of sprays, number of irrigations (tube well and canal) and number of tractor run operations made for preparing soil and sowing seed and number of hoeings are used to forecast cost of production for 2021-22 sugarcane crop. Their physical usages (quantities) are those revised for 2020-21 along with the respective prices and hiring rates for the above referred tractor operations in the major sugarcane producing districts/regions of the Punjab and Sindh.

32. Consolidated summary of cost of production of sugarcane for 2021-22 crop for Punjab and Sindh are produced in Table-6 to Table-8 while background data are placed in Annex-IV and Annex-V.

33. In the following paragraphs, peculiar features of cost of production estimates as mentioned above are described for comparison with the previous crop estimates.

7.1 Cost of Different Inputs and Operations in Punjab and Sindh

34. Following paragraphs present decomposition of cost of production into its constituent parts to assess main ingredients of cost of production during 2021-22. Table-6 produces the said data for 2020-21 and prospectively for 2021-22.

35. It is visible from data in Table-6 (column-6) that in Punjab, land rent (32%) would be the major cost component during 2021-22, which is followed by fertilizers (16.7%). Third major item is Seed & sowing operations (14.6%) while cost of harvesting, stripping, binding and loading of cane stands at 11.7% of total cost of cultivation. 'Other costs' would make about 8.3% of the total. Land and seed bed preparation is about 6.8% and Irrigation is 6.9% while the interculture and plant protection make 3.25%.

36. Component wise cost of production in Sindh (Table-6) indicates that land rent is about to make maximum part of total cost of cultivation of sugarcane, estimated to take about 31%. Next higher item would be 'seed and sowing operations' (16.5%), followed by fertilizers including application (15.4%). 'Other costs' which include mark-up on capital, management charges, land tax, land revenue, Road Cess, etc are likely to carry about 9.5% of the cost of cultivation in 2021-22. Land and seed bed preparation and Harvesting, stripping, binding and loading of cane are about 8.4 and 9%, respectively. Rest of the cost items like Plant protection and Interculture and Irrigation show a share of approximately 10.3% combined.

37. Last column of Table-6 shows per cent change in each component over the last year, which also support the above findings.

Table-6: Cost of Major Items of Sugarcane: 2020-21 versus 2021-22 Crops

Summary of cost of production estimates for sugarcane in Punjab					
Major operation	2020-21	Share	2021-22	Share	Change over 2020-21
	Rs/acre	%	Rs/acre	%	%
1. Land and seed bed preparation	10,389	8.46	9,200	6.79	(11.44)
2. Seed and sowing operations	15,000	12.21	19,800	14.62	32.00
3 Plant protection and interculture	4,875	3.97	4,400	3.25	(9.74)
4. Irrigation	8,820	7.18	9,325	6.88	5.73
5. Fertilizer & FYM includ TPT & app	19,187	15.62	22,625	16.70	17.92
6. Land rent	37,917	30.86	43,333	31.99	14.29
7. Harvesting, stripping, binding, loading	15,400	12.53	15,840	11.69	2.86
8. Other costs	11,278	9.18	11,195	8.26	(0.74)
9. Gross cost of cultivation	122,866	100.00	135,468	100.00	10.26
10 Subsidy on DAP +value of tops	-	-	2,400	-	-
11 Net cost of cultivation	122,866		133,068	-	8.30
12 Yield (Kgs/acre)	700.00		720.00		2.86
13 Cost of Production at mill gate (Kgs/40 kgs	194.02		204.32		

Source: Annex-IV

Summary of cost of production estimates for sugarcane in Sindh					
Major operation	2020-21	Share	2021-22	Share	Change over 2020-21
	Rs/acre	%	Rs/acre	%	%
1. Land and seed bed preparation	11,024	9.49	11,010	8.40	(0.13)
2. Seed and sowing operations	20,165	17.36	21,600	16.49	7.12
3. Irrigation	3,899	3.36	4,078	3.11	4.59
4 Plant protection and interculture	8,895	7.66	9,465	7.22	6.41
5. Fertilizer & FYM including TPT & app	16,774	14.44	20,224	15.44	20.57
6. Land rent	32,500	27.99	40,625	31.01	25.00
7. Harvesting, stripping, binding, loading	11,220	9.66	11,560	8.82	3.03
8. Other costs	11,653	10.03	12,445	9.50	6.79
9. Gross cost of cultivation	116,130	100.00	131,008	100.00	12.81
10 Subsidy on DAP value of tops	-	-	2,400	-	-
11 Net cost of cultivation	116,130		128,608		10.74
12 Yield (Kgs/acre)	660.00		680.00		3.03
13 Cost of Production at mill gate (Kgs/40 kgs)	194.46		208.13		7.03

Source: Annex-V

- **Punjab**

38. From the data presented in Table-7 below, it may be seen that the unit cost of cultivating one acre of sugarcane inclusive of land rent during 2021-22 in Punjab province is likely to be Rs. 133,068. After incorporating the subsidy on fertilizers Rs. 900/bag and value of tops Rs. 1500/acre this ultimately ends in cultivation cost/40 kg at farm level as Rs 184.82/40 Kg with land rent and Rs 124.63 without land rent. By adding marketing cost @ Rs 19/40 kg to these estimates, the cost of production per 40 kg of sugarcane at the mill gate estimates to Rs 204.32 with land rent and Rs 144/40 kg without land rent.

39. Main reasons for rise in cost of cultivation of sugarcane in Punjab (10.3%) could be viewed from the Table-6. Column-6 of this table gives percentage change in different components of cost of cultivation against the last year. It is clear that major contributors of this increase during 2021-22 are seed and sowing operation (32%) followed by other cost i.e. irrigation, interculture, plant protection etc. of (18.3%). The third component which increased significantly the fertilizers and farm yard manure (17.91%) while the land rent changed by (14.28%) on the last year.

Table–7: Average Farmer's Cost of Production of Sugarcane in Punjab: 2020-21 versus 2021-22

Item	Unit	2020-21	2021-22
Punjab			
1. Net cost of cultivation	Rs/acre	-	128,608
a) Subsidy on DAP	Rs/bag	-	900.00
b) Value of tops	Rs/acre	-	1500.00
2. Total cost of cultivation	Rs./ acre	122,866	133,068
3. Yield	40 Kg/ acre	700.00	720.00
4. Cost of production at farm level	Rs./ 40 Kg		
a) With land rent	"	175.50	184.82
b) Without land rent	"	121.36	124.63
5. Marketing charges	"	18.50	19.00
6. Cost of production at mill gate	"		
c) With land rent	"	194.00	204.32
d) Without land rent	"	139.86	144.00

Source: Annex-IV.

- **Sindh**

40. For 2021-22 crop seasons, total cost of cultivating an acre of sugarcane in Sindh is expected to be Rs 131,008 (Table-8). This cost is higher than the last year cost Rs 116,130. Its reason is higher cost estimated for 2021-22 for Fertilizers & FYM including transportation and application of sugarcane because yield of 2020-21 crop which is used for 2021-22 analysis is higher 680 per 40 kg/acre against the yield 660 per 40 kg/acre used for the last year. The cost of Fertilizers & FYM including transportation and application of sugarcane have also been greater than the previous year which is about to up total cost of cultivation per acre for 2021-22.

41. In view of an average yield of 680 kg per acre, farm level cost of cultivation of sugarcane works out at Rs 189.10 per 40 kg (Table-8). Adding marketing cost @ 19/40 kg, mill gate cost of production comes to Rs 208.13 per 40 kg. It is Rs 7.03 higher than the last year.

42. While without land rent costs are concerned, these are Rs 129.40/40 Kg at the farm level and Rs 148.39/40 Kg at the mill gate in 2021-22.

Table–8: Average Farmer's Cost of Production of Sugarcane in Sindh: 2020-21 versus 2021-22

Item	Unit	2020-21	2021-22
Sindh			
1.Net cost of cultivation	Rs./ acre	116,130	131,008
2.Yield	40 Kg/ acre	660.00	680.00
3.Cost of production at farm level	Rs./ 40 Kg		
a) With land rent	"	175.95	189.10
b) Without land rent	"	126.71	129.40
4.Marketing charges	"	18.50	19.00
5.Cost of production at mill gate	"		
a) With land rent	"	194.46	208.13
b) Without land rent	"	145.21	148.39

Source: Annex-V

8. NOMINAL AND REAL INDICATIVE / MARKET PRICES OF SUGARCANE

43. The Real price of a commodity is the price achieved by removing the inflationary effect from its nominal price. The resultant price of that commodity reflects its real value. It represents increase or decrease in purchasing power of the respective commodity against the base year level. In the following text, an analysis of the indicative and market prices of sugar has been carried out. This analysis is based on the prices of sugarcane during 2015-16 to 2020-21. Discussing below indicates the province-wise trends in nominal and real terms.

8.1 Nominal and Real Indicative and Market Prices of Sugarcane in Punjab

44. The analysis of indicative and market prices of sugarcane for the Punjab province during 2015-16 to 2020-21 is given in the Table-9.

45. The nominal indicative prices of sugarcane in the Punjab have been increased by 11.11 per cent from Rs 180 to Rs 200 per 40 kgs between 2015-16 and 2020-21. During the period under review, the Consumer Price Index (CPI), the most commonly used for measurement of inflation in the economy has escalated by 40.06 per cent. Thus graduates decreasing trend is observed in real indicative prices of sugarcane against the base year level from 2015-16 to 2020-21. The real indicative price was lower than the nominal indicative price since 2016-17 mainly due to higher CPI reached at 143.69/40 kgs,

Table-9: Nominal and Real Indicative & Market Prices of Sugarcane Realized by the Growers in the Punjab: 2015-16 to 2020-21

Crop year	Nominal Prices		Consumer Price Index (CPI)***	Real Prices	
	Indicative *	Market **		Indicative	Market
	---- Rs per 40 kgs ----		2015-16=100	---- Rs per 40 kgs ----	
1	2	3	4	5=(2/4)x100	6=(3/4)x100
2015-16	180	180	100.00	180.00	180.00
2016-17	180	180	104.81	171.74	171.74
2017-18	180	145	109.72	164.05	132.15
2018-19	180	200	116.35	154.71	171.90
2019-20	190	220	130.33	145.78	168.36
2020-21	200	250	140.06	143.69	178.49

Notes: * Indicative price of sugarcane at mill-gate fixed by the Provincial Government.
**Prices of sugarcane actually realized by the growers reported during the API's field survey.
***CPI Base year 2015-16.
Sources: - 1. Price Policy Report for Sugarcane by API (various issues).
2: Pakistan Economic Survey, 2020-21

46. As far as nominal market price of sugarcane is concerned, it has upward trend except 2017-18 and reached at Rs 250 per 40 kgs. However, the real market price remained below the nominal market price during the period under review.

8.2 Nominal and Real Indicative Prices of Sugarcane in Sindh

47. The nominal and real indicative and market prices of sugarcane in Sindh for the period 2015-16 to 2020-21 are displayed in Table-10.

48. During the period, nominal indicative prices in Sindh gradually increased from Rs 172 per 40 kgs in 2015-16 to Rs 202 per 40 kgs in 2020-21. Although it decrease slightly during 2017-18. This count to 17.44 per cent increase and market price usually observed higher than the indicative price. The real indicative price of sugarcane during the period has experienced a continues downward trend during the period under review except and touched the lowest level of price of Rs 144.22 in 2020-21.

49. As far as the nominal market price of sugarcane has observed an overall rise of 30.89 per cent during 2015-16 to 2020-21, the higher trend in CPI impacted the real market price of sugarcane in Sindh province recorded at 178.49 per 40 kgs in 2020-21 present depressing situation which remained below the nominal market price throughout the period.

Table–10: Nominal and Real Indicative & Market Prices of Sugarcane Realized by the Growers in Sindh:2015-16 to 2020-21

Crop year	Nominal Prices		Consumer Price Index (CPI)	Real Prices	
	Indicative*	Market**		Indicative	Market
	---- Rs per 40 kgs ----		2015-16=100	---- Rs per 40 kgs ----	
1	2	3	4	5=(2/4)x100	6=(3/4)x100
2015-16	172	191	100.00	172.00	191.00
2016-17	182	182	104.81	173.65	173.65
2017-18	181	130	109.72	164.97	118.48
2018-19	182	215	116.35	156.42	184.79
2019-20	192	220	130.33	147.32	168.80
2020-21	202	250	140.06	144.22	178.49

Notes: * Indicative price of sugarcane at the mill gate fixed by the Provincial Govt.
** Prices of sugarcane actually realized by the growers collected during the API field survey.

Sources: - 1. Price Policy Report for Sugarcane by API for market price.
2. Pakistan Economic Survey, 2020-21 for (CPI).

50. It may be observed from the above data that CPI consistently increased from Rs.100 in 2015-16 to Rs 140.06 in 2020-21. The higher CPI resulted lower the real value of the commodity whether at indicative or the Market price .Hence, it may be concluded that to ensure flow of smooth returns to farmer, the inflationary trend needs to be controlled .Nominal prices have also evidenced a continuous improvement in nominal terms. The real market prices are recovered 5.74 percent in 2020-21 as compared to previous year.

9. COMPARATIVE ECONOMICS OF SUGARCANE AND COMPETING CROPS

51. 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.

52. 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 'kharif' and 'rabi' crops. Economics of sugarcane and competing crops/ crop combinations has been analyzed in terms of output prices received by growers and input prices paid by growers during the 2020-21crop year. Detail of the analysis is presented for the Punjab and Sindh provinces in Annex-VI. A summary of analysis against various economic indicators is provided in Table-11 and Table-12 and results of the analysis are briefly discussed in the following paragraphs.

Table-11: Economics of Sugarcane and Competing Crops at Prices Realized by the Growers for 2020-21crop in Punjab Province

Competing crops/ combinations	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	4.08	411	3,376
2. Cotton + wheat	1.15	3.50	357	4,414
3. Cotton + sunflower	1.24	3.64	390	3,726
4. Basmati + wheat	1.14	2.71	370	1,904
5. Basmati+ sunflower	1.24	2.86	409	1,839
6. IRRI + wheat	1.07	2.75	349	1,698
7. IRRI + sunflower	1.16	2.91	387	1,661

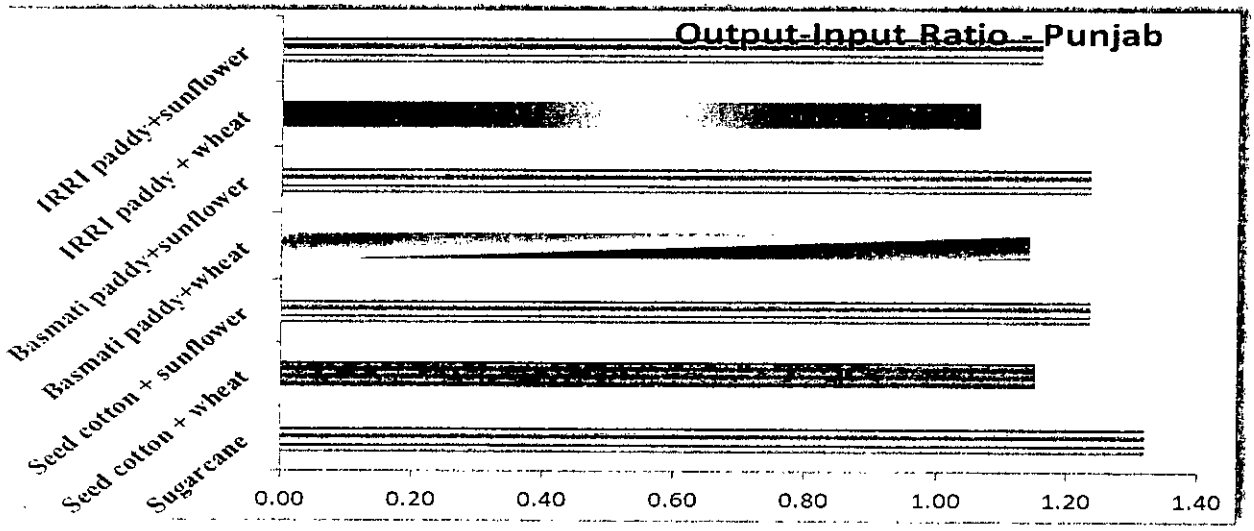
Source: Annex-VI

Punjab

53. The Table- above indicates that growers' returns to overall investment, based on the market prices, remained higher for sugarcane, which performed better than the entire crop combinations. Only cotton combinations could compete with Sugarcane and performed better in terms of returns to irrigation water. In terms of returns to crop duration, Basmati+sunflower combination could show the nearest level while rest of combinations remained far behind the sugarcane. IRRI combinations, however, remained far below the sugarcane in rest of entire criteria analyzed in this case. Amongst the rice varieties, IRRI performed relatively better specifically in terms of returns to purchased inputs cost, while IRRI+sunflower combination further performed better than IRRI+wheat in most of the criteria adopted in this analysis.

54. During last two years, sugarcane farmers were reported receiving relatively better prices, mainly with the intervention of the provincial Government and the Courts of Law at various levels for resolving the issue of payment to growers.

Fig-5: Output-Input Ratio of Sugarcane in Punjab



Sindh

55. Sugarcane growers, in Sindh too, have been largely reported receiving the prices better than the indicative price announced for the year 2020-21. The analysis presents a favourable situation for Sugarcane performing better than the cotton combinations with wheat and sunflower, specifically in terms of output-input ratio and returns to purchased inputs. However, cotton combinations remained better than earlier in giving returns to grower in terms of crop duration and irrigation water used.

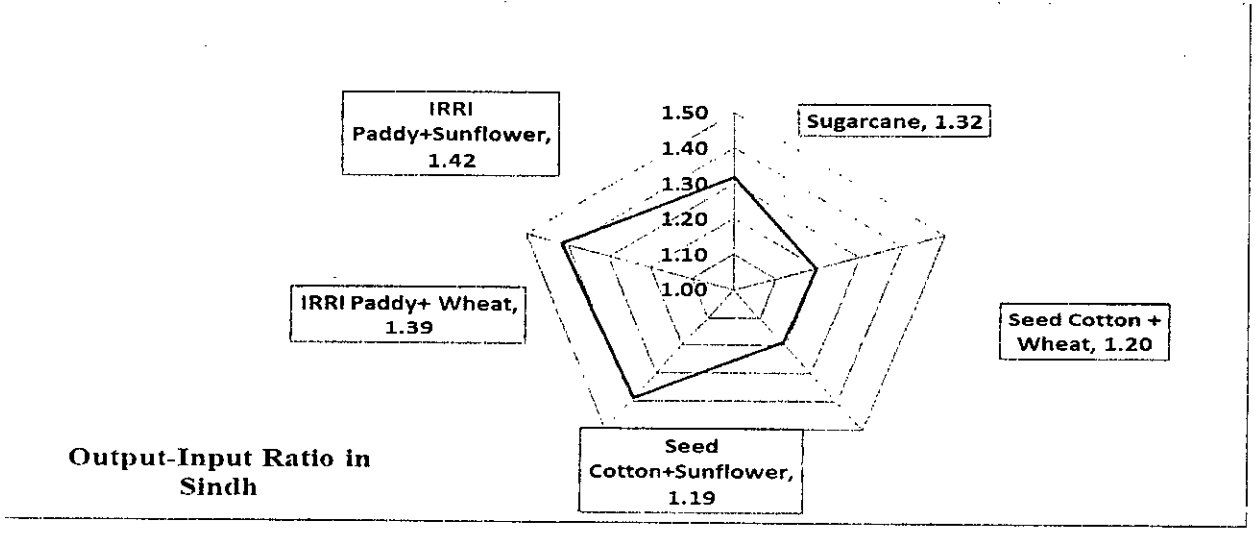
Table-12: Economics of Sugarcane and Competing Crops at Prices Realized by the Growers for 2020-21 Crop in Sindh

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	4.10	313	2,152
2. Cotton + wheat	1.20	3.56	387	5,414
3. Cotton + sunflower	1.19	3.16	344	3,608
4. IRRI + wheat	1.39	3.93	406	2,151
5. IRRI + sunflower	1.42	3.76	356	1,643

Source: Annex-VI

56. Similarly, Sugarcane also performed better than IRRI combinations in terms of returns to purchased inputs and irrigation water, but its performance remained low in context of output-input ratio and crop duration notably. Amongst IRRI combinations, though sunflower shows relatively better in terms of returns to overall investment, however, wheat paid back returns considerably higher in rest of all the economic criteria's adopted in this analysis.

Fig-6: Output-Input Ratio of Sugarcane in Sindh



9.1 Economics of Sugarcane: Inter Provincial Comparison

57. In view of its longer duration, sugarcane crop in Sindh province requires more water and other inputs as compared to Punjab.

58. The cost incurred on purchased inputs other than chemical fertilizers is relatively lower in Sindh i.e 13 percent as compared to the Punjab. However, irrigation water is applied on higher side in Sindh (48 percent). The crop duration is longer in Sindh by 24 percent as compared to Punjab.

59. Chemical fertilizers are used on higher side in Sindh by 86 per cent in nitrogenous and by 15 per cent in phosphate ingredients. Despite these increased applications of inputs and allocation of increased resources, the yield in Sindh has declined by around 6 percent. One of the major factors reported is climate change which is impacting the agricultural productivity adversely.

Table-13: Input Use Level and Yield of Sugarcane in Sindh Vs Punjab: 2020-21 Crop

Item	Unit	Sindh	Punjab	Difference of the Sindh province over Punjab (%)
Crop duration	Crop day	488	394	23.86
Irrigation water	Acre inch	71	48	47.92
Purchased inputs other than fertilizer	Rs./ acre	21,134.0	22,417.15	-12.83
Fertilizer Use:				
• N	Nutrients kg/acre	104	56	85.71
• P	"	39	34	14.71
Crop yield	40 kg/ acre	660	700	-6.0

10. IMPACT OF INCREASE IN SUGAR PRICE ON CONSUMER PRICE INDEX (CPI)

60. Sugar is one of the important item in average household budget. Sugar is also included in the basket of goods used in estimating the Consumer Price Index (CPI). Any change in sugar price affects the household budget and CPI. The impact of change in the price of sugar has been worked out against the CPI on the basis of three consumption pattern i.e Balance Sheet Method HIES Consumption, World average consumption and annual expenditure and the summarize these results is given in Table-14.

10.1 Impact on CPI

61. It is evident from the Table-14 that every increase of Re 1 per kg over the average price of Rs 103.12 per kg is expected to raise the CPI by 0.01 percent, provided other things remaining the same. Accordingly, the CPI is likely to increase from 8.67 per cent to 8.68 per cent, if sugar price is increased by Rs 2 and 8.71 if the price is enhanced by Rs 5 per kgs..

Table-14: Impact of Increase in Sugar Price on CPI and Household Expenditure

Sugar price	Rise in CPI		Increase in annual expenditure on the basis of average per capita consumption of sugar					
			Balance sheet method by API		HIES		World average	
			24.60 kgs/annum		15.36 kgs/annum		22.60 kgs/annum	
			Per person	Per household	Per person	Per household	Per person	Per household
Rs per kg	Per cent	Change	---------- Rupees ----------					
Base price 103.12 *July 2021								
104.12	8.67	-	24.60	155.96	15.36	97.38	22.60	143.28
105.12	8.68	0.01	49.20	311.92	30.72	194.76	45.20	286.57
106.12	8.69	0.02	73.80	467.89	46.08	292.15	67.80	429.85
107.12	8.70	0.03	98.40	623.85	61.44	389.53	90.40	573.14
108.12	8.71	0.04	123.00	779.82	76.8	486.91	113.00	716.42
109.12	8.72	0.05	147.60	935.78	92.16	584.29	135.60	859.70
110.12	8.73	0.06	172.20	1,091.70	107.52	681.68	158.20	1,002.99
111.12	8.74	0.07	196.80	1,247.70	122.88	779.06	180.80	1,146.27
112.12	8.75	0.08	221.40	1,403.60	138.24	876.44	203.40	1,289.56
113.12	8.76	0.09	246.00	1,559.60	153.6	973.82	226.00	1,432.84

Note: * Average Price for the month of July 2021 was Rs **103.12** per kg
Average size of household comprises 6.34 members (2018-19)

Sources:

1. For CPI, Pakistan Bureau of Statistics (PBS), Islamabad
2. Annex-XI (Per capita of availability of sugarcane).

10.2 Impact on Household Expenditure

62. According to the Household Integrated Economic Survey (HIES) during 2018-19 by the PBS, average household in Pakistan consists of 6.34 members. On the basis of three scenarios as discussed earlier, the impact of selected increases in sugar price on the average Household Expenditure has been presented in table above. It may be seen that every increase of Re 1 in sugar price over the average level of 103.12 per kg would raise the CPI by 0.01 per cent. In addition, the per head expenditure would increase by Rs 24.60, and average household expenditure would increase by Rs 155.96 using the balance sheet method. While this increase

would be 15.36 and 22.60 per head respectively per annum by using the HIES and world average method. However, based on the World average consumption, this increase will be Rs 22.60 and 143.25 per house-hold, respectively, with rise in sugar price by Re 1 per kg, provided other things remaining the same. Accordingly, an increase of Rs 2 and Rs 5 over the base level would increase the per head expenditure by Rs 49.20, 30.72 and 45.20 respectively for the three scenarios. The house-hold expenditure will accordingly increase by Rs 779.80, 486.91 and 716.42 respectively.

11. ECONOMIC EFFICIENCY OF SUGARCANE PRODUCTION

63. Measurement of economic efficiency of a crop requires measurement of performance of different resources employed in production of that crop. Briefly it helps assess justification for putting national resources in production of that crop.

64. There are three widely accepted measures of economic efficiency, namely, Nominal Protection Coefficient (NPC), Effective Protection Co-efficient (EPC) and Domestic Resource Cost Co-efficient (DRC). These efficiency measures are studied both in export as well as import perspective. Analysis in export context is based on export parity price of the concerned crop while import substitution ability of the crop is analyzed using import parity price of that crop.

65. Sugar is an important food item in Pakistan. Sugarcane provides raw material for manufacturing sugar. Accordingly, it is very necessary to study resource use efficiency of the crop.

66. In resource use efficiency, the cumulative effect of cost of production of the crop and its import and export parity prices are compared against the established economic efficiency yard sticks i.e Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost (DRC) Coefficients.

67. Efficiency is a comparison of crop revenues against its cost of production. Though profit is very important consideration from farmer point of view to sustain a crop but at the same time, viability of a crop to justify national resources (land, labour, capital, entrepreneurship skills) employed in its production is also equally important from social point of view. In the former case, the cost of production and domestic private market price of the crop are applied and the inputs used in its production while for the later we convert private (market) prices are converted into social with the help of corresponding import and export parity prices of the crop.

68. In the following paragraphs above mentioned three parameters of efficiency i.e NPC, EPC and DRC are described in more detail.

11.1 Nominal Protection Coefficient (NPC)

69. NPC is the ratio of the domestic market price to the social price of a commodity. It examines the impact of domestic market price of the crop ignoring misrepresentations in the input prices. As a rule of thumb if NPC is greater than one it means that local producers are protected through crop pricing policy. If it is less than one, it implies implicit taxation to growers

rather than protection to them. Implicit taxation to a crop indicates outflow of resources from that crop to other sectors of the economy.

70. Experiential estimates of NPCs for sugarcane are provided in Table-15 below. Before describing Nominal Protection Coefficients (NPCs) under import and export scenarios it seems relevant to refer to fundamental procedures of deriving price of sugarcane equivalent to international price.

71. For this analysis, NPC estimates are estimated under import and export scenarios both for Punjab and Sindh provinces. For import scenario analysis, corresponding import parity price and for export scenario analysis relevant export parity price of sugarcane in Pakistan is used.

72. Under import scenario we calculate this price by converting cif (international price) at Karachi port into domestic currency and then by adding port handling charges and other incidentals to it to shift imported sugar to sugarcane producing districts of Punjab and Sindh.

Table-15: Nominal Protection Coefficients for Sugarcane in Punjab and Sindh

Year	Punjab		Sindh	
	NPC		NPC	
	Under import scenario	Under export scenario	Under import scenario	Under export scenario
2015-16	1.35	1.88	1.40	1.40
2016-17	1.14	1.88	1.24	1.65
2017-18	1.31	1.73	1.24	1.66
2018-19	1.05	2.33	1.02	2.22
2019-20	0.96	1.72	0.90	1.65
2020-21	1.18	1.90	1.06	1.73

Source: For NPC, Annex-VIII, IX and XIII.

73. It may be observed from data produced in Table-15 that the NPCs for both Punjab and Sindh under import as well as export situations claim greater than one throughout the period except 2019-20 in import of Punjab and Sindh province under analysis. It implies that sugarcane growers are receiving relatively higher price for their cane than the corresponding parity price. However, it is important to note that these coefficients are calculated assuming Rs 180-250/40 Kg price of sugarcane received by the growers whereas it is commonly observed during the cane disposal season that farmers sell their consignments to the Mill/middlemen where they get price greater than Rs 180-250/40 Kg. It has been revealed during the field surveys that farmers sell their produce to mill gate relatively at higher price. Normally Mill/middle man price is 10-15% greater than the indicative price. Its reason is that the sugarcane crop was short to last year. Thus if we estimate NPC values on the basis of Mill/middleman price, NPC values would be around one which may approximate domestic sugar price to international price.

74. However, the above coefficients show that sugarcane growers seem price protected through the indicative price of sugarcane. This may be questioned why sugarcane growers get this price protection? A valid explanation may be that sugar being an important food item, needs

to be adequately available in the market. Indicative price helps continue sugarcane cultivation. Another argument may be if Pakistan becomes dependent on imported sugar, occasional shifts in international price of sugar may increase Pakistan's import burden.

11.2 Effective Protection Coefficient (EPC)

75. Dissimilar NPC, EPC is the ratio of the difference between revenue and cost of tradable inputs at private prices and difference between revenue and tradable inputs cost at social prices. Thus EPC is the indicator of net incentive or disincentive effect of all policies affecting prices of tradable (seed, fertilizer, pesticides, cost of tractor run operations, tube well irrigations etc) inputs and output.

76. Equivalent rule of thumb is for EPC as it is for NPC coefficients. If EPC is higher than one, it means domestic growers of the crop have some degree of protection/ support through prices of inputs or price of output. This implies growers' profit higher than it would be without government intervention (price support). On the other side, if EPC is less than one, it indicates that the net effect of input and output prices reduces grower profit. In the earlier case, the growers are policy-protected while in the later they are implicitly taxed which discourages domestic production.

Table-16: Effective Protection Coefficient for Sugarcane in Punjab and Sindh

Year	Punjab		Sindh	
	EPC		EPC	
	Under the import scenario	Under the export scenario	Under the import scenario	Under the export scenario
2015-16	1.45	2.60	1.47	1.47
2016-17	1.13	2.41	1.24	1.78
2017-18	1.44	2.23	1.23	1.78
2018-19	1.06	2.38	0.95	2.85
2019-20	0.91	2.66	0.82	1.85
2020-21	1.24	2.70	1.02	1.91

Source: Estimated from Annex-VIII.

77. Table-16 provides EPC values for Punjab and Sindh provinces under import and export scenarios. All values are found higher than one except 2019-20 in import scenario. Respective values of EPC higher than one mean that input/ output prices induce for producing more sugarcane in the country. From the referred EPC values it may be concluded that domestic production of sugar is relatively better for domestic consumption than to export because EPC values under export scenario analysis are much higher than those derived under import scenario analysis.

11.3 Domestic Resource Cost Coefficient (DRC)

78. Domestic Resource Cost (DRC) coefficient shows the social cost of non-traded inputs (domestic resources like labour, interest on capital employed in the crop, management cost, harvesting charges, cost of farmyard manure, land rent etc) used in producing the commodity. In DRC, the numerator is the opportunity cost of non-tradable factors at social prices while the denominator is the value-added (crop revenue) at social prices. If the value of DRC is less than one it indicates comparative advantage in domestic production of the crop. Its reason is that cost of non-tradable domestic factors like hired labour, interest on capital, farmyard manure, transportation, canal water, land rent, managerial services, land revenue and Drainage Cess is less than the corresponding import cost of these factors.

Table-17: Domestic Resource Cost Coefficients (DRCs) for Sugarcane in Punjab and Sindh Provinces

Year	Under the import situation		Under the export situation	
[1]	Punjab [2]	Sindh [3]	Punjab [4]	Sindh [5]
2015-16	0.64	1.01	1.15	1.01
2016-17	0.45	0.75	0.95	1.07
2017-18	0.56	0.80	0.87	1.15
2018-19	0.46	0.61	0.58	1.83
2019-20	0.40	0.53	1.17	1.19
2020-21	0.41	0.51	0.90	0.95

Sources: 1. Import situation estimates derived from Annex-VII and Annex-IX,
2. Export situation estimates derived from Annex-XIII and Annex-X.

79. It is observed from Table-17 that DRC values under import scenario analysis are less than one throughout analysis except for Sindh, 2015-16. However, these have a mixed trend under export scenario analysis. Findings in the above table support that Punjab has an advantage in producing sugarcane for domestic consumption of sugar and we may save foreign exchange by substituting sugar import.

12. DOMESTIC DEMAND, SUPPLY, STOCK AND PRICES OF SUGAR

12.1 Domestic demand, supply and stocks

80. The sugar production from 2020-21 (Oct-Sept) crop has been estimated at 5.60 million tons. After accounting the carryover stocks of 0.60 million ton, and accounted for the imports and export of sugar, the total sugar availability for 2020-21 is estimated to 5.86 million tons. There are three sugar consumption patterns used for calculation of domestic requirement. i) Based on average of three years i.e 2017-18 to 2019-20, per capita availability of sugar estimated at 24.60 kgs, ii) On the basis of Household Integrated Economics Survey (HIES) 2018-19, consumption of sugar is 15.36 kgs per annum and iii) on the basis of World average sugar consumption is 22.60 kgs per annum(for detail Annex-XI). On the basis of balance sheet method, total domestic requirement for a population of 226.52 million has been worked at 5.57

million tons for 2020-21. Thus, there is an estimated 0.28 million tons surplus sugar is available at country level, while on the basis of HIES data, domestic requirement comes to 3.48 million tons and on the basis of World average consumption, the domestic requirement calculated at 5.12 million tons. Resultantly, 2.38 and 0.74 million tons of surplus stocks would be available during 2020-21

Table-18: Domestic Requirement Situation of Sugar during 2020-21

S.No.	Items	Per capita consumption of sugar kgs/annum		
		Balance Sheet Method	HIES Data	World Average consumption
		24.60	15.36	22.60
		-------- Thousand tons----------		
1	Opening stocks as on October 2020	0.596	0.596	0.596
2	Production for 2020-21 crop	5,601	5,601	5,601
3	Import	253	253	253
4	Export	0	0	0
5	Total availability	5,855	5,855	5,855
6	Population (Millions)	226.52	226.52	226.52
7	Requirement on the basis of per capita consumption	5,572	3,479	5,119
8	Surplus	282	2375	735

Sources:
i. Annex-XI
ii. For production and Stocks; Ministry of Industries and Production.
iii. For import and export, PBS.

12.2 Behavior of sugar prices in domestic market

81. The monthly average wholesale prices of sugar prevailing in major domestic markets of Lahore, Faisalabad, Karachi, Hyderabad and Peshawar markets during 2020 and 2021 (Jan - Aug) are presented Annex-XII while for the last 12 years in Annex-XIII.

82. During 2018, average monthly wholesale prices ranged between Rs 7,060 per 100 kgs in Hyderabad markets during the month of January 2020 to Rs 9,630 per 100 kgs in Peshawar during November, 2020. During 2021 (Jan-Jun), average monthly wholesale prices lowest price observed in Hyderabad Market in the month of January 2021 to Rs 8,300 per 100 kgs and the highest price were reported in Lahore market during months of May-Jun to Rs 9,500 per 100 kgs The overall average of sugar price at country level ranged between Rs 7,217 to Rs 9,361 per 100 kgs during 2020-21.

13. WORLD SUPPLY, DEMAND, STOCKS, TRADE AND PRICES OF SUGAR

13.1 Supply, demand, stocks and trade

83. The data on world balance sheet of sugar (raw equivalent) for the period of 2019-20 to 2021-22 are presented in Table-19:

Table-19: World Balance Sheet of Sugar (Raw Equivalent): 2019-20 to 2021-22 October - September)

Item	2019-20	2020-21 Estimated	2021-22 Forecast
	----------Million tones----------		
1. Opening stocks	92.44	93.80	96.40
2. Production	175.20	171.90	170.30
.3 Total supply (item 1+2)	267.64	265.70	266.70
4. Disappearance (consumption)	169.20	168.70	172.00
5. Stock adjustment *	-04.64	-0.60	-0.10
6. End year stocks (3-4+5)	93.80	96.40	94.60
7. Trade (Export)	57.20	62.30	64.40

Note: * Including adjustment for unknown net trade.
Source: Food Outlook, FAO, June 2021.

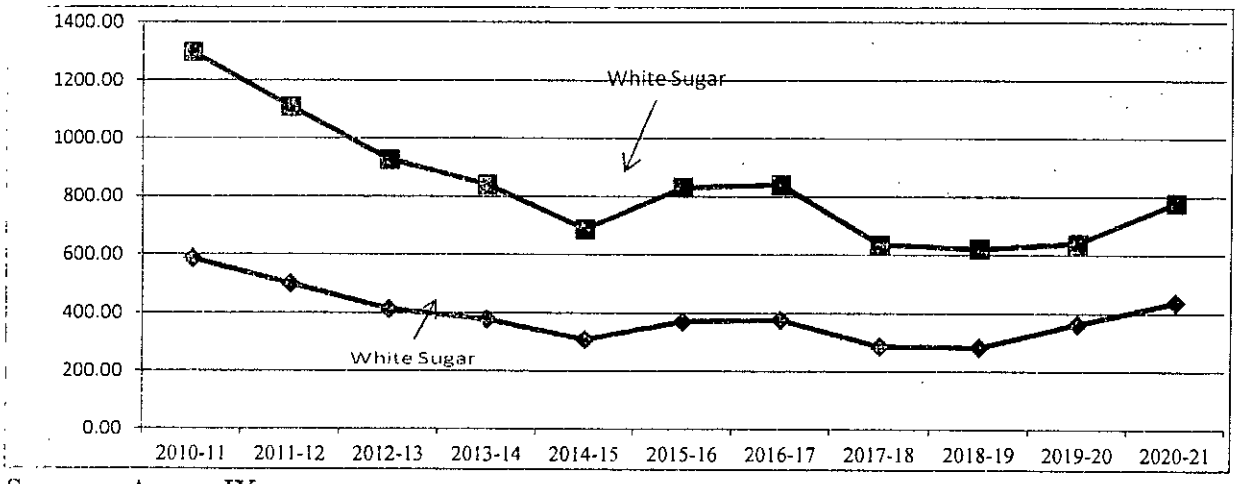
84. The world sugar production is estimated at 171.90 million tons during 2020-21, 3.30 million tones (0.93 per cent) lower than the last year level of 175.20 million tons. With the addition of opening stocks of 93.80 million tons, global supply of sugar in 2020-21 were reported at 265.70 million tons 0.73 per cent lower than 2019-20. The world consumption in 2020-21 estimated at 168.70 million tons, 0.30 per cent lower than the last year level of 169.20 million tons. End year stocks in 2020-21 are estimated at 96.40 million tons, 277 per cent higher than last year due to slightly increase in opening stock decrease in consumption.

85. According to Food Outlook, FAO, June 2021 issue, the World sugar production during 2021-22 is forecast at 170.30 million tons, a further decrease of 0.93 1 per cent than last year's production. Accounting for the opening stocks of 96.40 million tons, global supply of sugar in 2021-22 has projected at 266.70 million tons 0.38 per cent higher than 2020-21. World consumption in 2021-22 is projected at 172.00 million tons, 1.96 per cent higher than last year. Due to reduction in production and higher consumption projection, the end year may decreased to 94.60 million tones or 1.87 per cent. If these forecasts come true, the price of sugar in international market may increase.

13.2 International Prices of Sugar

86. International prices of raw (fob Caribbean ports) and white (fob London) sugar from 2010-11 to 2020-21 are presented in Annex-XIV while their graphical movement shown in Fig-7.

Fig-7: International Prices of Raw Sugar



Source: Annex-IX.

87. Prices of both raw and white sugar have fluctuated but shown a continues decreasing pattern from 2010-11 to 2019-20. During 2010-11, the price of raw sugar (Caribbean port) was averaged at US $ 585.45 per ton. However, the price of raw sugar started decreasing continuously and reached at US $ 307.69 per ton during 2014-15. Next couple of year price increased slightly and averaged at US $ 376.40 but again started decreasing and averaged at US $ 276.23 per ton, touched the lowest level of price during the period under review. In the current season 2020-21 (Oct-Jun), a upward trend is being observed and prices reached at $ 342.00 per ton.

88. The pattern followed by the prices of white sugar during period under reference has been similar to that of raw sugar described above. Difference between average annual price of raw and white sugar is ranged between $ 57.37 per ton to $ 128.58 per ton.

14. IMPORT AND EXPORT PARITY PRICES OF SUGARCANE

89. Estimation of import parity price of a commodity is helpful in determining the opportunity cost of resources used in its domestic production while the export parity prices are helpful in ascertaining its competitiveness in international market. Since Pakistan has been importer of sugar 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.

90. Both the import and export parity prices have been calculated on the basis of white sugar price (fob London). Detailed calculations in this connection are given in Annexes-XV and XVI, while the results are summarized in Table-20.

Table-20: Import/Export Parity Prices of Sugarcane as Worked Back from Average fob (London) Prices of Sugar

Average fob London prices of white sugar per ton	Sugarcane prices (Rs/40 kgs)	
	Punjab	Sindh
Import parity		
US $ 500.61 (September 2021)	344.59	356.08
US $ 448.07 (2020-21 Oct-Sept)	314.31	324.80
US $ 349.92 (2017-18 to 2019-20)	257.74	266.34
Export parity		
US $ 500.61 (September 2021)	218.02	225.29
US $ 448.07 (2020-21 Oct-Sept)	188.71	195.00
US $ 349.92 (2017-18 to 2019-20)	133.96	138.43

Source Annexes –XI and XIII

15. MILL-GATE PRICES OF SUGARCANE BASED ON DOMESTIC WHOLE SALE PRICES OF SUGAR DURING 2020-21 CONSUMPTION YEAR

91. Sugarcane prices have also been estimated from the wholesale prices of sugar during the 2020-21 consumption year and presented in Table-21. This analysis is based on actual sucrose recovery as reported by the provincial sugarcane commissioners; processing cost of sugar and Sales Tax @ 17 percent. A summary of sugarcane prices estimated under this scenario from various wholesale prices of sugar is presented in Table-21 while the details are given in Annex - XVII.

Table-21: Sugarcane Prices worked back from Expected Wholesale Prices of Sugar during 2020-21

Wholesale prices of sugar (Rs /Ton)	Sugarcane prices (Rs/40 Kgs)	
	Punjab	Sindh
Rs 85,000	231.51	239.24
Rs 90,000	245.13	253.31
Rs 95,000	258.75	267.38
Rs 100,000	272.37	281.45

Source Annex XVII

16. USE OF SUGARCANE CESS FUND

92. The former Agriculture Prices Commission (APCom) presently Agriculture Policy Institute (API) had been suggesting in the Price Policy Reports that the sugarcane cess fund which was aimed/meant for the construction and improvement of roads in the sugar mills areas, should also be utilized for research and development of sugarcane crop. Huge amounts of

sugarcane cess fund are lying unutilized with the district/provincial governments, due to lack of proper coordination, planning and decision making. The Provincial Cane Commissioners are mainly responsible for regulating the affairs relating to development, marketing and processing of sugarcane in their respective provinces.

93. To strengthen sugarcane research in the Punjab, the Government of Punjab has allocated 10% of Sugarcane Cess Fund to Sugarcane Research and Development Board (SRDB), Punjab. The SRDB is utilizing that cess fund for both sugarcane research & development and also include operational expenditures of SRDB. Brief description on SRDB Achievements / Contribution in the field of Sugarcane Research is as under:-

i. Status of Cess fund

Description	**Period**	**Amount**
CESS amount Received	2015-2018	780 million
Amount of CESS fund In-Process	2018-2020	700 Million

ii. Key Achievements by using the Cess Fund

Performance/Contribution	**Status**	**Unit/Locations**
National/International Conference, round tables, workshops, field days on Sugarcane Production	8 Events Completed	400 participants-Punjab
Training of Scientists as Master Trainer	2 Completed 4 in Process	SRI Sri Lanka and MSIRI Mauritius
Publication of Pakistan Sugar Journal	Quarterly and Regular	SRDB, Faisalabad
Field Trainings on Modern Technologies for Sugarcane Plantation	Completed	1200 participants 6 Locations in Punjab
SRDB website linked with Agri. Dept. website.	Completed	Faisalabad
Import of 19 sugarcane fuzz/clones from Canal Point USA.	Completed	Faisalabad
Publication of 2 Urdu Books on Sugarcane Crop Production Technologies	Completed	Faisalabad
Import of 9 sugarcane fuzz/clones from CIRAD France	Completed	Faisalabad
Import of 2 sugarcane varieties, one form India and one form Australia	Completed	Faisalabad

iii. **Non-Development / Service Delivery**

Performance/Contribution	**Status**	**Unit/Locations**
Draft Center of Excellence on Sugarcane	Completed	Faisalabad
Input on Report of Sugar Sector Reforms Committee	Completed	Faisalabad
Input on National Sugarcane policy	Completed	Faisalabad
Development of Seed Farms under Project of National	Completed	Faisalabad

Program for enhancing sugarcane profitability		
Sugarcane Breeding Plan for Res. Inst. of Punjab	Completed	Faisalabad
Recommendations for Growth and Equity Strategy (2021-23)-market development and reforms	Completed	Faisalabad
Draft of SRDB business rules for solicited and unsolicited projects	Completed	Faisalabad
Dr. Jack C. Comstock visit for review of Sugarcane Breeding plan and training of scientists	Completed	Faisalabad/Lahore
Research paper presented paper in Pakistan Society of Sugarcane Technologist Workshops / Convention	Completed	Faisalabad, Rawal-pindi and Karachi
Draft of SRDB Vision	Completed	Faisalabad
Import of Germplasm (Commercial / Promising Clones /True Seed-Fuzz)	In-process	USA, Brazil, China and Sri Lanka,
Research paper accepted for presentation in International Society of Sugarcane technologist (ISST) conference at Argentina	Completed	ISSCT 30th Congress 2019, Argentina
Research paper presented in International Society of Sugarcane technologist (ISST) conference at Thailand.	Completed	ISSCT 29th Congress, Thailand

iv. **Special Initiatives/ Mega Projects**

Performance/Contribution	**Status**	**Unit/Locations**
Draft of SRDB Act 2021	In process	Lahore
Mitigation of water stress effects in sugarcane through physiological approaches (Project, Rs: 6.77 million)	Completed	Faisalabad
Population dynamics and cost-effective biological control of sugarcane whitefly, Aleurobus barodensis in Punjab (Project, Rs: 12.20 million)	Completed	Faisalabad
Strengthening of Sugarcane Research Institute, Faisalabad (Project, Rs: 30 million)	Completed	Faisalabad
Draft Biological material transfer agreement (BMTA) with ARS-USDA, Brazil, China & Sri Lanka	Completed	Faisalabad
TORs of Sugar Policy of Punjab	Completed	Faisalabad
Flower induction and testing of fuzz viability in Sugarcane (Project, Rs: 1.8 million)	Completed	Murree
Import of Sugar Beet Varieties from Germany/Belgium and Sweet Sorghum Varieties from Colombia for outfield Trails	Completed	Faisalabad
7 projects amounting (82.72 million) are ready for approval	In process	Faisalabad

17. SUGARCANE CROP RESEARCH AND DEVELOPMENT IN PAKISTAN

- **Sindh**

94. The National Sugar and Tropical Horticulture Research Institute (NSTHRI), Thatta is an apex public sector organization working under umbrella of Pakistan Agriculture Research Council (PARC) on development and release of sugarcane varieties along with production technologies.

95. The Institute has overall developed 4 commercial sugarcane varieties for general cultivation in the Sindh. Varieties developed in the last ten years with characteristics are as under:

Table-22: Varieties Developed by Pakistan Agriculture Research Council (PARC) National Sugar and Tropical Horticulture Research Institute (NSTHRI), Thatta in Last Ten Years with their Characteristics

S.No	Variety	Year of Release	Main characteristics
1	Thatta-10	2004	• It is medium maturing variety • Avg. yield potential: 180-200 t ha^{-1} • Avg. yield: 150 t ha^{-1} • Sugar recovery: 12.15% • Ratooning ability: Good
2	Thatta-2109	2016	• It is early maturing variety • Avg. yield potential: 160-180t ha^{-1} • Avg. yield: 140 t ha^{-1} • Sugar recovery: 13.5% • Ratooning ability: Good
3	Thatta-326	2016	• It is early maturing variety • Avg. yield potential: 180-200t ha^{-1} • Avg. yield: 150 t ha^{-1} • Sugar recovery: 12.25% • Ratooning ability: Good
4	YT-55-Thatta	2018	• It is early maturing variety • Avg. yield potential: 160-180 t ha^{-1} • Avg. yield: 140 t ha^{-1} • Sugar recovery: 12.5% • Ratooning ability: Good

Source: PARC.

- **Punjab**

96. The Sugarcane Research Institute, (SRI), Faisalabad is an apex public sector organization working on development and release of sugarcane varieties along with production technologies.

97. The Institute has overall developed 24 commercial sugarcane varieties for general cultivation in the Punjab. These varieties occupied more than 95% of sugarcane cultivated area in the province. Varieties developed in the last ten years with characteristics are as under:

Table-23: Varieties Developed by SRI, in Last Ten Years with their Characteristics

S.No	Variety	Year of Release	Main characteristics
1	CPF 246	2011	• It is medium maturing variety • Avg. yield potential: 1600 t ha^{-1} • Avg. yield: 1200 t ha^{-1} • Sugar recovery: 12.15% • Ratooning ability: Good • 2083 t ha^{-1} cane yield was reported in sugarcane yield competition in the Punjab-2012
2	CPF 247	2011	• It is medium maturing variety • Avg. yield potential: 1500 t ha^{-1} • Avg. yield: 1200 t ha^{-1} • Sugar recovery: 12.25% • Ratooning ability: Good • Also good for light soils and non-lodging variety
3	CPF 248	2014	• It is medium maturing variety • Avg. yield potential: 1500 t ha^{-1} • Avg. yield: 1200 t ha^{-1} • Sugar recovery: 12.71% • Ratooning ability: Good
4	CPF 249	2016	• It is medium maturing variety • Avg. yield potential: 1650 t ha^{-1} • Avg. yield: 1200 t ha^{-1} • Sugar recovery: 12.46% • Ratooning ability: Good • Also good for saline soils and having highest yield potential

Source: SRI/PARC.

- **KPK**

98. The Crops Research Institute, Mardan is an apex public sector organization working on development and release of sugarcane varieties along with production technologies.

99. The Institute has overall developed 4 new commercial sugarcane varieties for general cultivation in the Province. Varieties developed in the last ten years with characteristics are as under:

Table-24: Varieties Developed by Crops Research Institute, Mardan in Last Ten Years with their Characteristics

S.No	Variety	Year of Release	Main characteristics
1	Israr Shaheed SC	2017	• Maturing: Early • Avg. yield potential: 97.23 t ha^{-1} • Avg. yield: 90.0 t ha^{-1} • Sugar recovery: 13.40% • Ratooning ability: Good
2	Abdul Qayum	2017	• Maturing: Early • Avg. yield potential: 113.73 t ha^{-1} • Avg. yield: 89.00 t ha^{-1} • Sugar recovery: 13.69% • Ratooning ability: Good
3	Mardan 2021	2021	• Maturing: Early • Avg. yield potential: 95.41 t ha^{-1} • Avg. yield: 87.00 t ha^{-1} • Sugar recovery: 12.71% • Ratooning ability: Good
4	Gul Rehman	2021	• Maturing: Early • Avg. yield potential: 1650 t ha^{-1} • Avg. yield: 85.00 t ha^{-1} • Sugar recovery: 12.46% • Ratooning ability: Good

Source: PARC.

18. MARKETING OF SUGARCANE

100. Sugarcane is one of the main cash crops of Pakistan sown on vast areas throughout the country. As it cannot be stored after harvesting, so is to be processed either into gur/khandsari at the farms or crushed by sugar mills for sugar manufacture. So its marketing plays an important role in this respect. For having an upto date information in this respect, API conducted a mini survey in the main sugarcane producing areas of Punjab and Sindh. On the basis of survey results and discussion in the API Committee meetings for sugarcane, the main issues/problems faced by the farming community are briefly discussed below:

18.1 Delayed payments

101. In the normal or higher production years, the sugar industry in the beginning of the season, generally made payments to growers within two weeks but as the season progresses to the end, the payments are delayed by months and in some cases by seasons. Mills are of the view that this happens due to liquidity problem. Similarly vast majority of sugarcane growers sell their produce at the local procurement centers which are managed privately. Here though they sell relatively at lower price but they get cash immediately whereas at the mill gate they may sell at higher price but they receive payment much later from the sugar mill. However, due to relatively small harvest during last two years and increased role of middlemen in the sugarcane mills, the payment to cane growers has made payment promptly by the mills.

18.2 Presence of middlemen

102. During the current season 2020-21, the sugar mills have paid to the cane growers within the time limit, even earlier. However, the role of middleman, which was increasing day by day in sugarcane business, was also observed at top level due to fear of delayed payment at the end. The small growers sold their produce to middleman for prompt payment because small growers are in need of immediate payments for their sale proceeds, they in order to avoid the delayed payments are compelled to sell their produce at discount rates varying from area to area, but mostly ranging between Rs 2 – 5 per 40 kgs of cane price to the middle man. In order to improve the situation, the mills may be compelled to make the payments for sale proceeds at the earliest according to Sugarcane Factory Control Act.

18.3 Underweighment and Undue deductions

103. Underweighment of cane at the purchase centers and mill gates were the regular complaint of cane growers and in the current season when supply was short and purchase war among the sugar mills have reduced both unlawful deductions. 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 supervisory committees should play an effective and vigilant role against, these malpractices.

18.4 Provision of Seed of Approved Varieties

104. The sugarcane seed is required in bulk quantity, its harvesting, transportation and planting is carried out at same time and cannot be stored/ packed. Its rate of multiplication is hardly 1:10 as compared to 1:40 for wheat. The production, multiplication and distribution of quality seed of high yielding varieties at Institute level does not exist. After de-zoning, sugar mills also have stopped their cane development activities including the supply of improved seed to the growers. Resultantly, farmers generally use their commercial crop as seed without its treatment against diseases. In this regards, the API suggests the following measure:

i. The sugar industry should provide incentive to the growers for growing cane of high sucrose varieties in the form of quality premium and Provincial Agriculture Departments should launch an aggressive campaign for educating the growers regarding the sowing of improved varieties and discouraging the cultivation of unapproved varieties.

ii. The sugar mills should establish/ revive their Cane Development Programme either individually or collectively. These centers in collaboration with the progressive growers and sugarcane researchers should develop the sugarcane seed according to climate change.

iii. The responsibility of production, multiplication and distribution of High Yielding Variety (HYV)/quality seed of sugarcane be assigned to the sugar mills, as they are the main beneficiaries of increased production of sugarcane. The sugar mills should also provide the technical guidance to growers for using the modern technique

18.5 Low Plant Population

105. Lack of adequate plant population remains an important factor in low productivity of sugarcane. The research on sugarcane has found that even good quality seed does not provide more than 60 per cent germination. In general, 80-100 maunds seed of thin and 100-120 maunds of thick varieties of cane is recommended for cultivating of one acre but due to manual sowing operation, it is not possible to achieve the optimum level of seed.

106. It is imperative to use the sugarcane planter and harvester to ensure achieving the maximum production of sugarcane crop. The sugarcane planter minimizes cost of sowing, which is a labour intensive and time consuming operation.

18.6 Amendments in Sugar Factories Control Act, 1950

107. After de-zoning and emerging issues, 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 in the light of emerging issues, especially for the promotion of contract system between growers & the mills.

19. VALUE-ADDITION AND VERTICAL INTEGRATION IN SUGAR INDUSTRY

108. In view of the falling trend in the world prices of sugar and large-scale investments in the domestic sugar industry it is imperative to improve the efficiency of resource use in sugarcane production and its processing. For improving the productivity in sugar processing, the requirement is not only to improve the efficiency but also value addition through vertical integration. In the wake of fast approaching globalization and WTO requirements the sugar industry would also have to go into value adding business and growers also get their share in returns.

20. IMPROVING PRODUCTIVITY

109. The raw material requirement of sugar industry comprising 89 sugar mills, with crushing capacity of about 350 thousand tons per day has been met through expanding acreage under sugarcane. This demand-led horizontal expansion in cane production has not only resulted in extension of sugarcane cultivation to prime land but also aggravated the water shortage. Sugarcane, a high water delta crop, poses serious competition to other important crops: cotton, rice, wheat, etc. Thus, further expansion in sugarcane area already spanning over one million hectares, given the recurring water shortages and the increasing demand for water from other crops and non-farm uses, is no more a viable option. With the increasing requirements of other food and cash crops to meet the ever expanding demand from burgeoning population, it is of utmost importance to increase the productivity of resource use in agriculture through all the possible means.

20.1 Varietal Development

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

20.2 Sugarcane Seed Certification Process in Punjab

111. The sugarcane seed is required in bulk quantity, its harvesting, transportation and planting is carried out at same time and cannot be stored/ packed. Its rate of multiplication is hardly 1:10 as compared to 1:40 for wheat. Tagging is difficult for sugarcane seed. At present Punjab Seed Corporation, private seed companies or sugar mills are involved in certified sugarcane seed production, multiplication and distribution in the Punjab without tagging.

112. The Government of Punjab has started a process of newly approved sugarcane seed certification process (Seed Standards, tagging process) of FSC & RD by involving government intuitions, PSC, Sugar Mills, private seed companies etc, The implementation of the concept of certified seed (healthy ,pure, true to type and site specific) sugarcane seed production ,

multiplication and distributions).the Sugarcane Research Institute (SRI), Faisalabad has been given the responsibility for this process

113. The SRI, in meeting with all the stakeholders made the following decision/ recommendations:

i. The tagging system is not practicable in case of sugarcane because it is difficult to tag or pack each unit of seed for transportation purpose. The disposal of sugarcane seed at Institute level is a big challenge
ii. Quality seed production, multiplication and distribution of sugarcane at the level of SRI, Faisalabad may be continued in the best interest of the farming community.
iii. Sugarcane seed multiplication and distribution process is entirely different from other crops, therefore, this process should be designed in such a way to facilitate the provisioning of pure, health and good quality seed of approved varieties to the growers.
iv. FSC7RD may issue "Lot number" on area basis regarding pure & healthy seed to SRI, Faisalabad after fulfilling certification/ inspection process.

20.3 Balanced Use of Fertilizers

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

21. SUGARCANE YIELD AMONG COMPETING COUNTRIES

115. Global sugarcane during 2019 occupied an area of around **26,777** thousand hectares with a total production of **1,907,025** thousand tons. The world top 25 producing countries contribute 93.26 per cent of total area and 90.01 per cent of total production as narrated in Tables-25-26.

Table-25: Major Sugarcane Producing Countries (Area) of the World: 2019 Crop

S.No.	Country	Area (000)ha	Per cent Share in World area
1	Brazil	10,081	32.0
2	India	5,061	16.07
3	Thailand	1,835	5.8
4	China, mainland	1,446	5.3
5	Russia	1,133	3.6
6	**Pakistan**	**1,041**	**3.3**
7	Mexico	796	2.5
8	USA	766	2.4
9	Indonesia	513	1.6
10	Argentina	476	1.5
11	Colombia	459	1.46
12	France	447	1.42
13	Australia	433	1.4
14	Germany	409	1.3
15	Philippines	379	1.2
16	Turkey	348	1.1
17	Turkey	310	0.99
18	South Africa	299	0.95
19	Guatemala	270	0.86
20	Poland	241	0.77
21	Ukraine	221	0.70
22	Mynmar	215	0.68
23	Cuba	209	0.66
24	Iran	192	0.61
25	Cameroon	136	0.43
	Total of 25 countries	**27,716**	**88.62**
	World Total	**31,498**	

Source: World statistics year book 2019

116. In terms of sugarcane **area**, Brazil is on the top with 10,081 thousand hectares followed by India with 5,061 thousand hectares and Thailand, China mainland, with 1,835, 1,446 thousand hectares. Pakistan with 1,040 thousand hectares, lies at 5th position in this regard sharing 3.3 per cent of global acreage.

117. In terms of sugarcane **production**, Brazil is on the top with 746,828 thousand tons followed by India with 405,416 thousand tons while Thailand and China with 131,002, 109,388 thousand tons respectively. However, Pakistan retains at 5th position in sugarcane production of the world ranking (Table-27).

Table-26: Major Sugarcane Producing Countries (Production) of the World: 2019 Crop

S.No.	Country	Production in (000)tons	Per cent Share in World area
1	Brazil	746,828	38.69
2	India	405,416	20.84
3	Thailand	131,002	6.73
4	China, mainland	109,388	5.62
5	Pakistan	66,880	3.44
6	Mexico	59,334	3.05
7	Colombia	33,507	1.68
8	Australia	32,415	1.67
9	Indonesia	29,100	1.50
10	Guatemala	29,087	1.49
11	United States of America	28,973	1.49
12	Philippines	20,719	1.06
13	South Africa	19,482	1.00
14	Argentina	19,040	0.91
15	Egypt	16,316	0.84
16	Viet Nam	15,270	0.78
17	Myanmar	11,846	0.61
18	Peru	10,929	0.56
19	Bolivia (Plurinational State of)	9,558	0.49
20	Iran (Islamic Republic of)	9,285	0.48
21	Ecuador	9,258	0.48
22	Cuba	8,725	0.45
23	Nicaragua	7,372	0.38
24	El Salvador	7,178	0.37
25	Paraguay	58,19.5	0.30
	Total of 25 countries	**1,751,325**	**90.01**
	World Total	**1,907,025**	**100.00**

Source: World statistics year book 2019

118. In terms of **yield** kgs per hectare, Peru lies at the top with 12,548.76 thousand kgs per hectare followed by Egypt 11,574.27 thousand kgs per hectare and Senegal, Guatemala, Malawi with 11,325.47, 10,767.25, 10,756.13 thousand kgs per hectare correspondingly. It is an upsetting situation that Pakistan ranks at 41st in terms of yield with 6,432.15 thousand kgs per hectare, which is far below the international average while India lies at 16th position with 3,010.45 tons per hectare. The world average yield of sugarcane is 72,664.8 thousand kgs (72.66 tons per hectare) (Annex-XXII).

Table-28: Yield Per Hectare of Major Sugarcane Producing Countries in the World: 2019 Crop

S.No.	Country	**Yield (kg)ha**	S.No.	Country	**Yield (kg)ha**
1	Peru	12,548.76	22	Mauritius	7,558.15
2	Egypt	11,574.27	23	Australia	7,483.56
3	Senegal	11,325.47	24	Brazil	7,468.33
4	Guatemala	10,767.25	25	Mexico	7,454.18
5	Malawi	10,756.13	26	Mali	7,244.09
6	Chad	10,378.29	27	Thailand	7,138.75
7	Zambia	10,332.47	28	Colombia	7,135.03
8	Burkina Faso	10,098.15	29	Panama	7,113.32
9	Eswatini	9,642.11	30	Costa Rica	7,059.25
10	Nicaragua	9,557.15	31	United Republic of Tanzania	6,991.00
11	El Salvador	8,864.55	32	Sierra Leone	6,978.63
12	French Polynesia	8,845.00	33	Mozambique	6,953.85
13	Honduras	8,684.13	34	Uganda	6,893.70
14	Cote d'Ivoire	8,217.56	35	China, Taiwan Province of	6,649.10
15	Iran (Islamic Republic of)	8,205.87	36	Haiti	6,616.49
16	**India**	**8,010.45**	37	Indonesia	6,560.42
17	United States of America	7,839.80	38	Viet Nam	6,542.66
18	Zimbabwe	7,743.48	39	South Africa	6,524.29
19	China, mainland	7,736.06	40	Myanmar	6,503.24
20	Sudan	7,663.85	**41**	**Pakistan**	**6,432.15**
21	Ecuador	7,599.99		**World average**	**72,664.79**

Source: World statistics year book 2019

22. MEASURES FOR IMPROVING PRODUCTIVITY

119. In view of high-water requirement of sugarcane and increasing water shortages, horizontal expansion of this crop is not feasible. Hence, the enhanced productivity is the only way forward to maintain the regular supply of sugarcane as raw material to 2nd largest agro-based sugar industry of Pakistan. API has recommended the following productivity enhancement measures.

22.1 Varietal Development

120. 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.

22.2 Improved Cultural practices

121. Provincial Departments of Agriculture Extension should take the following steps in this regard:

- Land should be prepared by deep ploughing at least after every two years. The soil should be discked.
- Modernizing technology for improving productivity and competitiveness in the sugar industry.
- Need for improvement in efficiency and productivity of irrigation water and fertilizer.
- Chemicals and bio-control agents for the management of pests and diseases be introduced.
- Promote use of deep tillage for seedbed preparation for sugarcane cultivation.
- Practice recommended 'row to row' distance in sugarcane fields for effective weed control.
- Use healthy seed of improved varieties of fresh crop of sugarcane and discourage cultivation of un-approved varieties.
- Motivate farmers for 'Hot Water Treatment' of sugarcane sets for disease control.
- To conserve water, there is a need for improvement in efficiency and productivity of irrigation water.
- Apprise the farmers for achieving the desirable plant population per acre.
- Awareness to the farmers for using press mud to improve soil fertility.
- Educate sugarcane growers for using different fertilizers in recommended dosage.
- Well decayed farmyard manure (FYM) should be applied prior to land preparation.
- Apprise the growers about use of weedicides for controlling weeds.

22.3 Biological Control

122. The government should emphasize Pakistan Sugar Mills Association and Provincial Research Institutes to establish Integrated Pest management (IPM) labs for rearing predators for disease control in sugarcane crop.

22.4 Role of Sugar Industry in Cane Development

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

- Take responsibility for a campaign against pest and plant diseases, but on a limited scale.
- Study soils in sugarcane producing areas and to relate these to crop management.
- 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
- Investigate the agronomic problems of sugarcane production and soil conditions
- Take concrete measures to multiply and disseminate high sucrose varieties along-with 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.

22.5 Low Sugar Recovery

124. Provincial Research Institutes and PARC should determine the reasons for low sugar recovery. The comparison with the world sugar recovery rate, which is on average lower than 10 percent, indicates that efforts are required to enhance this percentage, in order to increase sugar production. The best practices in Brazil and other developed countries need to be adopted and new technologies introduced for achieving countries of scale and comparative advantage in the export market.

23. ACKNOWLEDGEMENT

125. The technical contribution and professional efforts of the following staff members are highly appreciated in completion of Sugarcane Policy Report for 2020-21 Crop:

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1	Mr. Hussain Ali Turi	Chief
2	Mr. Muhammad Amin	Chief **(Coordinator)**
3	Dr. Farrah Yasmin	Assistant Chief **(Deputy Coordinator)**
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8	Mr. Shamir Ahmed	Assistant Private Secretary **(Composed the Report)**
9	Mr. Muhammad Naeem	Machine Operator
10	Mr. Shakeel Ahmed	Naib Qasid

Abdul Karim
Director General

ANNEX-I

PROVINCE-WISE AREA ,PRODUCTION AND YIELD OF SUGARCANE IN PAKISTAN : 2010-11 TO 2020-21

YEAR	PUNJAB	SINDH	KPK	BALOCHISTAN	PAKISTAN
AREA	---------- 000 hectares ----------				
2010-11	672.2	226.5	88.4	0.60	987.7
2011-12	761.2	189.7	105.9	0.70	1057.5
2012-13	767.7	253.7	106.7	0.65	1128.8
2013-14	756.8	297.6	117.4	0.67	1172.5
2014-15	710.6	316.7	112.5	0.66	1140.5
2015-16	705.4	312.8	112.7	0.70	1131.6
2016-17	777.8	320.5	118.6	0.66	1217.6
2017-18	859.1	333.3	148.5	0.86	1341.8
2018-19	710.6	279.5	111.0	0.87	1102.0
2019-20	643.4	286.1	109.4	0.89	1039.8
2020-21	777.0	279.7	107.4	0.92	1165.0
YIELD	---------- Tonnes per hectare ----------				
2010-11	55.76	60.78	45.59	51.33	56.00
2011-12	56.35	56.87	44.23	44.86	55.22
2012-13	55.99	62.93	44.71	48.46	56.48
2013-14	57.75	61.70	45.67	48.06	57.54
2014-15	57.80	52.46	45.40	47.42	55.09
2015-16	59.50	57.49	48.79	45.29	57.87
2016-17	63.79	63.05	47.46	48.17	61.99
2017-18	64.10	61.84	51.25	50.47	62.11
2018-19	63.19	59.72	49.84	50.92	60.96
2019-20	67.37	60.24	52.60	50.79	63.84
2020-21	73.36	65.55	52.40	50.65	69.53
PRODUCTION	---------- 000 Tonnes ----------				
2010-11	37481.0	13766.4	4030.3	30.8	55308.5
2011-12	42893.0	10788.3	4684.3	31.4	58397.0
2012-13	42982.0	15966.2	4770.2	31.5	63749.9
2013-14	43704.0	18362.5	5361.4	32.2	67460.1
2014-15	41074.0	16613.8	5107.0	31.3	62826.1
2015-16	41968.2	17984.3	5498.3	31.7	65482.5
2016-17	49613.0	20208.9	5628.7	31.6	75482.2
2017-18	55067.5	20611.9	7610.0	43.4	83332.8
2018-19	44906.3	16691.3	5532.0	44.3	67173.9
2019-20	43346.6	17233.8	5754.0	45.2	66379.6
2020-21	57000.0	18335.5	5627.5	46.6	81009.6

Sources:
1- For 2010-11 to 2018-19 : Previous Policy of Sugarcane for 2019-20 crop
2- For 2019-20: Final estimates provided by concerned Provincial Agriculture Departments.
3- For 2020-21: Final estimate of Punjab, Sindh and KPK and second estimate of Baloch. provided by concerned Provincial Agriculture Departments.

ANNEX-II

PROVINCE-WISE AREA ,PRODUCTION AND YIELD OF SUGARCANE IN PAKISTAN : 2010-11 TO 2020-21

YEAR	PUNJAB	SINDH	KPK	BALOCHISTAN	PAKISTAN
AREA	---------- 000 acres ----------				
2010-11	1661.1	559.7	218.4	1.5	2440.7
2011-12	1881.0	468.8	261.7	1.7	2613.2
2012-13	1897.1	626.9	263.7	1.6	2789.3
2013-14	1870.1	735.4	290.1	1.7	2897.3
2014-15	1756.0	782.6	278.0	1.6	2818.2
2015-16	1743.1	773.0	278.5	1.7	2796.3
2016-17	1922.0	792.0	293.1	1.6	3008.7
2017-18	2122.9	823.6	367.0	2.1	3315.6
2018-19	1756.0	690.7	274.3	2.1	2723.1
2019-20	1589.9	707.0	270.3	2.2	2569.4
2020-21	1920.0	691.2	265.4	2.3	2878.9
YIELD	---------- Tonnes per acre ----------				
2010-11	22.56	24.60	18.45	20.77	22.66
2011-12	22.80	23.01	17.90	18.15	22.35
2012-13	22.66	25.47	18.09	19.61	22.86
2013-14	23.37	24.97	18.48	19.45	23.28
2014-15	23.39	21.23	18.37	19.19	22.29
2015-16	24.08	23.27	19.74	18.33	23.42
2016-17	25.81	25.52	19.21	19.49	25.09
2017-18	25.94	25.03	20.74	20.42	25.13
2018-19	25.57	24.17	20.17	20.61	24.67
2019-20	27.26	24.38	21.28	20.55	25.83
2020-21	29.69	26.53	21.20	20.50	28.14
	688				
PRODUCTION	---------- 000 Tonnes ----------				
	656				
2010-11	37481.0	13766.4	4030.3	30.8	55308.5
2011-12	42893.0	10788.3	4684.3	31.4	58397.0
2012-13	42982.0	15966.2	4770.2	31.5	63749.9
2013-14	43704.0	18362.5	5361.4	32.2	67460.1
2014-15	41074.0	16613.8	5107.0	31.3	62826.1
2015-16	41968.2	17984.3	5498.3	31.7	65482.5
2016-17	49613.0	20208.9	5628.7	31.6	75482.2
2017-18	55067.5	20611.9	7610.0	43.4	83332.8
2018-19	44906.3	16691.3	5532.0	44.3	67173.9
2019-20	43346.6	17233.8	5754.0	45.2	66379.6
2020-21	57000.0	18335.5	5627.5	46.6	81009.6

Sources:
1- For 2010-11 to 2018-19 : Previous Policy of Sugarcane for 2019-20 crop
2- For 2019-20: Final estimates provided by concerned Provincial Agriculture Departments.
3- For 2020-21: Final estimate of Punjab, Sindh and KPK and second estimate of Baloch. provided by concerned Provincial Agriculture Departments.

ANNEX-III

DISTRICT- WISE AREA, YIELD AND PRODUCTION OF SUGARCANE
AVERAGE OF 2018-19 TO 2020-21

Area: 000 ha
Production: 000 tonnes
Yield: Tonnes/hectare

S. No	Province/ District/ Agency	Area	Production	Share in total production	Yield	S.No	Province/ District/ Agency	Area	Production	Share in total production	Yield
	PUNJAB						**KHYBER PAKHTUNKHWA**				
1	R.Y.Khan	171.76	12624.72	17.65	73.50	1	Charsadda	30.32	1690.03	2.36	55.74
2	Faisalabad	80.59	5498.54	7.69	68.23	2	D.I.Khan	25.13	1565.38	2.19	62.30
3	Sargodha	59.01	3814.41	5.33	64.64	3	Mardan	29.79	1280.82	1.79	42.99
4	Muzaffargarh	44.61	3279.06	4.58	73.51	4	Peshawar	10.69	555.11	0.78	51.91
5	Rajanpur	39.64	3079.25	4.31	77.69	5	Malakand	4.86	192.36	0.27	39.58
6	Jhang	46.68	2979.63	4.17	63.84	6	Nowshera	3.75	191.39	0.27	51.11
7	Chiniot	37.99	2656.41	3.71	69.92	7	Swabi	2.36	91.76	0.13	38.93
8	T T.Singh	30.77	2029.02	2.84	65.94	8	Bannu	0.47	21.66	0.03	46.22
9	Bhakkar	29.40	1781.65	2.49	60.59	9	Tank	0.71	20.40	0.03	28.83
10	Kasur	20.97	1249.15	1.75	59.57	10	Khyber AG.	0.68	15.97	0.02	23.49
11	M B.Din	21.50	1246.13	1.74	57.96	11	Mohmand AG.	0.15	4.90	0.01	32.37
12	Bahawalpur	17.56	1216.59	1.70	69.27	12	Bunir	0.06	2.20	0.00	34.72
13	Layyah	16.50	1119.52	1.57	67.86	13	Haripur	0.05	1.50	0.00	31.48
14	Vehari	12.05	810.61	1.13	67.26	14	Kohat	0.04	1.50	0.00	34.84
15	Bahawalnagar	11.10	753.16	1.05	67.83	15	F.R.D.I.Khan	0.11	1.02	0.00	9.22
16	D.G.Khan	9.48	716.99	1.00	75.65	16	Hangu	0.02	0.63	0.00	35.09
17	Nankana Sahib	9.12	548.46	0.77	60.15	17	F.R.Peshawar	0.04	0.52	0.00	13.19
18	Okara	9.11	541.91	0.76	59.47	18	F.R Hasan Khel	0.01	0.37	0.00	28.77
19	Khanewal	6.07	358.90	0.50	59.11	19	F.R.Bannu	0.02	0.14	0.00	8.60
20	Khushab	6.72	347.07	0.49	51.67	20	Lakki Marwat	0.00	0.09	0.00	38.57
21	Hafizabad	5.27	344.62	0.48	65.34	21	Mansehra	0.00	0.06	0.00	24.00
22	Lodhran	3.97	265.78	0.37	66.87						
23	Multan	3.94	232.65	0.33	59.00						
24	Mianwali	3.18	194.04	0.27	61.01						
25	Sahiwal	2.78	173.99	0.24	62.66						
26	Sheikhupura	1.85	127.46	0.18	68.81						
27	Gujrat	2.24	101.73	0.14	45.35						
28	Pakpattan	1.32	79.03	0.11	59.93						
29	Gujranwala	1.57	78.81	0.11	50.20						
30	Sialkot	1.45	75.11	0.11	51.73						
31	Narowal	1.32	52.85	0.07	40.08						
32	Lahore	0.53	30.66	0.04	58.14						
33	Jhelum	0.26	9.74	0.01	37.84						
	Sub Total	**710.33**	**48417.64**	**67.70**	**68.16**		**Sub Total**	**109.26**	**5637.84**	**7.88**	**51.60**
	SINDH						**BALOCHISTAN**				
1	Ghotki	58.61	3870.23	5.41	66.03	1	Sibi	0.63	31.43	0.04	49.68
2	Thatta	36.11	2324.07	3.25	64.36	2	Jaffarabad	0.25	12.99	0.02	53.01
3	Nawabshah	32.15	2126.61	2.97	66.14	3	Lasbela	0.02	0.82	0.00	51.42
4	N.Feroze	22.05	1443.09	2.02	65.46						
5	Khairpur	22.28	1389.20	1.94	62.36						
6	Tando Allahyar	19.29	1146.90	1.60	59.45						
7	Tando Muhammad	13.62	835.60	1.17	61.34						
8	Mirpurkhas	15.16	824.18	1.15	54.36						
9	Matiari	12.31	811.22	1.13	65.92						
10	Sanghar	13.07	784.12	1.10	59.98						
11	Badin	14.72	683.02	0.95	46.39						
12	Sukkur	7.06	404.70	0.57	57.36						
13	Dadu	6.63	317.51	0.44	47.86						
14	Hyderabad	5.61	300.55	0.42	53.59						
15	Unerkot	1.27	57.84	0.08	45.55						
16	Larkana	0.71	47.87	0.07	67.84						
17	Jamshoro	0.43	20.00	0.03	46.70						
18	Tharparkar	0.24	12.45	0.02	51.24						
19	Shikarpur	0.18	8.46	0.01	46.58						
20	Kashmore	0.11	6.09	0.01	53.93						
21	Jacobabad	0.09	3.59	0.01	41.09						
22	Shadadkot	0.05	2.91	0.00	54.99						
	Sub Total	**281.75**	**17420.23**	**24.36**	**61.83**		**Sub Total**	**0.89**	**45.24**	**0.06**	**50.62**
							Pak Total	**1102.24**	**71520.95**	**100.00**	**64.89**

Notes:
1. Data have been arranged in decending order of production.
2. Percentage shares are calculated on the basis of country total.

Sources:
1- MINFAL, Islamabad
2- Respected Agriculture Provincial Departments

ANNEX-IV

AVERAGE FARMER'S COST OF PRODUCTION ESTIMATES OF SUGARCANE IN PUNJAB : 2020-21 AND 2021-22 CROP

S. No	Operations / Inputs	Unit	Average No. of units/ acre	For 2020-21 crop		For 2021-22 crop		Change in 2021-22 over 2020-21
				Cost per unit	Cost per acre	Cost per unit	Cost per acre	
1	2	3	4	5	6 =4*5	7	8 =4*7	9=8-6
1	**Land preparation:**					Rupees		
	1.1 Deep ploughing	No.	0.500	1,600	928.0	2,000	1,000.0	72
	1.2 Rotavator/disc plough used	No.	1.000	1,700	1,700.0	1,750	1,750.0	50
	1.3 Ploughing	No.	3.000	900	3,600.0	1,000	3,000.0	(600)
	1.4 Planking	No.	1.000	450	450.0	500	500.0	50
	1.5 Levelling	Hour	0.500	1,275	1,761.0	1,300	650.0	(1,111)
2	**Seed bed preparation:**							
	2.1 Ploughing	No	1.000	900	900.0	1,000	1,000.0	100
	2.2 Ridge making with tractor	Hour	0.500	900	450.0	1,000	500.0	50
	2.3 Clearing soil at ends of ridges (labor charges)	M. day	1.000	600	600.0	800	800.0	200
3	**Seed and sowing operations:**							
	3.1 Seed used	Marlas/ acre	10.000	1,050	10,500.0	1,500	15,000.0	4,500
	3.2 Contract sowing - including harvesting, stripping, making of sets for seed, transport and sowing	Rs./ acre			4,500.0		4,800.0	300
4	**Irrigation:**							
	4.1 Canal				250.0		250.0	
	4.2 Tubewell	Irrig/acre	7.000	890	6,230.0	925	6,475.0	245
	4.3 Mixed	Irrig/acre	2.000	445	1,140.0	500	1,000.0	(140)
	4.4 Labour for irrigation and water course cleaning	M. days/ acre	2.000	600	1,200.0	800	1,600.0	400
5	**Interculture/ hoeing:**							
	5.1 Manual hoeing on contract	No. of hoeings	1.000	1,250	1,750.0	1,300	1,300.0	(450)
	5.2 With tractor	Hour/acre	0.500	900	450.0	1,000	500.0	50
6	**Plant protection including application cost :**							
	6.1 weedicide	No. of appli	1.000	1,100	1,100.0	1,200	1,200.0	100
	6.2 Sprays	"	1.000	900	900.0	1,000	1,000.0	100
	6.3 Application cost	Rs./appli/acre	0.500	225	675.0	800	400.0	(275)
7	Farm yard manure including transport and application cost	No. of trolleys	0.250	3,200	1,300.0	4,000	1,000.0	(300)
8	**Fertilizers: (bags) :**							
	8.1 DAP	No. of bags	2.000	3,400	6,800.0	7,100	14,200.0	7,400
	8.2 Urea	"	2.000	1,650	5,940.0	1,800	3,600.0	(2,340)
	8.3 NP	"	0.500	2,550	1,326.0	3,600	1,800.0	474
	8.4 CAN	"	0.250	1,400	350.0	1,500	375.0	25
	8.5 SOP	"	0.250	4,100	2,870.0	4,800	1,200.0	(1,670)
	8.6 Fertilizer transport and application cost	"	5.000	85	601.0	90	450.0	(151)
9	Traded inputs' cost (Item 1 to 8 minus Item 4.1)	Rs./acre			58,271.0		65,100.0	6,829
10	Mark up on item 9 @ 12% per annum for 13 months	"			8,146.0		8,463.0	317
11	**Land rent for 13 months**	"		35,000	37,916.7	40,000	43,333.3	5,417
12	**Other Costs:** i) Average weighted land tax @ Rs 132/acre/annum for 13 months	"			132.0		132.0	-
	ii) Management charges for 13 months	"	1.08		3,000.0		2,600.0	(400)
13	Crop harvesting, stripping, binding, loading, etc.	Rs./40 Kg		22	15,400.0	22	15,840.0	440
14	**Gross cost of cultivation**	Rs./acre			122,865.7		135,468.3	12,603
15	Sunsidy on DAP fertilizer	Rs/bag					900.0	
16	Value of tops	Rs/acre					1,500.0	
17	**Net cost of cultivation**				122,865.7		133,068.3	
18	**Yield**	40Kg/acre			700.0		720.0	
19	**Cost of production**							
	19.1 At farm level including land rent	Rs./40 Kg			175.5		184.8	
	19.2 At farm level excluding land rent	Rs./40 Kg			121.4		124.6	3
18	**Marketing cost :**							
	18.1 Transportation	Rs./40 Kg			17.5		18.0	1
	18.2 Road Cess	Rs./40 Kg			1.0		1.5	1
19	**Cost of production :**							
	19.1 At mill gate including land rent	Rs./40 Kg			194.0		204.3	10
	19.2 At mill gate Excluding land rent	Rs./40 Kg			139.9		144.1	4

Source:

1 For rates/ prices of inputs, API field survey , 2021

2 For input rates, field surveys of API for respective years.

ANNEX-V

ESTIMATES FOR AVERAGE FARMER'S COST OF PRODUCTION OF SUGARCANE IN SINDH: 2020-21 AND 2021-22 CROP

S. No	Operations / Inputs	Unit	Average No. of units/used acre	For 2020-21 crop		For 2021-22 crop		Change in 2021-22 over 2020-21
				Cost per unit	Cost per acre	Cost per unit	Cost per acre	
1	2	3	4	5	6 =4x5	7	8 =7x4	9=8-6
1	Land preparation:				Rupees			
	1.1 Deep ploughing	No	0.680	1,800.0	1,224.0	2,000.0	1,360.0	136
	1.2 Ploughing	No	4.000	1,250.0	5,000.0	1,275.0	5,100.0	100
	1.3 Planking	No	1.000	625.0	625.0	637.5	637.5	13
	1.4 Tractor levelling	Hour	0.300	1,250.0	375.0			-375
	1.5 Laser levelling	"	1.000	1,300.0	1,300.0	1,325.0	1,325.0	25
2	Seed bed preparation							
	2.1 Ploughing	No	1.000	1,250.0	1,250.0	1,275.0	1,275.0	25
	2.2 Ridge making with tractor	Hrs.	0.500	1,300.0	650.0	1,325.0	662.5	13
	2.3 Clearing soil at ends of ridges	M. day	1.000	600.0	600.0	650.0	650.0	50
3	Seed and sowing operations:							
	3.1 Seed used	40 Kgs	89.000	185.0	16,465.0	200.0	17,800.0	1335
	3.2 Contract sowing including harvesting, stripping, making of sets, transport and sowing	Rs./ acre			3,700.0		3,800.0	100
4	Irrigation							
	4.1 Canal	Irrigs./acre	18.000		250.0		250.0	0
	4.2 Private tubewell (RS./irrigation)	Irrigs./acre	1.000	775.0	775.0	800.0	800.0	25
	4.3 Mixed	Irrigs./acre	2.160	775.0	1,674.0	800.0	1,728.0	54
	4.4 Labour for irrigation and water course cleaning	M. day	2.000	600.0	1,200.0	650.0	1,300.0	100
5	Interculture/ hoeing							
	5.1 Manual	M. day	2.000	2,100.0	4,200.0	2,200.0	4,400.0	200
	5.2 Hoeing with tractor	No	1.800	1,300.0	2,340.0	1,325.0	2,385.0	45
6	Plant protection including application cost							
	6.1 weedicide	No. of sprays	1.000	950.0	950.0	1,100.0	1,100.0	150
	6.2 Sprays	"	1.200	850.0	1,020.0	950.0	1,140.0	120
	6.3 Application cost	Rs/acre	2.200	175.0	385.0	200.0	440.0	55
7	Farm Yard Manure including transport & application cost (50%)	No	0.320	2,000.0	640.0	2,100.0	672.0	32
8	Fertilizers: (bags)							
	8.1 DAP	No	1.500	3,500.0	5,600.0	7,100.0	10,650.0	5050
	8.2 Urea	"	3.000	1,850.0	7,400.0	1,900.0	5,700.0	-1700
	8.3 NP	"	0.560	2,800.0	1,568.0	3,150.0	1,764.0	196
	8.5 SOP	"	0.200	4,500.0	900.0	4,300.0	860.0	-40
	8.6 Fertilizer transport and application cost	"	5.260	100.0	666.0	110.0	578.6	-87
9	Traded inputs cost (Item 1 to 8-Item 4.1)	Rs./acre			60,507.0		66,127.6	5621
10	Mark up on item 9 @ 13% per annum for 13 month	"			8,521.4		9,313.0	792
11	Land rent	"		30,000.0	32,500.0	37,500.0	40,625.0	8125
12	Other Costs: i) Average weighted land tax	"			132.0		132.0	0
	ii). Management charges for 13 months	"			3,000.0		3,000.0	0
13	Crop harvesting, stripping, binding, loading, etc.	Rs./ 40 Kg		17.0	11,220.0	17.0	11,560.0	340
14	Total cost of cultivation	Rs./ acre			116,130		131,008	14877
15	Sunsidy on DAP fertilizer	Rs/bag					900	
15	Value of tops	Rs/acre					1,500	
16	Net cost of cultivation				11,220		128,608	
17	Yield	40 Kg/acre			660.00		680.00	20
18	Cost of production at farm level:							
	18.1 Including land rent	Rs./ 40 Kg			176.0		189.1	13.2
	18.2 Excluding land rent	Rs./ 40 Kg			126.7		129.4	2.7
19	Marketing cost :							
	19.1 Transport	Rs./40 Kg			17.5		18.0	0.5
	19.2 Road Cess	Rs./40 Kg			1.0		1.0	0.0
20	Cost of production at mill gate:							
	20.1 Including land rent	Rs./ 40 Kg			**194.46**		**208.13**	13.7
	20.2 Excluding land rent	Rs./ 40 Kg			145.21		148.39	-3.2

Sources:

1 For input usage,-API field survey , 2021

2 For input rates, field surveys of API for respective years.

Annex-VI

ECONOMICS OF SUGARCANE AND COMPETING CROPS AT
PRICES REALIZED BY THE GROWERS: 2020-21 CROPS

S #	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	Acre inch of water used
		Days	Acre inches	.....Rupees per acre.....					Ratio	.....Rupees.....		
	1	2	3	4	5	6	7=6-5	8=6-4	9=6/4	10=6/5	11=6/2	12=6/3
	Punjab											
1	Sugarcane	394	48	122786	39703	162050	122347	39264	1.32	4.08	411	3376
2	Seed Cotton	240	22	76796	25962	89680	63718	12884	1.17	3.45	374	4076
3	Basmati Paddy	180	58	63164	32362	72846	40484	9682	1.15	2.25	405	1256
4	IRRI Paddy	180	62	64507	28885	65244	36359	736	1.01	2.26	362	1052
5	Wheat	180	12	53313	16857	60400	43543	7087	1.13	3.58	336	5033
6	Sunflower (spring)	180	22	55703	19098	74250	55152	18547	1.33	3.89	413	3375
7	Seed Cotton + Wheat	420	34	130108	42820	150080	107260	19972	1.15	3.50	357	4414
8	Seed Cotton+Sunflower	420	44	132499	45061	163930	118869	31431	1.24	3.64	390	3726
9	Basmati Paddy+Wheat	360	70	116477	49219	133246	84027	16770	1.14	2.71	370	1904
10	Basmati Paddy+Sunflower	360	80	118867	51460	147096	95636	28229	1.24	2.86	409	1839
11	IRRI Paddy + Wheat	360	74	117820	45742	125644	79902	7824	1.07	2.75	349	1698
12	IRRI Paddy+Sunflower	360	84	120211	47983	139494	91511	19283	1.16	2.91	387	1661
	Sindh											
1	Sugarcane	488	71	116096	37238	152790	115552	36694	1.32	4.10	313	2152
2	Seed Cotton	240	18	81210	28060	92422	64362	11212	1.14	3.29	385	5135
3	IRRI Paddy	180	56	50593	19677	76250	56573	25657	1.51	3.88	424	1362
4	Wheat	180	12	54556	17571	70000	52429	15444	1.28	3.98	389	5833
5	Sunflower (spring)	180	22	39958	14393	51909	37517	11951	1.30	3.61	288	2360
6	Seed Cotton + Wheat	420	30	135766	45631	162422	116791	26656	1.20	3.56	387	5414
7	Seed Cotton+Sunflower	420	40	121169	45631	144331	98700	23163	1.19	3.16	344	3608
8	IRRI Paddy+ Wheat	360	68	105149	37249	146250	109001	41101	1.39	3.93	406	2151
9	IRRI Paddy+Sunflower	360	78	90551	34070	128159	94090	37608	1.42	3.76	356	1643

Notes for Annex - vi:

1. The economic analysis presented in the above exercise is based on the input-output prices applicable for 2020-21crops.

2. The data regarding input-output parameters have been adopted from the API's price policy papers for sugarcane, seed cotton, rice paddy and wheat, 2020-21 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 2020-21 crops. To incorporate the escalations in input prices, which occurred during the growing period of 2020-21 crops, some marginal revisions/updates have been incorporated.

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

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

   4.1 The support price of Rs 1800 per 40 kgs, as maintained by the Punjab and Rs 2000 by Sindh for 2020-21 crop, have 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 have averaged at Rs 2000 and Rs 1300 per 40 kgs, respectively. While, the average price of IRRI paddy in Sindh is reported at Rs 1500 per 40 kgs.

   4.3 The wholesale market prices of seed cotton during the post-harvest months of 2020-21 in the main producer area markets have averaged at Rs 4524 per 40 kgs in the Punjab and Rs 4241 Sindh.

   4.4 The price of Sunflower crops has been reported hovering around Rs 4000/40 kgs and Rs 4000/40 kgs for Canola during 2020-21.

   4.5 The average market prices of sugarcane as realized by the farmers are taken for the analysis i.e Rs 250 per 40 kgs in the Punjab and Sindh. However, the prices notified by the provincial governments were lower i.e Rs 200 and 202, respectively for Punjab and 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 18.5 per 40 kgs in Punjab and Sindh for sugarcane, Rs 40 for seed cotton in Punjab and Sindh, Rs 50 for rice paddy in Punjab and Sindh, and for wheat and oilseeds, Rs 40 in Punjab and Rs 45 in Sindh.

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

ANNEX-VII

GROSS REVENUE OF SUGARCANE, TRADED INPUTS AND DOMESTIC FACTOR COST IN PUNJAB ESTIMATED ON THE BASIS OF PRIVATE AND SOCIAL PRICES (BASIS - IMPORT PARITY PRICE OF SUGAR)

Description	Revenue	Traded Inputs Cost	Domestic Factor Cost	Profit
	-------- Rupees per acre --------			
2016-17				
Private Prices	108000	27990	57909	22101
Social Prices	94752	24249	31534	38969
Transfers	13248	3741	26375	-16868
2017-18				
Private Prices	108000	26369	54348	27283
Social Prices	82386	25769	31873	24745
Transfers	25614	600	22476	2538
2018-19				
Private Prices	118710	44975	60812	12923
Social Prices	112768	43173	31731	37864
Transfers	5942	1802	29081	-24941
2019-20				
Private Prices	130840	46475	69712	14652
Social Prices	136741	44217	37191	55334
Transfers	-5902	2259	32521	-40682
2020-21				
Private Prices	175000	46884	75902	52214
Social Prices	148162	44491	42742	60929
Transfers	26838	2393	33160	-8715

ANNEX-VIII

GROSS REVENUE OF SUGARCANE, TRADED INPUTS AND DOMESTIC FACTOR COST IN PUNJAB ESTIMATED ON THE BASIS OF PRIVATE AND SOCIAL PRICES (BASIS - EXPORT PARITY PRICE OF SUGAR)

Description	Revenue	Traded Inputs Cost	Domestic Factor Cost	Profit
	--------- Rupees per acre ---------			
2016-17				
Private Prices	108000	27990	57909	22101
Social Prices	57492	24249	31534	1709
Transfers	50508	3741	26375	20392
2017-18				
Private Prices	108000	26369	54348	27283
Social Prices	62388	25769	31873	4747
Transfers	45612	600	22476	22536
2018-19				
Private Prices	118710	44975	60812	12923
Social Prices	51032	43173	31731	-23872
Transfers	67678	1802	29081	36795
2019-20				
Private Prices	130840	46475	69712	14652
Social Prices	75908	44217	37191	-5500
Transfers	54932	2259	32521	20152
2020-21				
Private Prices	175000	46884	75902	52214
Social Prices	91924	44491	42742	4691
Transfers	83076	2393	33160	47523

ANNEX-IX

GROSS REVENUE OF SUGARCANE, TRADED INPUTS AND DOMESTIC FACTOR COST IN SINDH ESTIMATED ON THE BASIS OF PRIVATE AND SOCIAL PRICES (BASIS - IMPORT PARITY PRICE OF SUGAR)

Description	Revenue	Traded Inputs Cost	Domestic Factor Cost	Profit
	-------- Rupees per acre --------			
2016-17				
Private Prices	132832	34082	61822	36928
Social Prices	108651	28796	59621	20234
Transfers	24181	5286	2201	16693
2017-18				
Private Prices	134356	35922	63783	34652
Social Prices	110338	30330	63688	16320
Transfers	24018	5592	95	18332
2018-19				
Private Prices	140590	44029	61533	35028
Social Prices	138028	36742	61772	39514
Transfers	2562	7287	-239	-4486
2019-20				
Private Prices	145106	46429	63544	35132
Social Prices	159309	38760	63376	57173
Transfers	-14203	7670	168	-22041
2020-21				
Private Prices	186220	47201	68895	70124
Social Prices	176210	39414	69394	67402
Transfers	10010	7788	-499	2722

ANNEX-X

GROSS REVENUE OF SUGARCANE, TRADED INPUTS AND DOMESTIC FACTOR COST IN SINDH ESTIMATED ON THE BASIS OF PRIVATE AND SOCIAL PRICES (BASIS - EXPORT PARITY PRICE OF SUGAR)

Description	Revenue	Traded Inputs Cost	Domestic Factor Cost	Profit
	--------- Rupees per acre ---------			
2016-17				
Private Prices	132832	34082	61822	36928
Social Prices	84349	28796	59621	-4068
Transfers	48483	5286	2201	40996
2017-18				
Private Prices	134356	35922	63783	34652
Social Prices	85501	30330	63688	-8516
Transfers	48855	5592	95	43168
2018-19				
Private Prices	140590	44029	61533	35028
Social Prices	70569	36742	61772	-27945
Transfers	70021	7287	-239	62973
2019-20				
Private Prices	145106	46429	63544	35132
Social Prices	92207	38760	63376	-9929
Transfers	52899	7670	168	45061
2020-21				
Private Prices	186220	47201	68895	70124
Social Prices	112286	39414	69394	3478
Transfers	73934	7788	-499	66646

ANNEX - XI

PER CAPITA AVAILABILITY (CONSUMPTION OF SUGAR: 2017-18 TO 2019-20
(October - September)

S. No	Items	2017-18	2018-19	2019-20
		---------Thousands tonnes----------		
1	Opoening stocks as on Ist October	1580	1495	2060
2	Production	6621	5267	4875
3	Imports	8	7	36
4	Export	1572	619	73
5	Closing stocks as on 30th September	1495	2060	0.596
6	Net availability (item 1+2+3-4-5)	5142	4090	6897
		----------Million----------		
7	Population (a)	214.09	218.31	222.23
		----------Kgs per annum----------		
8	Per capita availability (consumption)	24.02	18.73	31.04
9	Average per capita availability Average (2016-17 to 2019-20)		24.60	

Note: a). It includes the population of Pakistan, AJ&K, GB and Afghan Refugees.

Sources:

1. For stocks and production: Pakistan Sugar Mills Association, Islamabad.
2. For import and export: Federal Bureau of Statistics, Karachi.
3. For popolation of Pakistan: Economic Survey, 2020-21.

ANNEX- XII

DOMESTIC AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 2020 AND 2021

Month	Lahore	Fasilabad	Karachi	Hyderabad	Peshawar	Average
2020	---------- Rupees per 100 kgs----------					
January	7396	7111	7280	7060	7240	**7217**
February	7693	7502	7520	7350	7460	**7505**
March	7400	7629	7780	7690	7720	**7644**
April	7603	7650	7700	7560	7600	**7623**
May	7900	7650	7920	7740	7750	**7792**
June	7871	7650	7750	7420	7750	**7688**
July	7832	8154	8000	7800	9500	**8257**
August	8733	9018	9200	9000	9070	**9004**
September	9043	9121	8800	8575	9260	**8960**
October	9338	9428	9200	9000	9625	**9318**
November	9500	8911	9400	9225	9630	**9333**
December	9500	7730	7200	6975	7870	**7855**
Average	**8317**	**8130**	**8146**	**7950**	**8373**	**8183**
2021						
January	8707	8578	8500	8300	8450	**8507**
February	9018	8828	8900	8625	8998	**8874**
March	9121	9490	9300	9075	9425	**9282**
April	9121	8794	9100	8825	9425	**9053**
May	9500	8809	9400	9100	9300	**9222**
June	9500	9380	9400	9125	9400	**9361**
Average	**9161**	**8980**	**9100**	**8842**	**9166**	**9050**

Source: i Agriculture Marketing Information Services, Lahore, Punjab
ii Bureau of Supply and Prices, Karachi
iii Agriculture Marketing Services, K.P

ANNEX - XIII

AVERAGE WHOLESALE PRICES OF SUGAR IN MAJOR DOMESTIC MARKETS: 2008-09 TO 2020-21 (October- September)

Year	Lahore	Fasilabad	Karachi	Hyderabad	Peshawar	Average	Increase(+) decrease(-) in average price over
	---------- Rupees per 100 kgs----------						Percent
2008-09	4049	3997	3998	3938	4090	4014	-
2009-10	6203	6161	6138	6084	6276	6173	53.76
2010-11	6848	6706	6687	6895	6993	6826	10.58
2011-12	5326	5256	5055	5374	5350	5272	-22.75
2012-13	5117	5084	4977	4947	4772	4979	-5.56
2013-14	4942	4949	5050	5314	5113	5074	1.89
2014-15	5726	5634	5463	5529	5564	5583	10.04
2015-16	6198	6098	5975	5933	6750	6191	10.88
2016-17	6032	5889	6044	6006	6419	6078	-1.82
2017-18	4977	5008	5008	4931	4874	4960	-18.40
2018-19	5600	5883	5934	5835	6127	5876	18.47
2019-20	7737	7734	7671	7515	6578	7447	26.74
2020-21 (Oct-Jun)	9256	8883	8933	8694	9125	8978	20.56

Sources: 1. Agruculture Marketing Information Services, Punjab, Lahore.
2. Agriculture Marketing Services, Sindh, Hyderabad.
3. Agriculture Marketing Services, Peshawar, KPK.

ANNEX - XIV

AVERAGE INTERNATIONAL PRICES OF SUGAR: 2010-11 to 2021-22 (OCT-SEP)

Years	ISA Daily price of Raw sugar (Fob and stowed Caribbean ports in bulk)		London Daily price of White sugar (Fob and stowed European ports in bags of 50 kgs)		Difference between White and raw sugar prices		
Oct - Sep	US Cents/ lb	US$/ tonne	US Cents/ lb	US$/ tonne	US Cents/ lb	US$/ tonne	Per cent of White Sugar
2010-11	26.56	585.45	32.29	711.93	5.74	126.49	17.77
2011-12	22.68	499.96	27.54	607.20	4.86	107.23	17.66
2012-13	18.12	399.56	23.96	528.15	5.83	128.58	24.35
2013-14	17.42	384.02	20.96	461.99	3.54	77.97	16.88
2014-15	13.96	307.69	17.19	378.98	3.23	71.29	18.81
2015-16	16.56	370.19	20.89	460.45	3.23	71.29	18.81
2016-17	17.07	376.40	20.76	464.16	3.68	87.75	17.75
2017-18	12.96	285.62	15.84	349.12	2.88	63.50	18.19
2018-19	12.72	280.46	15.32	337.84	2.60	57.37	16.98
2019-20	12.53	276.23	16.46	362.80	3.93	86.56	23.86
2020-21	**16.36**	**360.74**	**20.32**	**448.07**	**3.96**	**87.33**	**19.49**
Oct	13.73	302.69	17.66	389.41	3.93	86.72	22.27
Nov	14.13	311.51	18.29	403.15	4.16	91.64	22.73
Dec	13.98	308.20	18.01	397.09	4.03	88.89	22.39
Jan	15.22	335.54	19.90	438.74	4.68	103.20	23.52
Feb	16.19	356.92	20.88	460.41	4.69	103.49	22.48
Mar	15.54	342.59	20.20	445.32	4.66	102.73	23.07
Apr	16.16	356.26	20.25	446.37	4.09	90.11	20.19
May	17.26	380.51	20.82	458.95	3.56	78.44	17.09
Jun	17.41	383.82	22.64	499.10	5.23	115.28	23.10
Jul	17.70	390.21	20.56	453.30	2.86	63.09	13.92
Aug	19.48	429.45	21.97	484.38	2.49	54.93	11.34
Sept	19.56	431.22	22.71	500.61	3.15	69.39	13.86

Source: International Sugar Organization (ISO), London.

ANNEX-XV

IMPORT PARITY PRICES OF SUGARCANE AT MILL-GATE ON THE BASIS OF FOB (LONDON)

PRICE OF WHITE SUGAR

S.No	Item	During					
		September 2021		2020-21 (Oct-Sept)		2018-19 to 2019-20	
		---------- US $ per tonne----------					
1.	Average fob (London) price	500.61		448.07		349.92	
2.	Freight charges upto Karachi	60		60		60	
3.	C & f cost at Karachi port	561		508		410	
4.	Exchange rate (Rs/$)	170.00		170.00		170.00	
		---------- Rs per tonne----------					
5.	C & f cost at Karachi port (Pak rupees)	95304		86372		69686	
6.	Marine insurance @ 0.2 % of c & f cost	191		173		139	
7.	**Cif cost at Karachi port**	**95494**		**86545**		**69826**	
8	Landing charges @1% of Cif Value	955		865		698	
9	L.C opening charges @0.02% of C&f Value	19		17		14	
10	Stevedoring Charges	1300		1300		1300	
11	Provision of shortage & unforeseen losses @0.05% of C&F	48		43		35	
12	Survey & lab testing, weight ment wharfage and	163		163		163	
	Clearing & forwarded charges	8		8		8	
13	TCP's Commission @ 0.75 % of C&F	715		648		523	
14	Transport charges for up country	5000		5000		5000	
15	**Incidetal charges incured on imported sugar**	**8207**		**8045**		**7741**	
16	Ex-mill/ market cost of imported sugar	103702		94589		77566	
		Punjab	**Sindh**	**Punjab**	**Sindh**	**Punjab**	**Sindh**
17	Processing cost of sugar (a)	20948	20035	19107	18275	15668	14986
18	Value of cane to produce one tonne of sugar (item 16-item 17)	82754	83667	75482	76315	61898	62581
19	Provincial base sugar recovery **(Percent) (b)**	10.41	10.64	10.41	10.64	10.41	10.64
20	Qunatity of cane in tonnes required to produce on tonne of sugar ((100/ item 19)	9.61	9.40	9.61	9.40	9.61	9.40
21	Price of one tonne of sugarcane (item 18/item 20)	8614.69	8902.12	7857.71	8119.88	6443.59	6658.58
22	**Price of 40 kgs of cane**	**344.59**	**356.08**	**314.31**	**324.80**	**257.74**	**266.34**

Note

(a) Ratio of cost of cane to processing cost has been estimated at 79.80:20.20 for Punjab and 80.68:19.32for Sindh as calculated in theS.R.O No 1259(I) 2021 by NFS&R.

(b) Respective Provincial Cane Commissioners.

Sources:

i) For average fob (London) price: International sugar Organisation.

ii) For freight, incidentals and duties: Trading Corporation of Pakistan, Karachi.

ANNEX-XVI

EXPORT PARITY PRICES OF SUGARCANE AT MILL-GATE ON THE BASIS OF (FOB LONDON) PRICES OF WHITE SUGAR

S.No	Item	During					
		September 2021		2020-21 (Oct-Sept)		2018-19 to 2019-20	
		US $ per tonne					
1.	Average fob (London) price	500.61		448.07		349.92	
2.	Exchange rate (Rs/$)	170.00		170.00		170.00	
		Rs. per tonne					
3.	Average fob Karachi price (assuming equivalent to fob London price)	85104		76172		59486	
4.	Transport charges from interior Sindh to port, special packing, inspection transit insurance, loading and unloading, clearing and forwarding and port terminal charges	18000		18000		18000	
5	Bank commission @ 1.25 % of fob price	1064		952		744	
6.	Inspection charges	429		429		429	
7.	Ex-mill price of sugar (item 3 minus items 4 through 6)	65611		56791		40314	
		Punjab	Sindh	Punjab	Sindh	Punjab	Sindh
8	Processing cost of sugar (a)	13253	12676	11472	10972	8143	7789
9	Value of cane to produce one tonne of sugar (item 7-item 8)	52358	52935	45319	45819	32170	32525
10	Provincial base sugar recovery **(Percent) (b)**	10.41	10.64	10.41	10.64	10.41	10.64
11	Quntity of cane in tonnes required to produce one tonne of sugar ((100/ item 10)	9.61	9.40	9.61	9.40	9.61	9.40
12	Price of one tonne of sugarcane (item 9/ item 11)	5450	5632	4718	4875	3349	3461
13	**Price of 40 kgs of cane**	**218.02**	**225.29**	**188.71**	**195.00**	**133.96**	**138.43**

(a) Ratio of cost of cane to processing cost has been estimated at 79.80:20.20 for Punjab and 80.68:19.32for Sindh as calculated in theS.R.O No 1259(I) 2021 by NFS&R.

(b) Respective Provincial Cane Commissioners.

Sources:

i) For average fob (London) price: International sugar Organisation.

ii) For freight, incidentals and duties: Trading Corporation of Pakistan, Karachi.

ANNEX-XVII

MILL-GATE PRICES OF SUGARCANE WORKED BACK FROM THE EXPECTED WHOLESALE MARKET PRICES OF SUGAR DURING 2020-21

S.No	Item	----------Rupees per ton----------							
1.	Average wholesale market prices of sugar	85000		90000		95000		100000	
2.	Wholesale dealer margin @5% on net price	3484		3689		3893		4098	
3.	Sales Tax @ 17%	11844		12541		13238		13934	
4.	Net price of sugar (items 1-2-3)	69672		73770		77869		81967	
		Punjab	Sindh	Punjab	Sindh	Punjab	Sindh	Punjab	Sindh
5	Processing cost of sugar (a)	14074	13461	14902	14252	15730	15044	16557	15836
6	Value of cane to produce one tonne of sugar (item 4-item 5)	55598	56211	58869	59518	62139	62825	65410	66131
7	Provincial base sugar recovery **(per cent)(b)**	10.41	10.64	10.41	10.64	10.41	10.64	10.41	10.64
8	Qunatity of cane in tonnes required to produce one tonne of sugar ((100/ item 7)	9.61	9.40	9.61	9.40	9.61	9.40	9.61	9.40
9	Price of one tonne of sugarcane (item 6/item 8)	5788	5981	6128	6333	6469	6685	6809	7036
10	**Price of 40 kgs of cane**	**231.51**	**239.24**	**245.13**	**253.31**	**258.75**	**267.38**	**272.37**	**281.45**

(a) Ratio of cost of cane to processing cost has been estimated at 79.80:20.20 for Punjab and 80.68:19.32for Sindh as calculated in theS.R.O No 1259(I) 2021 by NFS&R.

(b) Respective Provincial Cane Commissioners.

For FED: FBR, Islamabad.