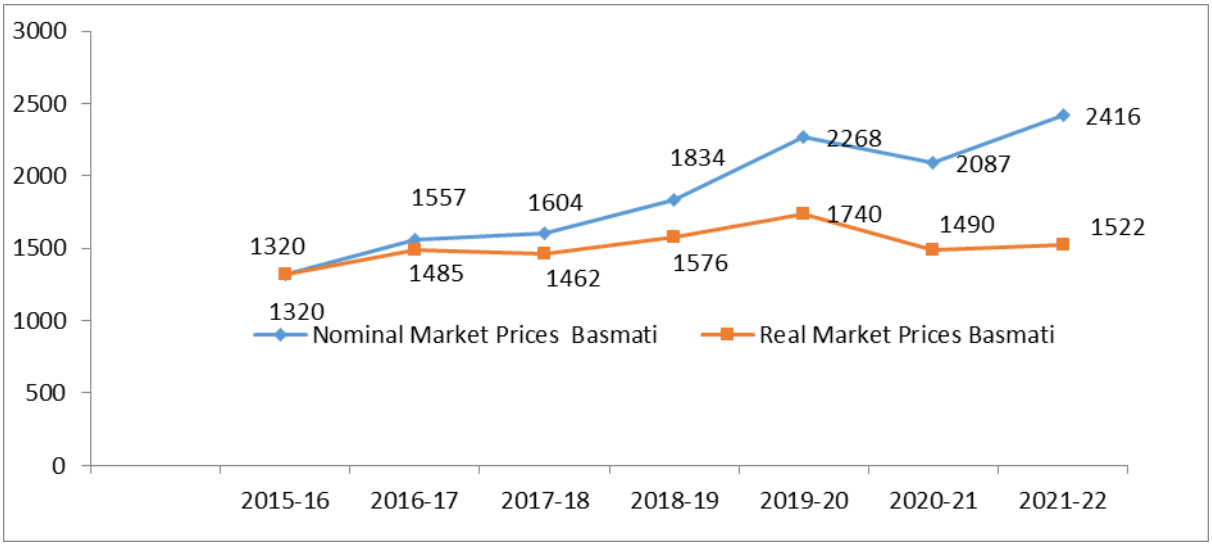
API SERIES NO. 284

RICE PADDY POLICY ANALYSIS
FOR
2022-23 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 rice 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, grower's/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

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ACRONYMS AND ABBREVIATIONS

API	Agriculture Policy Institute
BMR	Balancing Modernization Replacement
COP	Cost of Production
CPI	Consumer Price Index
DR	Dokri Research
DRC	Domestic Resource Cost
E&M	Economics and Marketing
ECC	Economic Coordination Committee of the Cabinet
EPC	Effective Protection Coefficient
FAO	Food and Agriculture Organization
FAQ	Fair Average Quality
FCA	Federal Committee on Agriculture
FOB	Free on Board
FMI	Farm Machinery Institute
FSC&RD	Federal Seed Certification and Registration Department
FYM	Farm Yard Manure
GAP	Good Agriculture Practices
GST	General Sales Tax
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
KS	Kala Shah Kaku
NFS&R	M/o National Food Security and Research
NARC	National Agricultural Research Centre
NIAB	Nuclear Institute for Agriculture and Biology
NPC	Nominal Protection Coefficient
PARC	Pakistan Agricultural Research Council
PASSCO	Pakistan Agricultural Storage and Services Corporation
PBS	Pakistan Bureau of Statistics
PSC	Punjab Seed Corporation
RRI	Rice Research Institute
SSC	Sindh Seed Corporation
WBPH	White Back Plant Hopper
WTO	World Trade Organization
CIS	Common Wealth of Independent States

RICE POLICY ANALYSIS FOR 2022-23 CROP

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Findings

1. Area and Production

- Rice production at the country level during the decade ending 2021-22 has grown @ 3.7% per annum owing to 3.0% expansion in area and 0.7% improvement in yield.

- At the country level production of rice from 2021-22 crop is estimated at 9.076 million tonnes which is higher by 7.8% against the 2020-21 production (8.420 million tonnes).

- In Punjab, production in 2021-22 increased by 8.8% which mainly happened due to 6.7% increase in area of the crop.

- In Sindh production of rice from 2021-22 crop also increased by 8.9% primarily due to 4.4% increase in area of the crop.

- Shares of the Punjab and Sindh in production of 'Basmati' varieties of rice during the period 2019-20 to 2021-22 stood at 96.9% and 3.1% respectively.

- Shares of the Punjab, Sindh, KPK and Baluchistan in production of 'Non-Basmati' varieties of rice during the period 2019-20 to 2021-22 stood at 31.5%, 53.3%, 3.5% and 11.7% respectively.

2. Domestic Prices

- Monthly average wholesale market prices of basmati paddy in Punjab during the post-harvest season of 2021-22 ranged between Rs. 2333 and Rs. 2478/ 40 Kg.

- Monthly average wholesale market prices of Kainat paddy in Punjab during the post-harvest season of 2020-21 ranged between Rs. 2221 and Rs. 3055/ 40 Kg.

- In Sindh, monthly average wholesale market prices of Non-Basmati paddy in major rice producing area markets ranged between 1394 and Rs. 1466/ 40 Kg.

3. Cost of Production

- Net cost of cultivation of basmati paddy in Punjab for 2022-23 crop (inclusive land rent) is estimated at Rs. 75352 per acre. Based on this estimate cost per 40 Kg at the market level approximates to Rs. 1944.

- Net cost of cultivation of non-basmati paddy in Punjab for 2022-23 crop (inclusive land rent) is estimated at Rs 71525 per acre. Based on this estimate cost per 40 kgs at the market level approximates to Rs 1490.

- The cost of cultivation of non-basmati paddy in Sindh for 2022-23 crop is estimated at Rs. 66145 per acre. Adding to this Rs 60/40 Kg as marketing cost, market level cost of production of non-basmati paddy in Sindh comes to Rs. 1263 per 40 kgs.

4. Economics of Rice Paddy and Competing Crops

- Resource allocation among competing enterprises is primarily guided by economic considerations as reflected in their gross cost, gross income, gross margin, net income, output-input ratio, etc. Rice, a major 'Kharif' crop, competes with cotton for land, water and other farm resources in the areas where cultivation of both crops is technically feasible. The coarse and fine varieties of rice may also compete among themselves. Rice also faces indirect competition from sugarcane, an annual crop, which occupies the land over the year.

- Basmati's performance in Punjab in terms of returns to overall investment has been slightly lower than seed cotton. Similarly, in terms of purchased inputs and irrigation water, and crop duration Basmati's returns to farmer for the farm investment were much lower than the cotton. Hence we can say that Basmati Paddy is lower than the Seed Cotton in all the economic criteria.

- In Sindh, Non-Basmati paddy farming has shown considerably worse results in terms of returns to overall investment and in the rest of the economic criteria except Irrigation water, against seed cotton. This situation shows that the rice growers have not been able to get rewarding prices for their produce, enabling them to compete with cotton successfully. However, Non-Basmati is lagging behind cotton in terms of returns to irrigation water, where the later out-competes the earlier significantly.

5. Real Prices

- Nominal market price of basmati paddy increased by 16% in 2021-22 against the previous year. In real terms, the real market price of basmati paddy in the Punjab exceeded the base year price during the period between 2015-16 and 2021-22.

- The nominal market price of Non-Basmati paddy in Sindh during the post-harvest season of 2015-16 has increased upward till 2020-21, indicating overall increase of 102 per cent. It also exceeded the base year real market price whole time during the reference period.

6. World Situation

- World production of rice in 2022-23 projected stood at 520 million tonnes which is 1.0% higher than the previous year 2021-22 estimated production (515 Mill. Tonnes).

- World rice trade during 2021-2 is reported at 52 million tonnes which is higher than the 2020-21 and projected to 56 million tonnes in 2022-23.

- Global trade in rice reported at 52 million tonnes in 2021-22 is projected to increase to 56 million tonnes in 2022-23.

- According to 2020 data, Pakistan lies at number 10^{th} in terms of area under rice varieties and in terms of production in the world. But in yield, Pakistan is far behind other rice producing countries and holds 87^{th} position in the world.

- In terms of global production of rice, China (main land) is on the top with 141.24 million tonnes followed by India with 118.87 million tonnes and Bangladesh with 36.60 million tonnes.

- In terms of yield, Australia lies at the top with 6687 kg/ha, followed by Tajikistan with 5920 and Egypt with 5887 kg/hectare while Pakistan has 1683 kg/hectare.

7. Export Parity Prices

- During 2021-22 (July-March) the average FOB Karachi price of basmati rice is reported at US$ 898.60 per tonne. On the basis of these prices export parity price of basmati paddy in the domestic market of Pakistan approximates to Rs 3276 per 40 kg.
- Average FOB Karachi price of Non-Basmati rice during the referred period is at US$ 434.29 per tonne. The equivalent export parity price of Non-Basmati paddy in the domestic market estimates Rs. 1908 per 40 kg.

8. Economic Efficiency

- Economic efficiency of resources used in rice production has been evaluated by estimating Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost (DRC).

- Basmati growers in Pakistan are implicitly taxed as NPC estimates have been less than one during the period 2017-18 through 2021-22. Similarly, EPC value for basmati paddy in Punjab also remained less than one during the referred period.

- In case of Non-Basmati rice in Sindh, NPCs and EPCs both of last three years (2018-19 and 2021-22) also remained less than one showing some implicit taxed to the Non-Basmati growers in Sindh.

- DRC indicates the opportunity cost of domestic resource used in the production of a commodity. The DRC less than one indicate a commodity system having comparative advantage and vice versa.

- DRCs for basmati rice have been less than one during the period under review implying that Pakistan has comparative advantage in basmati production.

- DRCs for Non-Basmati paddy in Sindh remained less than one during the period under review, indicating comparative advantage for Sindh in Non-Basmati rice for export.

9. Policy Options

- Based on the analysis of relevant factors covered in the main text of this Report, likely indicative price policy options for rice paddy 2021-22 crop are presented below:

	Basis	**Worked back price of Rice paddy at mill-gate**
		(Rs./40 Kg)
A.	**Export parity prices based on actual Fob (Karachi) prices of Pakistani basmati and Non-Basmati rice:**	
	i) Basmati	
	▪ March, 2022	971.40
	▪ 2021-22 (July-March)	898.60
	ii) Non-Basmati	
	▪ March, 2022	468.93
	▪ 2021-22 (July-March)	434.29
B.	**Domestic market price of rice paddy during Oct-Feb 2021-22**	
	i) Basmati/Kainat Punjab	2416/2624
	ii) Non-Basmati Sindh	1439
C.	**Cost of production at market level for 2021-22 Crop**	
	i) Basmati (Punjab)	1944
	ii) Non-Basmati (Punjab)	1490
	iii) Non-Basmati (Sindh)	1263

RECOMMENDATIONS

In view of the economic analysis of different factors bearing on price of Basmati and Non-Basmati rice paddy, comments of the participants of API committee on rice paddy held at API, farmers' feedback assembled through the field survey carried out for paddy 2022-23 crop policy by the API. The following suggestions are advanced:

a. Indicative price of rice paddy for 2021-22 crop

- In view of increase in cost of production of paddy, it is suggested that the government may consider announcement of indicative price of Basmati and Non-Basmati paddy with a reasonable profit margin to sustain the crop.

- Minimize the prices of pesticides by withdrawing GST.

- API suggests to give subsidy on fertilizer to subsidize inflationary effect on rice crop.

- In view of importance of free market and involvement of private sector, actual incentive to paddy growers should come through free play of the market forces.

- Government policy for promoting role of 'service providers' may be strengthened for wide spread of advance production technology in rice cultivation.

b. Improving productivity

- For promoting use of certified seed of rice, Provincial Seed Councils should be taken on board.

- Laser land levelers may be subsidized to promote its use. This may significantly reduce cost of irrigation.

- Concerted efforts are required to develop rice varieties suitable for dry cultivation.

- Monitoring role of Provincial Department of Agriculture (Extension) for curbing adulteration in pesticides needs to be invigorated.

- Portable dryers may be subsidized to ensure supply of quality rice in the market.

- Price of certified seed both local and imported must be closely monitored and controlled.

- Role of Department of Agriculture (Extension) may be strengthened for promoting balanced use of fertilizer.

c. Improving quality and marketing

- Par boiled steaming technology of rice may be encouraged under supervision of qualified technician for standardizing quality of rice.

- Performance of Provincial Crop Reporting Service (CRS) needs to be enhanced by providing mini threshers (portable) for measuring yield of rice paddy.

- Under WTO Rules considerable subsidy is permissible for undertaking research. It is suggested to advance more funds for evolving new hybrid varieties of rice.

Abdul Karim
Director General

RICE POLICY ANALYSIS FOR 2022-23 CROP

INTRODUCTION

Rice plays an important role in Pakistan's agrarian economy. It is second staple food of the country. It also makes significant contribution in the foreign exchange earnings of the country. Rice industry is an important source of employment and income for rural people.

2. Rice accounts for 3.5% of the value added in agriculture and 0.7% of GDP (Economic Survey 2021-22). Area under rice during 2021-22 was 3.522 million hectares. Rice production in the country consists of Basmati and Non-Basmati varieties. All these cumulatively turned out 9.076 million tonnes during 2021-22.

3. Rice is cultivated in all of the four provinces with varying levels of production. Basmati is long grain aromatic variety mainly produced in Punjab while Sindh leads in coarse (Non-Basmati) varieties. The crop also provides feed for livestock in the form of rice straw and husk. It is also used as a raw material in the manufacturing industry.

4. Rice production was at its lowest ebb (5.536 Mill. Tonne) during 2012-13. Since 2012-13 onward, rice production has increased in a fluctuating manner and stood at 9.076 million tonnes in 2021-22. During 2021-22, rice was cultivated on an area of 3522 thousand hectares, 5.6% higher than the last year's area of 3336 thousand hectares. Country production stood at 9076 thousand tonnes against the target of 8201 thousand tonnes, showing an excess of 10.7% against the target. Thus 2021-22 production was higher than the 2020-21 production by 7.8%. This production turnover happened mainly due to increase in area and yield by 5.6% and 2.1%, respectively.

5. There is a dire need to protect Pakistani rice exports and invest in research, pest eradication, storage, improvement in yield, develop international demanded varieties and have to keep it up by having GAP (Good Agriculture Practice) certification at farm level. The efforts should be made that our rice markets remain intact.

6. This report covers different aspects of the paddy extending from production to export. Necessary quantitative analysis is conducted on each aspect to draw important implications for making price policy suggestions for the 2022-23 crop.

7. Section-1 'Introduction' is preceded by summary of findings and recommendations. Section-2 gives sowing and transplanting time of rice (paddy) in Pakistan. Performance of the 2021-22 crop is reviewed in Section-3 while Section-4 is on domestic demand, supply and price situation of rice which is followed by Section-5 presenting cost of production of rice (paddy) for 2022-23 crop. Section-6 of the report is on economics of rice (paddy) and competing crops. Paddy prices in real/ nominal terms are analyzed in Section-7. It covers prices for both basmati and non-basmati varieties. Section-8 deals with world supply, demand, stocks, trade and international prices of milled rice. Analysis regarding rice export from Pakistan during 2020-21 is presented in Section-9 of the report. Section-10 is assigned

to analyze and describe economic efficiency in rice production in Pakistan. Section-11 gives rice yield among competing countries. Yield potential of domestic varieties of rice is assessed in Section-12. Next Section-13 casts on availability of improved seed of rice (paddy) during 2020-21 and last section-14 is attributed to acknowledgements.

2. SOWING AND TRANSPLANTING TIME OF RICE PADDY

8. Rice crop in Pakistan is mostly sown by transplanting of seedlings raised in nurseries. Direct seeding is also practiced but on a limited scale. Sowing time of nurseries and transplanting differ by variety and region. The recommended sowing time of nurseries and their transplanting in various regions are given in Table-1.

Table-1: Sowing Times of Rice Crop in Pakistan

Province	**Variety**	**Time for**	
		Sowing nursery	**Transplanting**
Punjab	Super Basmati	20 May to 7 June	20 June to 7 July
	Other Basmati	1 June to 20 June	1 July to 31 July
	IRRI	20 May to 7 June	20 June to 7 July
Sindh			
Upper Sindh	IRRI-6, Sada Hayat	8 May to 15 June	8 June to 15 July
	DR-82/92	23 May to 30 June	23 June to 31 July
	DR-83	16 June to 15 July	16 July to 15 August
Lower Sindh	IRRI-6, Sada Hayat	16 April to 15 May	16 May to 15 June
	DR-82/92	8 May to 22 June	8 June to 22 July
	DR-83	1 June to 7 July	1 July to 8 August
KPK			
Plains	All varieties	1 May to 31 May	1 June to end of June
Hilly areas	All varieties	1 May to 20 May	3rd week of May to end of June
Baluchistan	All varieties	20 May to 30 June	20 June to 30 July

Sources:

- For Punjab: Rice Research Institute, Kala Shah Kaku
- For Sindh: Rice Research Institute, Dokri, Sindh
- For KPK and Baluchistan: Rice Coordinator, NARC, Islamabad

3. REVIEW OF 2021-22 CROP

3.1 Provincial Shares in Area and Production of Rice (Paddy)

9. During the period (2019-20 to 2021-22), average annual production of rice worked out at 8.303 million tonnes from average area of 3.297 million hectares (8.148 million acres), (Table-2). Variety-wise break-up of rice production (Table-2) shows that Punjab having best suited agro climatic conditions in production of basmati rice is the most producer of basmati rice in the country and Sindh contributes very little amount that is 96.2 and 3.8 percent in total basmati production. In total production of non-basmati rice; Punjab, Sindh, KPK and Baluchistan contributed 31.5, 53.3, 3.5 and 11.7 percent respectively.

10. Provincial shares of Punjab, Sindh, KPK and Baluchistan in area under rice crop are 70.5, 22.5, 2.0 and 5.0 percent respectively. Basmati accounts for 55.8 percent while non-basmati varieties carried 44.2 percent of the total area.

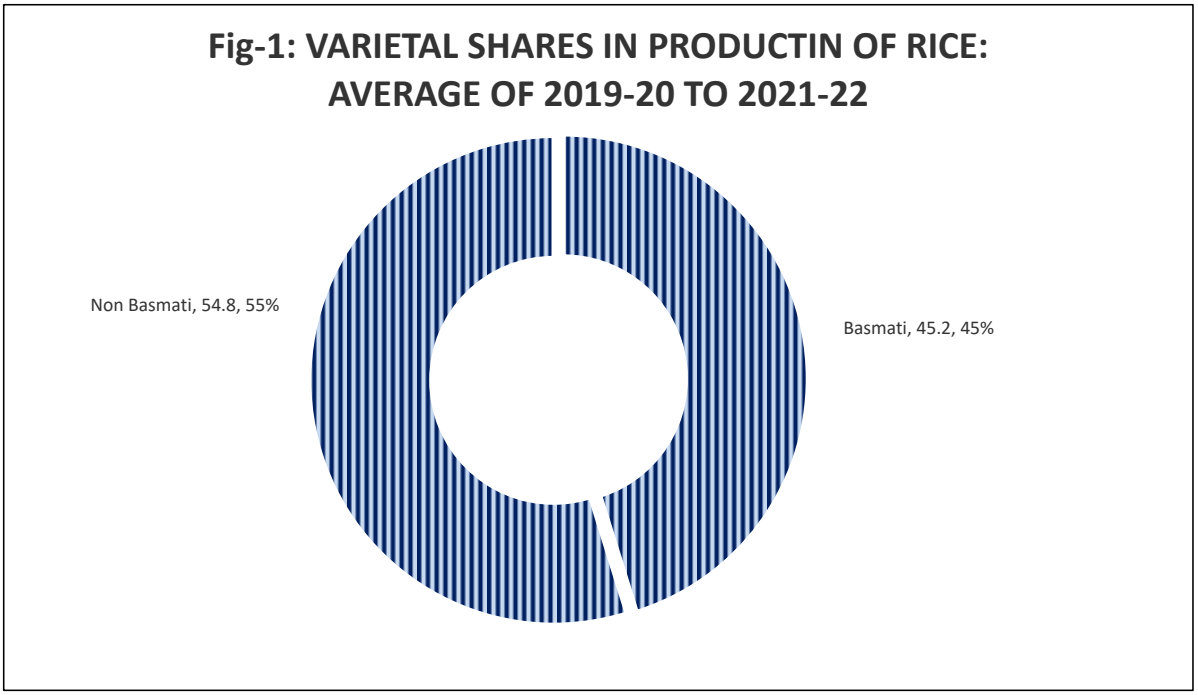
Table-2: Province Wise Average Share in Area and Production of Rice: 2019-20 to 2021-22 Crops

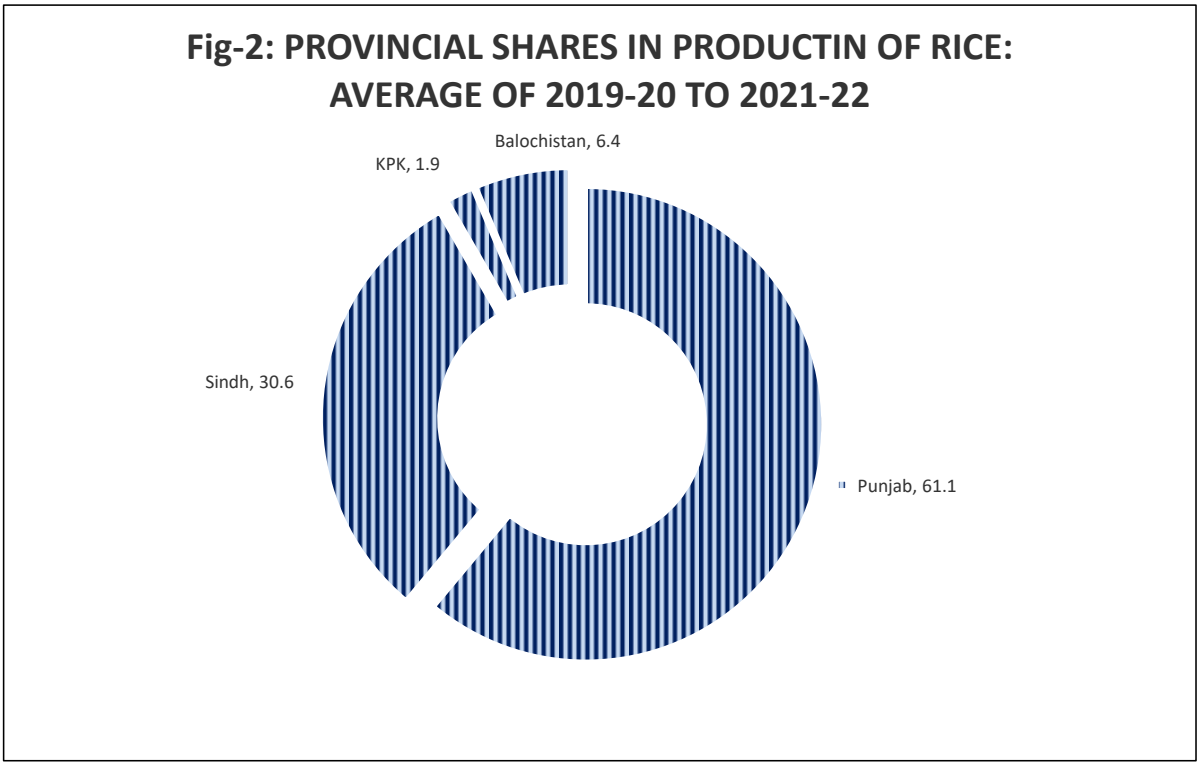
Variety	**Pakistan**		**Punjab**	**Sindh**	**KPK**	**Baluchistan**
Area (000 hectares)		**%**	**----------%----------**			
Total	**3297.3 (8148.1)**	**100.0**	70.5	22.5	2.0	5.0
Basmati	1839.2 (4544.8)	55.8	96.2	3.8	-	-
Non- Basmati	1458.1 (3603.4)	44.2	38.2	46.0	4.5	11.3
Production (000 tonnes)		**%**	**----------%----------**			
Total	**8303.3**	**100.0**	61.1	30.6	1.9	6.4
Basmati	3749.8	45.2	96.9	3.1	-	-
Non- Basmati	4553.5	54.8	31.5	53.3	3.5	11.7

Note: Figures in parenthesis are thousand acres
Source: Worked out from data in Annex-I

3.2 Overtime Changes in Area, Yield and Production of Rice

11. Area under rice crop during the period between 2011-12 and 2021-22 ranged between 2.309 and 3.522 million hectares (Annex-I) which in acre units ranged between 5.705 and 8.704 million acres (Annex-1A). During the same period production oscillated between 5.536 and 9.076 million tonnes (Annex-I) while yield during this period fluctuated between 2396 and 2576 kg per hectare. Long and short term changes in area, yield and production of rice are discussed below:





3.3 Long Term Changes (Growth Rates): 2011-12 to 2021-22

12. During the decade ending 2021-22, production of rice at country level is estimated to have increased @ 3.7 percent per annum as a cumulative effect of increase in yield @ 0.7 percent and area @ 3.0 percent. These data are given in Table-3.

- **Punjab**

13. Annual growth of rice production in Punjab during the period 2011-12 to 2021-22 remained 5.0 percent as a result of 1.4 percent per annum increase in yield and 3.5 percent per annum in area. Production of basmati rice during the same period increased by 8.2 percent per annum mainly due to 5.8 and 2.3 percent per annum increase in area and yield respectively. Production of Non-Basmati rice, during the reference period decreased by 0.9 percent annually, due to 1.9 percent decrease in area, however, 1.0 percent growths in yield.

- **Sindh**

14. In Sindh, where mostly Non-Basmati rice varieties are cultivated, rice production during the period under reference is estimated to have increased @ 1.7 percent annually due to 1.9 percent growth in area regardless of 0.2 percent decrease in yield.

Table-3: Average Annual Growth Rate of Area, Yield and Production of Rice: 2011-12 to 2020-21

Country/Province	Variety	Area	Yield	Production
		------Per cent per annum-----		
Pakistan	**All varieties**	**3.0**	**0.7**	**3.7**
	Basmati	5.6	2.3	8.0
	Non-Basmati	0.5	0.6	1.1
Punjab	**All varieties**	**3.5**	**1.4**	**5.0**
	Basmati	5.8	2.3	8.2
	Non-Basmati	**-1.9**	1.0	-0.9
Sindh	**All varieties**	**1.9**	**-0.2**	**1.7**
	Basmati	1.8	1.7	3.5
	Non-Basmati	1.9	-0.3	1.6
KPK	**Non-Basmati**	**2.9**	**2.6**	**5.5**
Baluchistan	**Non-Basmati**	**4.8**	**0.2**	**5.0**

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

- **KPK**

15. In KPK, production of rice during the referred period increased i.e. 5.5 percent per annum due to only surge in area and yield @ 2.9 and 2.6 percent per annum respectively.

- **Baluchistan**

16, In Baluchistan, rice production during the period under reference has recorded positive growth rate of 5.0 percent due to also increase in area @ 4.8 percent and rise in yield @ 0.2 percent per annum.

3.4 Short Term Changes (Growth Rates): 2020-21 to 2021-22

17. According to the Second estimates, rice production estimated at 9.076 million tonnes in 2021-22 is 7.8 percent higher than last year production of 8.420 million tonnes (Table-4). The production increased mainly due to increase in area and yield by 5.6 and 2.1 percent.

Changes in area, yield and production by province and by variety in 2021-22 in relation to 2020-21 are given in Table-4.

- Punjab

18. In Punjab, overall production of rice shows 8.8 percent increase during 2021-22 as compared with 2020-21. Rise in production occurred mainly due to 6.7 and 1.9 percent increase in area and yield respectively. Production of basmati decreased by 9.1 percent due to 5.3 and 4.0 percent decrease in area and yield respectively. Non-Basmati varieties show increase of 64.6 percent due to expansion both in area and yield by 49.8 and 9.9 percent respectively.

- **Sindh**

19. In Sindh, overall production of rice increased in 2021-22 by 8.9 percent mainly due to area and yield increase of 4.4 and 4.2 percent respectively against the last year. Production of Basmati decreased by 35.6 percent mainly due to area decreased by 38.8 percent however the yield increased by 5.2 percent against the last year. Production of Non-Basmati rice increased in 2021-22 by 12.1 percent mostly due to area and yield by 11.3 and 0.7 percent over the previous year.

- **Baluchistan**

20. In Baluchistan, where Non-Basmati varieties are grown, production in 2021-22 crop decreased by 3.5 percent mainly due to decrease in area by 3.5 percent is showing in Table-4.

Table-4: Area, Yield and Production of Rice by Variety: 2020-21 and 2021-22 Crop

Country/ Pakistan	Area		Change	Yield		Change	Production		Change
	2020-21	2021-22		2020-21	2021-22		2020-21	2021-22	
	000 hectares		%	Kgs/hectare		%	000 tonnes		%
Pakistan	**3335.5**	**3522.4**	**5.6**	**2524.3**	**2576.8**	**2.1**	**8419.7**	**9076.4**	**7.8**
Basmati	1968.3	1831.2	-7.0	2121.4	2048.4	-3.4	4175.6	3751.0	-10.2
Non-Basmati	1367.2	1691.2	23.7	3104.2	3148.9	1.4	4244.1	5325.4	25.5
Punjab	**2394.4**	**2555.0**	**6.7**	**2214.0**	**2256.6**	**1.9**	**5301.4**	**5765.6**	**8.8**
Basmati	1871.6	1772.0	-5.3	2144.8	2058.2	-4.0	4014.2	3647.1	-9.1
Non-Basmati	522.8	783.0	49.8	2461.9	2705.6	9.9	1287.2	2118.5	64.6
Sindh	**709.0**	**740.5**	**4.4**	**3407.9**	**3552.5**	**4.2**	**2416.1**	**2630.6**	**8.9**
Basmati	96.7	59.2	-38.8	1669.1	1755.1	5.2	161.4	103.9	-35.6
Non-Basmati	612.3	681.3	11.3	3682.5	3708.6	0.7	2254.7	2526.7	12.1
KPK	**64.9**	**65.5**	**0.9**	**2442.2**	**2374.0**	**-2.8**	**158.5**	**155.5**	**-1.9**
Baluchistan	**167.2**	**161.4**	**-3.5**	**3251.8**	**3250.9**	**0.0**	**543.7**	**524.7**	**-3.5**

Source: Annex-I

4 TARGETS VS ACHIEVEMENTS OF 2021-22 CROP

21. Federal Committee on Agriculture (FCA) fixed area target for 2021-22 rice crop at 3.070 million hectares and production target at 8.201 million tonnes in its meeting of October 17, 2021 held at Islamabad. So far as 2021-22 crop achievements are concerned, Provincial

Agriculture Departments have reported its final estimate of area at 3.522 million hectares is higher than the respective target by 14.8 percent and production at 9.076 million tonnes that is also higher than the respective targets by 10.7 percent (Table-5).

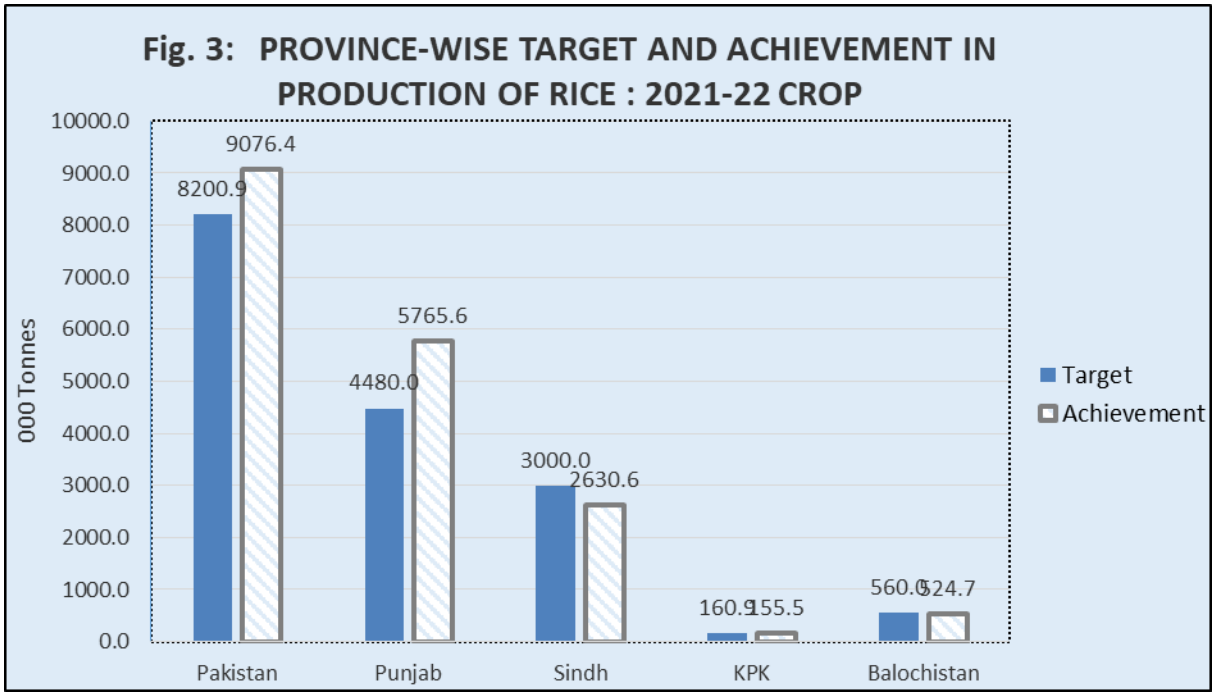
Table-5: Targets and Estimated Achievements of Area, Yield and Production of Rice: 2021-22 Crop

Country/ Province	Area		Deviation from target	Yield		Deviation from Target	Production		Deviation from target
	Target	Achieve-ment		Target	Achieve-ment		Target	Achieve-ment	
	000 hectares		%	kgs per hectare		%	000 tonnes		%
Pakistan	**3069.5**	**3522.4**	**14.8**	**2671.7**	**2576.8**	**-3.6**	**8200.9**	**9076.4**	**10.7**
Punjab	2023.0	2555.0	26.3	2214.5	2256.6	1.9	4480.0	5765.6	28.7
Sindh	800.0	740.5	-7.4	3750.0	3552.5	-5.3	3000.0	2630.6	-12.3
KPK	66.5	65.5	-1.5	2419.5	2374.0	-1.9	160.9	155.5	-3.4
Baluchistan	180.0	161.4	-10.3	3111.1	3250.9	4.5	560.0	524.7	-6.3

Sources:

1. For targets: Minutes of the Federal Committee on Agriculture (FCA) Meeting held in October 17, 2021 in Islamabad
2. For achievements: Derived from Annex-I

22. Area and production targets of the 2021-22 crop by province wise presented in Table-5. In Punjab area target remained exceed by 26.3 percent, but Sindh, KPK and Baluchistan remained short by 7.4, 1.5 and 10.3 percent restrictively. Production of Punjab also remained higher than respective target by 28.7 percent; however, Sindh, KPK and Baluchistan were also less than the target by 12.3, 3.4 and 6.3 percent respectively. The Punjab and Baluchistan yield increased the target by 1.9 and 4.5 percent respectively. However, Sindh and KPK yield target could not be achieved and that were down by 5.3 and 1.9 percent respectively (Fig. 3).



5. IMPORTANT RICE PRODUCING DISTRICTS

23. Districts, based on 2019-20 to 2021-22 average production (with varietal break-up) are arranged in descending order in Annex-II. Districts producing more than 50 thousand tonnes of rice include Gujranwala, Sheikhupura, Okara, Hafizabad, Jhang, Sialkot, Nankana Sahib, Bahawalnagar, Pakpattan, Kasur, M.B. Din, D.G. Khan, Narowal, T.T. Singh, Khanewal, Chiniot, Vehari, Sahiwal, Sargodha, Faisalabad, Muzaffargarh, Gujrat, Lahore, Multan, Rajanpur, R.Y Khan and Khushab from Punjab; Badin, Larkana, Jacobabad, Shikarpur, Qamber, Thatta, Kashmore, and Dadu from Sindh and Jafarabad and Nasirabad from Baluchistan. These 37 districts collectively produced 95.6% of total production of rice in the country. Main basmati producing districts which contribute about 72% of total basmati in the country are Sheikhupura, Jhang, Hafizabad, Sialkot, Okara, Nankana Sahib, Bahawalnagar, Pakpattan, Gujranwala, M.B. Din, Narowal, T.T. Singh and Khanewal While 63.3% of total Non-Basmati rice production is contributed by Badin, Larkana, Jacobabad, Shikarpur, Qambar, Thatta, Dadu, Nasirabad and Jafarabad. These districts are above 100 thousand tonnes producer (Annex-II).

6. DOMESTIC DEMAND, SUPPLY OF RICE AND PRICES OF RICE PADDY

6.1 Domestic Demand and Supply of Rice

24. Rice is an important food as well as cash crop. It is the second main staple food crop after wheat and the second major exportable commodity after textile product on regular basis.

25. Based on annual per capita availability of rice averaging at 14.35 kgs during the period 2018-19 to 2020-21 (Annex-III), the domestic consumption requirement in 2021-22 for population of 232.34 million has been estimated at 3334 thousand tones. According to second estimates the country has produced 9076.4 thousand tonnes rice during 2021-22 crop. After deduction of 545 thousand tons for the seed and wastage allowance @ 6 per cent of the production, the net available rice for consumption and trade comes to 8531 thousand tons, hence Pakistan has an export surplus of 5197 thousand tones during 2021-22.

6.2 Domestic Prices of Basmati Rice Paddy

26. During current season 2021-22, the farmers of Basmati paddy have fetched a high price as compared to last year. The wholesale prices of basmati super paddy in major markets in colar area (area designated/suitable for aromatic basmati rice) has been presented in Table-6. The price of basmati super paddy ranged between Rs 2120 per 40 kgs in Gujranwala market during November 2021 and Rs 2606 per 40 kgs in Kasur market during February 2021. The season average prices of basmati super (paddy) in the Punjab have ranged between Rs 2120 and Rs 2491 per 40 kgs.

Table-6: Monthly Average Wholesale Prices of Basmati Super (Paddy) in Major Producer Area Markets of the Punjab: Nov-Feb, 2021-22 crop

S.No	Markets	Nov	Dec	Jan	Feb	**Average**
		----------Rs per 40kgs----------				
1	Sheikhupura	2264	-	-	-	2264
2	Sialkot	2367	2485	-	-	2426
3	Gujranwala	2120	-	-	-	2120
4	Narowal	2442	2342	2359	2350	2373
5	M.B.Din	2370	2425	-	-	2397
6	Kasur	2436	2407	2513	2606	2491
Average		**2333**	**2415**	**2436**	**2478**	**2416**

Source: Directorate of Agriculture (E&M) Punjab, Lahore.

6.3 Domestic Prices of Kainat Paddy

27. The area of Kainat basmati has been increasing. The extra-long and pearl white Kainat paddy is being cultivated all over the Punjab. The monthly wholesale prices of Kainat paddy in main producing area markets of Punjab is presented in Table-7. The price of Kainat paddy has also followed the prices of basmati paddy. The price of Kainat paddy ranged between Rs 2075 per 40 kgs in Sargodha market during October 2021 and Rs 3187 per 40 kgs in Arifwala market during February 2022. The season average prices of Kainat (paddy) in the Punjab have ranged between Rs 2310 and Rs 2879 per 40 kgs.

Table-7: Monthly Average Wholesale Prices of Kainat (Paddy) in Major Producer Area Markets of the Punjab: Oct 2021 to Feb 2022

S.No	Markets	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Average**
		----------Rs per 40kgs----------					
1	Okara	-	2522	2799	2946	2993	**2815**
2	Nankana Sahib	2141	2590	2626	-	-	**2452**
3	Sialkot	-	2330	2545	-	-	**2437**
4	Pakpattan	2253	2738	2903	3102	3054	**2810**
5	Bahawalnagar	2318	2751	2938	3068	3048	**2825**
6	M.B.Din	-	2314	2450	-	-	**2382**
7	Chiniot	2135	2479	2315	-	-	**2310**
8	Sahiwal	2256	2607	2773	2850	-	**2622**
9	Sargodha	2075	2471	2698	2916	3065	**2645**
10	Burewala	2190	2578	2652	3012	2985	**2683**
11	Arifwala	2401	2793	2899	3114	3187	**2879**
Average		**2221**	**2561**	**2691**	**3001**	**3055**	**2624**

Source: Directorate of Agriculture (E&M) Punjab, Lahore.

28. The average wholesale market prices of Non-Basmati Paddy in Sindh are depicted in (Table-8). During the current season, the farmers have received extra ordinary price of Non-Basmati paddy. The prices have ranged between Rs 1350 to Rs 1550/ 40 kgs. The lowest and the highest prices were observed in Shikarpur and Badin market during September/October,

2021 and February, 2022. The seasonal average during 2021-22 crop ranged between Rs 1363 to Rs 1495 per 40kgs were less to the last season 2020-21.

Table-8: Monthly Average Wholesale Prices of Non-Basmati Paddy in Major Producer Area Markets of Sindh during September 2021 to February 2022

S.No.	Markets	Sept	Oct	Nov	Dec	Jan	Feb	Average
		----------Rs per 40kgs----------						
1.	Badin	1450	1470	1480	1500	1520	1550	**1495**
2.	T.M.Khan	1400	1450	1450	1490	1520	1550	**1477**
3.	Hyderabad	1400	1400	1410	1410	1420	1400	**1407**
4.	Thatta/Sujawal	1400	1430	1450	1450	1480	1450	**1443**
5.	Dadu	1400	1400	1430	1430	1480	1500	**1440**
6.	Larkana	1380	1400	1470	1440	1480	1480	**1442**
7.	Shikarpur	1370	1970	1390	1400	1400	1400	**1488**
8.	Jacobabad	1400	1400	1400	1400	1410	1400	**1402**
9.	Kashmore/ Kandkot	1350	1350	1370	1370	1370	1370	**1363**
10.	Kambar-Shahdadkot	1385	1385	1475	1450	1470	1430	**1433**
	Average	**1394**	**1466**	**1433**	**1434**	**1455**	**1453**	**1439**

Source: Market Committees, Sindh.

7. COST OF PRODUCTION OF RICE PADDY

29. Cost of production (COP) is one of the important factors in making price suggestion for farm commodities. However, its estimation involves a number of conceptual problems and practical difficulties. In this regard, wide variations in the inputs use level, technology adoption and diverse farming practices, resulting in varying yield levels are worth mentioning.

30. Cost of production estimates for Punjab and Sindh for various varietals groups of rice paddy for the 2022-23 crop have been updated by adapting the input-output parameters as used in the Price Policy Report for Rice Paddy 2021-22 crop in conjunction with the latest prices and rates of different inputs and cultural operations collected from main rice producing districts of Punjab and Sindh provinces. The prices of inputs and custom hiring rates of field operations were updated with the information provided by the participants in the API meeting held at Islamabad and annual field survey conducted by the API teams in the important rice growing areas of Punjab and Sindh during January 2022. COP estimates for rice paddy for the Punjab and Sindh are detailed in Annex-IV to VI, while summary of these is shown in Table-9.

7.1 Average farmer's expected cost of production of rice paddy for 2022-23 crop against 2021-22

31. Expected cost of production estimates of basmati and non-basmati for Punjab and non-basmati for Sindh in 2022-23 versus 2021-22 are summarized and presented in the Table-9.

Table-9: Average Farmer's Cost of Production of Rice Paddy: 2021-22 and 2022-23 Crops

Item	Unit	Cost estimate		Change in 2022-23 over 2021-22 [3]=[2]-[1]
		2021-22 crop [1]	2022-23 crop [2]	
Punjab (Basmati)				
1. Net cost of cultivation including land rent	Rs/acre	65016	75352	10336
2. Yield	Kgs/acre	1400	1600	200
3. Cost of production at farm gate	Rs/40 kgs	1858	1884	26
4. Marketing cost i.e. loading, transport Commission	"	60	60	0
5. Cost of production at market level	"	1918	1944	26
Punjab (Non-Basmati)				
1. Net cost of cultivation including land rent	Rs/acre	64375	71525	7150
2. Yield	Kgs/acre	2000	2000	0
3. Cost of production at farm gate	Rs/40 kgs	1287	1430	143
4. Marketing cost i.e. loading, transport commission	"	60	60	0
5. Cost of production at market level	"	1347	1490	143
Sindh (Non-Basmati)				
1. Net cost of cultivation including land rent	Rs/acre	57322	66145	8823
2. Yield	Kgs/acre	2200	2200	0
3. Cost of production at farm gate	Rs/40 kgs	1042	1203	160
4. Marketing cost i.e. loading, transport commission	"	60	60	0
5. Cost of production at market level	"	1102	1263	160

Source: Annex-IV to VI

Notes: Figures in last column may show slight difference due to rounding of decimals in column [1] and column [2].

- **Punjab**

Basmati

32. According to analysis presented in the above referred table, net cost of growing one acre of basmati paddy at the current input prices and hiring rates of different agricultural operations prevailing in Punjab during 2022-23 crop year is anticipated at Rs 75352 inclusive land rent. Based on the average yield of 1600 kg per acre, farm level cost of production works out to Rs 1884 per 40 kg. Adding marketing cost @ Rs 60 per 40 kg, cost of production till harvest and disposal in the market or at the sheller would be Rs. 1944 per 40

kg more by Rs 26 per 40 kgs than the last year corresponding cost estimated at 1918 per 40 kg.

Non-Basmati

33. According to analysis presented in the above referred table, net cost of growing one acre of Non-Basmati paddy at the current inputs prices and hiring rates of different agricultural operations prevailing in Punjab during 2022-23 crop is anticipated at Rs 71525 inclusive land rent. Based on the average yield of 2000 kg per acre, farm level cost of production works out to Rs 1430 per 40 kg. Adding marketing cost @ Rs 60 per 40 kg, cost of production till disposal in the market or at the sheller would be Rs. 1490 per 40 kg more by Rs 143 per 40 kgs than the last year corresponding cost estimated at 1347 per 40 kg.

- **Sindh**

34. In Sindh, net cost of cultivation for one acre of Non-Basmati paddy during 2022-23 crop is expected to cost Rs 66145 inclusive land rent. Based on 2021-22 average yield of 2200 kg per acre (as reported by the farmers during the API field survey), cost of production at farm level would be Rs 1203 per 40 kg. Including marketing expenses @ Rs 60 per 40 kg, the cost of production to deliver at sheller/ market would be Rs 1263 per 40 kgs, against Rs 1102/ 40 kg in 2021-22 - more by Rs 160 per 40 kgs.

35. Main factors behind these changes are increase in diesel and fertilizer prices during 2022, i.e DAP from Rs 6500 to Rs 9069 per bag.

7.2 Cost of Major Operations/Inputs

36. Break-up of costs of various field operations and farm inputs in the gross cost of cultivation of rice paddy in Punjab and Sindh during 2021-22 and expected in 2022-23 (with respective changes) over the previous year are presented in Table-10.

- **Punjab**

Basmati

37. In Table-10, cost of production of paddy is consolidated under broader headings rather than individual items. Analysis is presented for Punjab and Sindh provinces for basmati and Non-Basmati varieties. The data comprises major operations/ inputs of cost of production of paddy. It helps us to identify where policy support can be more beneficial to paddy growers.

38. Figures in parenthesis in Table-10 show respective percentages. It may be seen from the data that major components of the cost of basmati paddy production are land rent and fertilizer inclusive farm yard manure (FMY) having share of 21% both and thus are crucial items in the cost of production estimate. Next higher item is irrigation. Expenditure on irrigation mainly comes from tube well water which supplements the canal water consist of

16% of the total cost. Nursery, uprooting and transplanting and Land preparation are 13% and 12% each. All other cost items carry lesser weight in the gross cost of production of paddy.

Table-10: Cost of Major Operations/Inputs of Rice Paddy: 2021-22 and 2022-23 Crops

Operations/inputs	2021-22 Crop		2022-23 Crop		Change in 2022-23 over 2021-22
	(Rs/acre)				
Punjab (Basmati)					
1. Land preparation	9673	(13)	10000	(12)	328
2. Nursery, uprooting and transplanting	8090	(11)	10640	(13)	2549
3. Weeding	690	(1)	748	(1)	57
4. Plant protection	2050	(3)	2550	(3)	500
5. Irrigation	13006	(18)	13361	(16)	355
6. Fertilizer including FYM	13227	(18)	17376	(21)	4149
7. Land rent	16500	(23)	17500	(21)	1000
8. Harvesting and threshing etc	3000	(4)	4000	(5)	1000
9. Others	5780	(8)	6178	(8)	398
10. Gross cost	72016	(100)	82352	(100)	10336
Punjab (Non-Basmati)					
1. Land preparation	8783	(12)	9050	(12)	268
2. Nursery, uprooting and transplanting	7890	(11)	8640	(11)	749
3. Weeding	690	(1)	748	(1)	57
4. Plant protection	2050	(3)	2300	(3)	250
5. Irrigation	13006	(18)	13361	(17)	355
6. Fertilizer including FYM	13227	(19)	17376	(22)	4149
7. Land rent	16500	(23)	17500	(22)	1000
8. Harvesting and threshing etc	3000	(4)	3000	(4)	0
9. Others	6229	(9)	6551	(8)	321
10. Gross cost	71375	(100)	78525	(100)	7150
Sindh (Non-Basmati)					
1. Land preparation	7150	(12)	7800	(11)	650
2. Nursery/uprooting and transplanting	9000	(15)	10500	(15)	1500
3. Weeding	1440	(2)	1560	(2)	120
4. Plant protection	1500	(2)	1559	(2)	59
5. Irrigation	3956	(6)	4236	(6)	280
6. Fertilizer including FYM	11834	(19)	16252	(23)	4418
7. Land rent	16500	(27)	17500	(24)	
8. Harvesting and threshing etc	4000	(7)	6000	(8)	2000
9. Others	5943	(10)	6738	(9)	796
10. Gross cost	61322	(100)	72145	(100)	10823

Notes: 'Others' include cost of bund making, mark-up, management, land tax, land revenue and drainage cess.

- Figures in parenthesis are percent shares in total cost of cultivation.
- Rounding off figures may result in slight differences

Non-Basmati

39. Figures in parenthesis in Table-10 show respective percentages. It may be seen from the data that major component of the cost of non-basmati paddy production are land rent and fertilizer inclusive farm yard manure (FMY) (22%) each and thus fertilizer is a crucial item in the cost of production estimate. Next higher item is irrigation (17%). Expenditure on irrigation mainly comes from tube well water which supplements the canal water. Land preparation is (12%) while nursery, uprooting and transportation is (11%). All other cost items carry lesser weight in the gross cost of production of paddy.

- **Sindh**

Non-Basmati

40. For non-basmati paddy grown in Sindh, again land rent cost is the major cost component (24%), followed by fertilizer inclusive farm yard manure (FYM) (23%), Nursery/uprooting and transplanting (15%) and land preparation (11%). It needs to be noted that in all of the three categories land rent, land preparation and fertilizer emerges as major components of the cost of production of paddy. Thus these may be suggested for giving subsidy etc. for minimizing cost of production of this crop.

41. Last column of the above referred Table indicates overtime increase or decrease in the cost of production of basmati and non-basmati varieties against the last year. The data identify potential inputs and cultural operations whose cost may be reduced by providing subsidy to minimize cost of production of paddy. It may be assessed from the data that irrigation expenditure, land preparation costs and fertilizer cost may be reduced by subsidizing electricity for agricultural tube wells, removing GST on fertilizer and reducing price of diesel.

8. ECONOMICS OF RICE PADDY AND COMPETING CROPS

42. Resource allocation among competing crops is primarily guided by economic considerations as reflected in their gross cost, gross income, gross margin, net income, output-input ratio, etc. Rice, a major ‘Kharif’ crop, competes with cotton for land, water and other farm resources in the areas where cultivation of both crops is technically feasible. The coarse and fine varieties of rice may also compete among themselves. Rice also faces indirect competition from sugarcane, an annual crop, which occupies the land over the year.

43. The economics of rice and competing crops has been analyzed in terms of input-output prices paid and received by the growers for the 2021-22 crops. A summary of the relevant economic indicators emerging from the analysis is presented in Table-11 for the Punjab and Table-12 for Sindh. Also, the Output-Input ratios have been graphically presented in Fig-5 and Fig-6 for both the provinces. Details of the analysis are provided in Annex-VII.

- **Punjab**

44. Basmati's performance in Punjab in terms of returns to overall investment has been slightly lower than seed cotton. Similarly, in terms of purchased inputs and irrigation water, and crop duration Basmati's returns to farmer for the farm investment were much lower than the cotton. Hence we can say that Basmati Paddy is lower than the Seed Cotton in all the economic criteria.

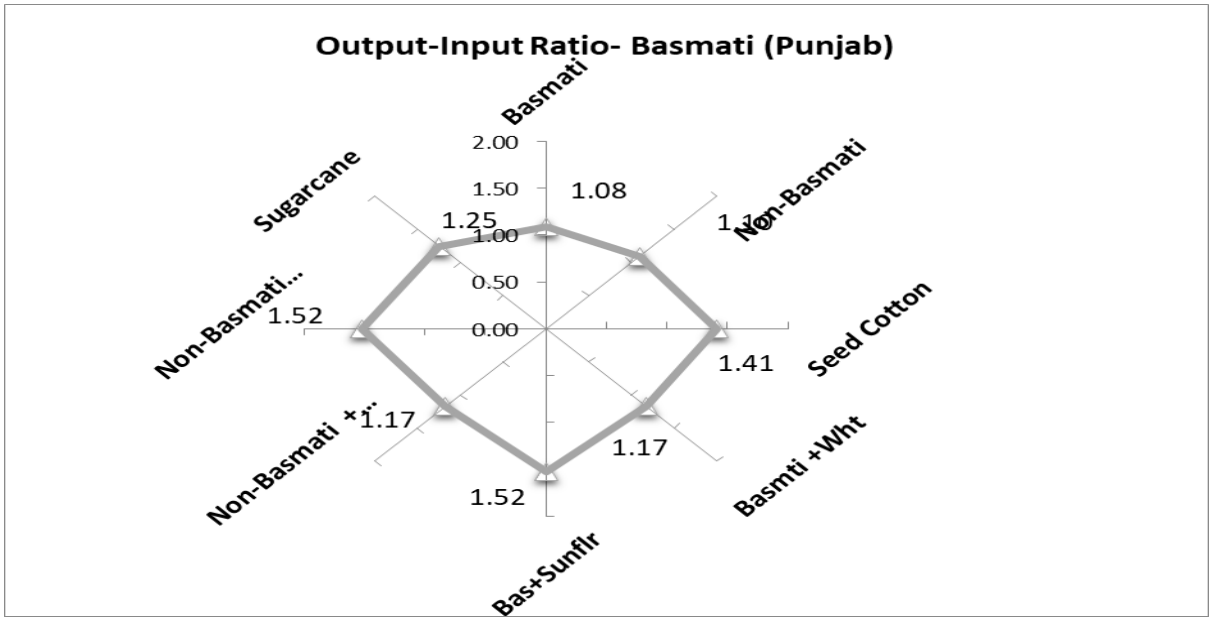
Table-11: Economics of Rice and Competing Crops at Prices Realized by the Paddy Growers in the Punjab: 2021-22 Crops

Crop/crop combination	Output-input ratio	Gross revenue per		
		rupee of purchased inputs cost	day of crop duration	acre-inch of irrigation water used
	---------- Rupees ----------			
1. Basmati paddy	1.08	2.03	419	1300
2. Non-Basmati paddy	1.10	2.36	443	1285
3. Seed Cotton	1.41	3.92	567	5415
4. Basmati+wheat	1.17	2.63	456	2150
5. Basmati+sunflower	1.52	3.25	558	2511
6. Non-basmati+wheat	1.17	2.88	469	2091
7. Non-Basmati+sunflower	1.52	3.51	570	2442
8. Sugarcane	1.25	3.45	421	3458

Source: Annex-VII.

45. Non-Basmati paddy in Punjab also could not perform against seed cotton in any of the economic indicators analyzed and cotton out-competed the earlier comprehensively. Not only that both Basmati and Non-Basmati paddy were out performed by seed cotton, the Non-Basmati even hardly could gain break-even point and its returns to overall investment i.e output-input ratio, were slightly above than 1, which indicates that farmer's costs have slightly met in cultivating Non-Basmati paddy.

Fig-4: *Output-input Ratio in Punjab for Basmati Paddy*



46. In case of indirect competition, the Basmati combinations with Wheat and Sunflower though show better returns, however, still lag far behind sugarcane in terms of output-input ratio. Sugarcane, based on the market price received by the farmers, has performed much better against the earlier in terms of all the indicators non-basmati combinations remained considerably lower in respect of all the economic indicators analyzed. However, the Non-Basmati combination with Sunflower gained a marginal edge over Wheat combinations in terms of returns to purchased inputs and output-input ratio.

- **Sindh**

47. In Sindh, Non-Basmati paddy farming has shown considerably worse results in terms of returns to overall investment and in the rest of the economic criterions except Irrigation water, against seed cotton. This situation shows that the rice growers have not been able to get rewarding prices for their produce, enabling them to compete with cotton successfully. However, Non-Basmati is lagging behind cotton in terms of returns to irrigation water, where the later out-competes the earlier significantly.

Table-12: Economics of Non-Basmati Paddy and Competing Crops at Prices Realized by the Growers in Sindh: 2021-22 Crops

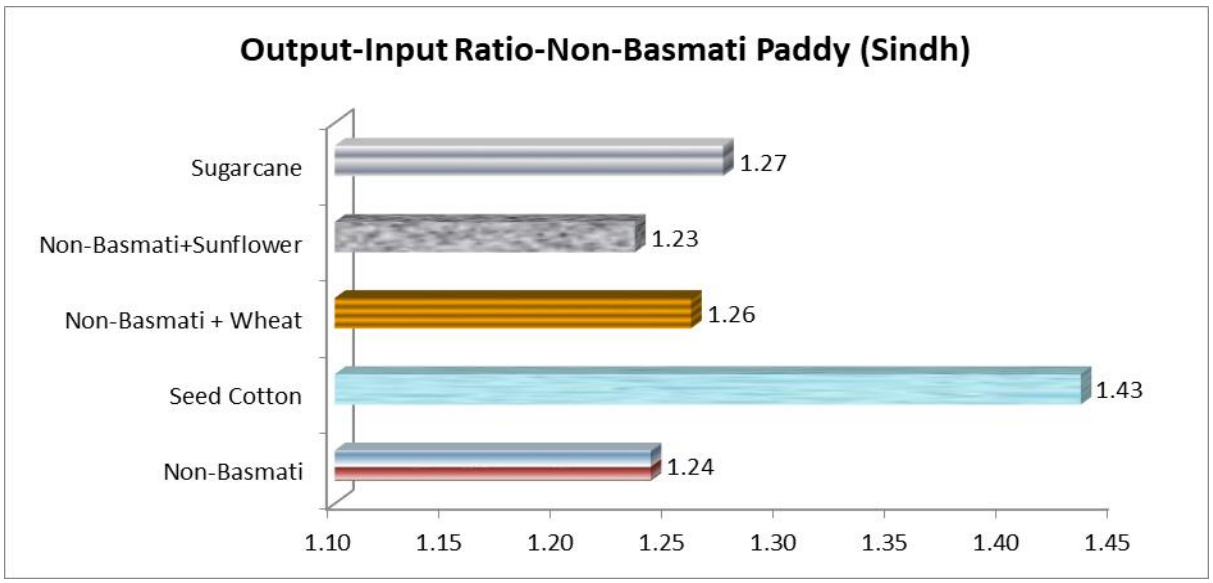
Crop/crop combination	Output-input ratio	Gross revenue per		
		rupee of purchased inputs cost	day of crop duration	acre-inch of irrigation water used
		---------- Rupees ----------		
1. Non-Basmati paddy	1.24	3.39	468	1504
2. Seed Cotton	1.43	4.26	607	7087
3. Non-Basmati+Wheat	1.26	3.57	460	2433
4. Non-Basmati+sunflower	1.23	3.36	403	1859
5. Sugarcane	1.27	3.74	333	2286

Source: Annex-VII.

48. In context of indirect competition with sugarcane, the economic position of Non-Basmati's combinations with wheat and sunflower is not better than sugarcane in terms of output-input ratio and purchase input cost. However, the performance of these combinations has been lower to the sugarcane in terms of the remaining indicators except crop duration.

49. The above situation portrays an encouraging situation for rice growers in Sindh, while in Punjab, they have yet to achieve efficiency through improved productivity and fetching better prices.

Fig-5: *Output-input Ratio in Sindh for Non-Basmati Paddy*



9. NOMINAL AND REAL MARKET PRICES OF BASMATI AND NON-BASMATI PADDY: 2015-16 to 2021-22

50. To analyze the overtime changes in the purchasing power of basmati (Punjab) and non-basmati paddy (Sindh), the nominal and real market prices of rice paddy for the period 2015-16 to 2021-22 crops were deflated by the Consumer Price Index (CPI), the most common measures of inflation in the economy. The results are given in Table-13 and also depicted in Figs-7 and 8.

51. It is important to note from the above analysis that due to increasing trend of general inflation in the economy, the gap between nominal and real prices, both of Basmati and Non-Basmati paddy is widening every year. It shows the deterioration of the purchasing power of the commodity overtime in real terms. Variety-wise detail of basmati and non-basmati paddy is discussed in the following paragraphs.

9.1 Basmati Paddy (Punjab)

52. The data in Table-13 reveals that the nominal market price of Basmati paddy has evidenced 83.03 per cent overall increase against the base year during the period under review while its real value improved by only 15.30 per cent. The major reason for this slow increasing trend in the real purchasing power of the crop is the 58.78 per cent general inflation observed in the economy during the same period.

Table-13: Nominal and Real Market Prices of Basmati and Non-Basmati Paddy: 2015-16 to 2021-22

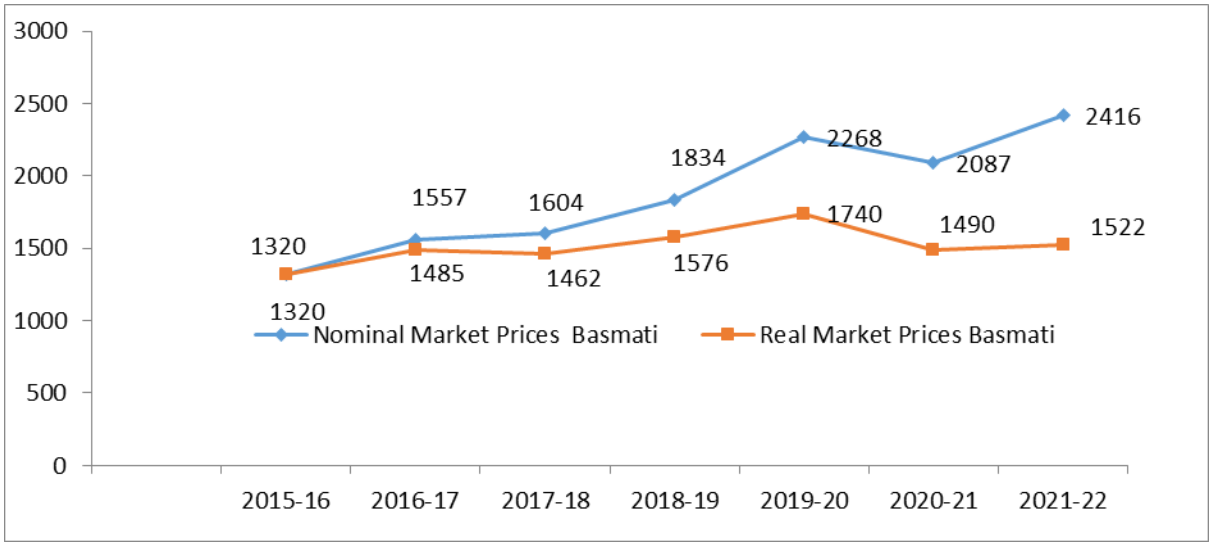
Crop year	Nominal Market Prices		Consumer Price Index (CPI)	Real Market Prices	
	Basmati (Punjab)	Non-Basmati (Sindh)		Basmati	Non-Basmati
1	2	3	4	5=(2/4)*100	6=(3/4)*100
	Rs per 40 kgs		2015-16=100	Rs per 40 kgs	
2015-16	1320	713	100.00	1320	713
2016-17	1557	832	104.81	1485	793
2017-18	1604	898	109.72	1462	818
2018-19	1834	1121	116.35	1576	963
2019-20	2268	1225	130.33	1740	940
2020-21	2087	1259	140.06	1490	899
2021-22	2416	1439	158.78	1522	906

Note: The market prices are the average wholesale prices prevailed during the post-harvest season in the main producer area markets of the Punjab for basmati and of Sindh for Non-Basmati paddy.

Sources:
i) Economic Survey of Pakistan, 2021-22.
ii) CPI 2007-08 base year series converted into base year 2015-16.
iii) Directorate of Agriculture, (E&M), Lahore, Punjab.
iv) Directorate of Agriculture Marketing, Hyderabad, Sindh.

53. For the entire period under review, the real market price remained above the base year level consecutively up to now. Further, about 16 per cent, the nominal market prices are higher in 2021-22 as compared to the last year. The year 2021-22 was relatively better for both for the rice growers as they fetched highest real prices of Rs 1522 per 40 kgs.

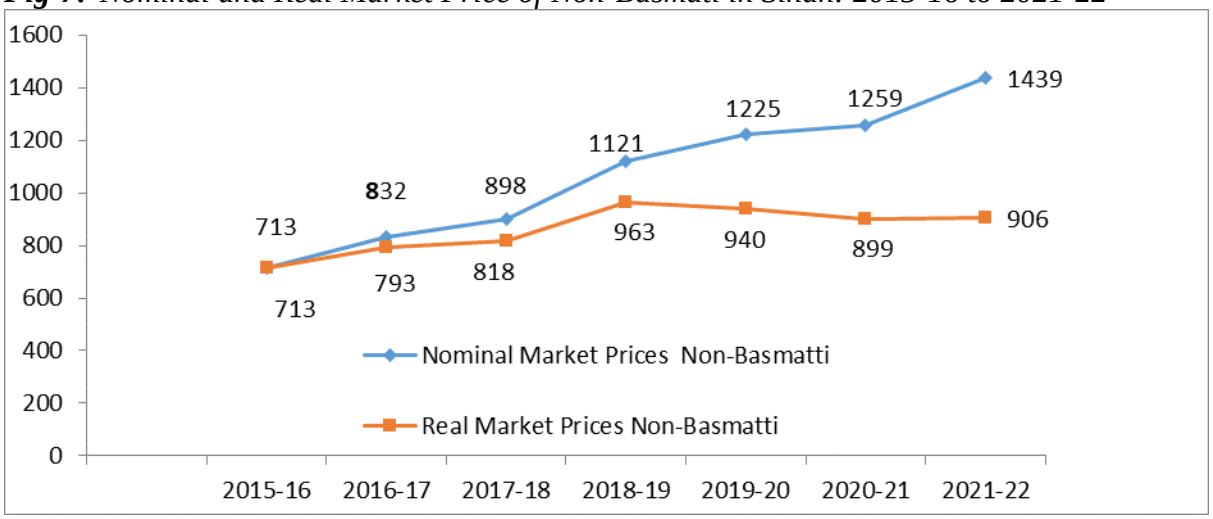
Fig-6: *Nominal and Real Market Price of Basmati Paddy in Punjab: 2015-16 to 2021-22*



9.2 Non-Basmati Paddy (Sindh)

54. It may be seen from Table-13, that the nominal market price of non-basmati paddy in Sindh averaging at Rs 713/- per 40 kgs during the post-harvest season of 2015-16 has increased to Rs 1439/- per 40 kgs in 2021-22, indicating overall increase of 102 per cent. For the rise in CPI by 58.78, the consequent increase in the real market price of non-basmati paddy is estimated at 27.06 per cent from Rs 713/- in base year to Rs 906/- per 40 kgs in 2021-22.

Fig-7: *Nominal and Real Market Price of Non-Basmati in Sindh: 2015-16 to 2021-22*



55. The data also reveals that during the whole period in question, the real market prices of non-basmati paddy remained above the base year level of Rs.713/- per 40 kg. However, during, 2021-22, the real non-basmati prices slightly increase over last year by 0.77 per cent. The real value of the crop remained higher to base year level throughout the period under review.

10. WORLD SUPPLY, DEMAND, STOCKS, TRADE AND PRICES SITUATION OF MILLED RICE

10.1 World Supply, Demand, Stocks, and Trade

56. The data regarding production, consumption, stocks and trade of rice from 2020-21 to 2022-23, reported by the International Grain Council in monthly Grain Market Report April 21, 2022 has been presented in table-14

57. The world production of rice in 2021-22 is estimated at 515 million tonnes, only 5 million tonnes higher than year 2020-21, accounting for the opening stocks of 181 million tonnes, total supply works out at 696 million tonnes, 6 million tonnes higher than previous year.

58. Rice production in 2022-23 is projected to increase to 520 million tonnes, 5 million tonnes higher than the last year, the increase is at par to last year increase. With the addition of opening stocks of 181 million tonnes the same level of previous year, total supply would be at 701 million tonnes, an increase of 5 million tonnes during 2022-23. The global consumption is estimated at 514 million tonnes, 5 million tonnes which is equal to increase of production during 2021-22. However, consumption is projected to decrease by 0.58 per cent (3 million tonnes) at 517 million tonnes. Resultantly the end year stocks are projected to increase from 181 million tonnes to 184 million tonnes during 2022-23. The global trade in rice reported at 52 million tonnes in 2021-22 is projected to increase to 56 million tonnes in 2022-23.

Table-14: World Supply, Demand, Stocks and Trade in Rice: 2020-21 to 2022-23

S.No	Item	2020-21	2021-22 Estimated	2022-23 Projected
		----------Million tones----------		
1.	Opening stocks	180	181	181
2.	Production	510	515	520
3.	Total supply (Items 1+2)	690	696	701
4.	Consumption/disappearance	509	514	517
5.	Closing stocks	181	181	184
6.	Trade	51	52	56

Source: International Grain Council, April 21, 2022.

11. REGION WISE EXPORT OF RICE FROM PAKISTAN

59. Pakistan is one of the largest exporters of rice with an average share of 8.87 per cent in global rice market during 2019-2021 which is forecasted to increase to 9.0 per cent during 2022. Export of rice has been decreased from 3.01 to 2.66 million tons during 2020-21 over 2019-20 in quantity and US$ 1.64 to 1.49 million in value terms. The reduction observed in both rice, basmati rice by 28.47 per cent and 5.08 per cent in course rice in quantity while 27.66 per cent in basmati and 34.96 per cent in course rice in value term.

60. The region-wise statistics revealed that bulk of the basmati rice export were continue destined to Asian countries (47.81 per cent) followed by European countries (20.07 per cent). Basmati rice during 2020-21 over 2019-20 has decreased in all the regions except CIS countries by 58.04 per cent increased, where the quantity has been increased from 32.70 thousand tons to 51.69 thousand thons. The major decline observed in America by 44.85 per cent.

61. The course has follow the same pattern of basmati rice, The bulk quantity has been imported by African countries 60.54 per cent, however, African countries has imported

45.94 per cent less quantity during 2020-21. The export of course rice has been decreased in all regions except in Asia, increased by 76.78 per cent.

Table-15: PER CENT CHANGE IN EXPORT OF BASMATI AND NON-BASMATI RICE IN 2020-21 OVER 2019-20

Region	Basmati Rice	Non-Basmati Rice	Basmati Rice	Non-Basmati Rice	Basmati Rice		Non-Basmati Rice	
	Quantity		Value		% share in total export			
	2019-20	2020-21	2019-20	2020-21				
	…… Percent change……				2019-20	2020-21	2019-20	2020-21
Asia	-43.18	76.78	-43.01	94.39	60.19	47.81	32.55	60.62
Oceania	-27.46	-80.83	-23.36	-70.57	2.62	2.66	0.07	0.01
Europe	-3.69	-31.63	-1.46	-22.36	14.91	20.07	1.19	0.85
Africa	-2.74	-45.94	-9.94	-37.95	11.63	15.82	60.54	34.48
America	-44.85	-42.24	-25.86	-39.08	6.88	5.30	4.24	2.58
CIS	58.04	-3.01	58.01	40.63	3.78	8.34	1.42	1.45
Total	-28.47	-5.08	-27.66	-34.96	100.00	100.00	100.00	100.00

Source: Annex- IX

12. EXPORT PARITY PRICES OF RICE (PADDY)

62. To ascertain export competitiveness of Pakistani rice in the international market export parity prices have been calculated on the basis of actual export prices of both fine and coarse rice. The details of these calculations are given in Annexes VIII and IX, a summary is given in table-16.

Table-16: Export Parity Prices of Basmati and Non-Basmati Paddy

Items	April 2022	2021-22	Average 2020-2022
A) Export Parity Price of Basmati Paddy			
Average fob Karachi prices (US$/ton)	971.40	899.60	927.22
Exchange Rate (Rs/US$)	185.50	185.50	185.50
Average fob Karachi prices (Rs/40Kgs)	7208	6668	6880
Mill-gate price of 40 Kgs paddy	3552	3276	3384
B) Export Parity Price Of Non-Basmati Paddy			
Average fob (Karachi) prices (US$/ton)	468.93	434.29	439.12
Exchange Rate (Rs/US$)	185.50	185.50	185.50
Average fob Karachi prices (Rs/40Kgs)	3479	3222	3258
Mill-gate price of 40 Kgs paddy	2066	1908	1930

Source: Annexes VIII to X.

13. ECONOMIC EFFICIENCY IN RICE PRODUCTION

63. Economic efficiency in rice production has been evaluated by estimating most frequently used economic parameters i.e Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost Coefficient (DRC). To assess the impact of price policy changes on rice producers and Pakistan's comparative advantage in rice production, the analysis is conducted from 2017-18 till 2021-22. NPC, EPC and DRC estimates are produced in Table-16 and background analyses given in Annex-XI to Annex-XII.

13.1 Nominal Protection Coefficient (NPC) under Export Situation

64. NPC is a measure of protection or taxation to the producers of a crop in lieu of open market price of the crop. In this calculation open market price is numerator while social price is denominator. By definition, social price is the export parity price minus marketing cost incurred in shifting the commodity from farm gate to the market.

65. NPC, EPC and DRC coefficients are separately calculated for Basmati and NON-BASMATI varieties of rice and produced in Table-17.

Table-17: Economic Efficiency Coefficients for Rice in Pakistan under Export Situation

Province/ Year	NPC	EPC	DRC	US $ 1= Pak Rs	Domestic Resources Spent (Rs) to earn Forex worth US$ 1
Punjab					
Basmati					
2017-18	0.54	0.50	0.34	37.42	109.84
2018-19	0.65	0.59	0.40	63.26	156.30
2019-20	0.79	0.74	0.46	77.67	167.39
2020-21	0.70	0.63	0.48	77.95	163.25
2021-22	0.75	0.69	0.46	81.73	175.78
Sindh					
Non-Basmati					
2017-18	1.21	1.25	0.75	81.94	109.84
2018-19	0.76	0.71	0.43	67.00	156.30
2019-20	0.79	0.74	0.46	77.48	167.39
2020-21	0.85	0.81	0.42	69.33	163.25
2021-22	0.78	0.72	0.46	80.71	175.78

Source: Annex-XI and XII

66. It is observed from the data given in Table-17 that for Basmati grown in Punjab, NPC values have been drastically fluctuating during the reference period. It indicates unstable domestic and international prices of basmati paddy

67. The decisive rule is that if NPC is smaller than one, local producers get price less than the corresponding export parity price and thus are implicitly taxed and vice versa.

68. For non-basmati paddy grown in Sindh NPC coefficients have been continuously above one during the period under study except in 2018-19 to 2021-22. It means that on the whole, non-basmati paddy growers are protected through the output price policy which induces producers for promoting the crop.

13.2 Effective Protection Coefficient (EPC) under Export Situation

69. Effective Protection Coefficient unlike NPC includes both input and output prices in its calculation. Thus it captures cumulative effect of both input costs and price of the crop on respective growers. In EPC calculation, difference of the crop revenue and traded inputs cost at private price is numerator and difference of the crop revenue and traded inputs cost at social price is denominator. However, it needs to be mentioned that EPC does not consider all input costs rather considers only traded inputs costs – those inputs which are purchased with cash. These are seed, fertilizer, tube well water, machinery (tractor etc). As a general principle if EPC is greater than one, producers of the crop are protected and if it is less than one they are implicitly taxed. In the former situation farmers are induced to produce more while in the later situation development of the crop is discouraged.

70. It is understood from EPC values for Basmati paddy produced in **Table-17** that produce prices of basmati have not been consistent with input prices in Pakistan. These have been highly fluctuating during the reference period. EPC values mentioned in the referred table indicate that basmati growers in Punjab remained implicitly taxed because EPCs were less than one during last five years.

71. EPC values for non-basmati paddy in Sindh mentioned in the referred table indicate that non-basmati growers in Sindh remained implicitly taxed because EPCs were less than one during last three years.

72. The above analysis implies that input output pricing policy in Pakistan favours non-basmati growers more than the basmati growers which may increase its production in future.

13.3 Domestic Resource Cost Coefficient (DRC)

- **Basmati paddy**

73. Domestic Resource Cost Coefficient (DRC) is a measure of opportunity cost of domestic resources used per unit of the value added in production of a crop. DRC value less than one indicates a country's comparative advantage in a particular commodity and the vice versa. In this calculation numerator is the total non-traded inputs expenditure at social prices and denominator is difference of the crop revenue and the traded inputs cost at social prices. As a principle, if DRC coefficient is greater than one, country does not have

comparative advantage in the concerned crop and if it is less than one, it has comparative advantage in that crop. In other words, the crop is efficiently produced in that particular country and cost of resources employed in its production is less than its import cost.

74. DRC values for Basmati and Non-Basmati are also produced in **Table-17**. It is observed from the data in this Table that DRC coefficient for basmati paddy in Punjab and non-basmati in Sindh has been always less than one during the analysis period which indicates Pakistan's comparative advantage for Basmati in Punjab and for Non-Basmati in Sindh.

13.4 Cost of Earning Foreign Exchange

75. It is already mentioned that DRC coefficient is a measure of the opportunity cost of the domestic resources (family labour, interest on capital, management charges, canal water charges, etc.) used in production of a crop. Thus DRC coefficient may be used to determine cost of foreign exchange earning in terms of domestic resources. The foreign exchange earning cost estimates are derived from the analysis produced in Table-17.

76. It is observed from column 5 in the referred table that we spend less to earn forex through Basmati than Non-Basmati because cost of domestic resources to earn one dollar are consistently less in Basmati than Non-Basmati. Furthermore, these costs are relatively more stable and consistent in Basmati than Non-Basmati paddy.

14. RICE YIELD AMONG COMPETING COUNTRIES

77. Global rice during 2020 occupied an area of 151.57 million hectares with a total production of 480.29 million tonnes. The world top 17 producing countries contribute 92.03 per cent of total area and 93.39 per cent of total production (Annex-XIV).

78. In terms of rice area, India is on the top with 45 million hectares followed by China, mainland with 30.08 million, Bangladesh with 11.42 and Indonesia, Thailand with 10.66, 10.41 million hectares. Pakistan lies at 10th number in this regard.

79. In terms of rice production, China is on the top with 141.24 million tonnes followed by India with 118.87 million, Bangladesh 36.6 and, Indonesia 36.43, Vietnam, Thailand with 29.36, 21.46 million tonnes respectively. However, Pakistan lies at 10^{th} position in rice production of the world.

80. In terms of yield per hectare, Australia lies at the top with 6687 kgs per hectare followed by Tajikistan 5920, Egypt 5887, Uruguay 5745 and USA with 5693 kgs per hectare. It is very alarming situation that **Pakistan** ranks at 87^{th} in terms of yield while **India** falls at 50^{th} position. (Annex-XV). It implies that there is a lot of potential to raise rice productivity per hectare in Pakistan.

15. MAJOR RICE VARIETIES AND THEIR YIELD POTENTIAL IN PAKISTAN

81. In Pakistan, rice is an important food and cash crop. It is the 2nd most important source of cash for the paddy growers. It also earns billion of rupees through its export. The yield potential of rice of different varieties of rice sown in Punjab and Sindh are presented in Table-18.

82. Pakistan is a major rice exporting country in the World. However, the national yield at the farm level is low despite that tremendous potential exists there. According to the Provincial Agriculture Departments, based on last three years (2019-20 to 2021-22) average yield of rice paddy of different varieties of Punjab and Sindh, is 823 kgs per acre for Basmati, 1050 kgs for Non-Basmati and 956 kgs for "others; in the Punjab. In Sindh, average yield level of Non-Basmati paddy is 1109 kgs per acre and 1572 kgs for other varieties. These yields are much below than the available potential. To meet the ever growing domestic food and export requirements for foreign exchanges, there is a need to make solid efforts to achieve the available yield potential. Yield potential of important rice varieties is presented in Table-18.

Table-18: Major Rice Varieties and Their Yield Potential

Variety	Yield Potential of Rice Paddy		Share in the total area of rice paddy (%)
	(Maund/acre)	(Kg/acre)	
Punjab			
a) **Basmati**			
Basmati-385	55	2600	6.05
Super Basmati	65	2600	70.72
b) **Non-Basmati**			
IRRI-6	80	3200	4.86
Niab- IRRI-9	80	3000	1.95
KS-282	100	3200	2.28
Sindh (Non-Basmati)			
a) IRRI-8	80	3200	80
IRRI-6	70	2800	
DR-82	70	2800	
DR-83	50-55	2100	
IRRI-92	70	2800	
Khanewal 95	50-55	2100	
Sada Hayat	60-65	2500	
Shaheen	80	3200	
Lateefy (Aromatic)	40	1600	
b) **In Pipe Line**			
DR-57	80	3200	
DR-58	85	3400	
DR-65 (Aromatic)	40-45	1700	

Sources: i) Nuclear Institute for Agriculture & Biology (NIAB), Faisalabad. ii) Rice Research Institute (RRI), Dokri Sindh.

16. IMPROVED SEED AVAILABILITY OF RICE PADDY

83. Seed is deemed as a nucleus of plant and plays a vital role in increasing the yield, thus it is necessary to use quality seed of the recommended varieties. In a self-pollinated crop like rice, experts recommend that at least 20% area of rice should be brought under fresh certified seed every year.

84. In order to review the overtime progress regarding coverage of quality seed, the annual gross and replacement of certified seed of rice and its availability during the period from 2016-17 to 2021-22 is presented in Annex-XVI.

85. It may be seen in Annex-XVI that supply of certified seed shows an irregular trend. Availability of certified seed at the country level during the referred period augmented and remained approximately 55.864 thousand tonnes in 2021-22 lower by 21.45% than the available certified seed (71.120 thousand tonnes) during 2020-21.

86. Varietal breakup of the supply of certified seed of rice both in public and private sectors for the crop year 2021-22 is presented in the Table-19.

Table-19: Variety wise Certified Seed of Paddy Supplied by Public and Private Sectors for 2021-22 Crop

Province/variety	Seed availability			Area sown	Seed requirement	Seed enough for area
	Public sector	Pvt. Sector	Total			
	(Tonne)			000 hac.	(Tonne)	%
Punjab	**2558.6**	**44788.8**	**47347.4**	**2555.0**	**40839.0**	**115.9**
Basmati (Fine)	912.4	16943.6	17856.0	1772.0	21264.0	**84.0**
Non-Basmati	1646.2	27845.2	29491.4	783.0	19575.0	**150.7**
Sindh (Non-Basmati)	**119.9**	**6302.3**	**6422.2**	**740.5**	18512.5	**34.7**
KPK (Non-Basmati)	**73.8**	**2021.0**	**2094.8**	**65.5**	1637.5	**127.9**
Baluchistan (Non-Basmati)	**0.0**	**0.0**	**0.0**	**161.4**	4035.0	**0.0**
	All Pakistan					
Basmati	912.4	16943.6	17856.0	1772.0	21264.0	**84.0**
Non-Basmati	1839.9	36168.5	38008.4	1750.4	43760.0	**86.9**
Total	**2752.3**	**53112.1**	**55864.4**	**3522.4**	**65024.0**	**85.9**

Source: FSC&RD, Islamabad

87. Provincial variety-wise data presented in the above table show that in all provinces major source of supply of certified seed was private sector. Share of the private sector in total seed availability is: Punjab (95%), Sindh (98%), Khyber Pakhtunkhwa (96%) and at country level 95%. Thus, it is concluded that certified seed of paddy was available to meet 86% of the total requirement in the country. The supply of certified seed needs to be increased to ensure paddy growers' access to certified seed.

17. ACKNOWLEDGEMENTS

88. In preparing this Report, following officers and officials have put a lot of effort and hard work which is appreciated.

Officers

1.	Mr. Hussain Ali Turi	Chief
2.	Mr. Muhammad Amin	Chief
3.	Syed Riaz Ali Shah	Assistant Chief (Coordinator)
4.	Mr. Salman Mahmood	Assistant Chief
5.	Mrs. Shagufta Tasleem	Assistant Chief
6.	Dr. Farrah Yasmin	Assistant Chief

Other Staff

1.	Mr. Muhammad Naeem	DMO
2.	Mst. Rabia Ijaz	LDC

Abdul Karim
Director General

ANNEX-I

AREA, YIELD AND PRODUCTION OF RICE BY VARIETY AND PROVINCE: 2011-12 TO 2021-22

Year	PUNJAB			SINDH			KPK Total	Baloch Total	Pakistan		
	Basmati	Non Bas	Total	Basmati	Non Bas	Total	(Non Bas)	(Non Bas)	Basmati	Non Bas	Total
AREA	---------- Thousand hectares ----------										
2011-12	1121.0	593.2	1714.2	73.5	562.3	635.8	50.1	171.1	1194.5	1376.7	2571.2
2012-13	995.1	716.3	1711.4	46.3	464.8	511.1	48.8	37.5	1041.4	1267.4	2308.8
2013-14	1192.6	616.3	1808.9	55.6	689.9	745.5	55.3	179.5	1248.2	1541.0	2789.2
2014-15	1320.0	557.7	1877.7	56.1	725.4	781.5	56.9	174.3	1376.1	1514.3	2890.4
2015-16	1254.1	526.1	1780.2	54.8	665.0	719.8	64.7	174.8	1308.9	1430.6	2739.5
2016-17	1352.8	383.7	1736.5	51.0	699.5	750.5	67.0	170.0	1403.8	1320.2	2724.0
2017-18	1416.4	424.5	1840.9	55.2	773.1	828.3	61.6	169.8	1471.6	1429.0	2900.6
2018-19	1473.0	431.0	1904.0	57.4	632.8	690.2	62.3	153.5	1530.4	1279.6	2810.0
2019-20	1662.0	367.1	2029.1	56.0	719.8	775.8	64.9	164.2	1718.0	1316.0	3034.0
2020-21	1871.6	522.8	2394.4	96.7	612.3	709.0	64.9	167.2	1968.3	1367.2	3335.5
2021-22	1772.0	783.0	2555.0	59.2	681.3	740.5	65.5	161.4	1831.2	1691.2	3522.4
YIELD	---------- kgs per hectare ----------										
2011-12	1685	2340	1912	1390	3838	3555	1890	3089	1667	3028	2396
2012-13	1767	2401	2032	1438	3824	3608	1922	3205	1752	2928	2398
2013-14	1725	2310	1924	1336	3686	3511	2024	3275	1708	3028	2437
2014-15	1771	2350	1943	1328	3554	3394	2302	3277	1753	3032	2423
2015-16	1817	2324	1967	1547	3741	3574	2377	3276	1806	3102	2483
2016-17	1866	2477	2001	1529	3693	3546	2361	3262	1854	3217	2514
2017-18	1989	2547	2117	1377	3589	3441	2394	3261	1966	3189	2568
2018-19	2002	2389	2090	1376	3938	3725	2469	3245	1979	3262	2563
2019-20	1952	2451	2042	1407	3470	3321	2442	3258	1934	3109	2444
2020-21	2145	2462	2214	1669	3683	3408	2442	3252	2121	3104	2524
2021-22	2058	2706	2257	1755	3709	3552	2374	3251	2048	3149	2577
PRODUCTI(	---------- Thousand tonnes ----------										
2011-12	1889.1	1387.9	3277.0	102.2	2157.9	2260.1	94.7	528.6	1991.3	4169.1	6160.4
2012-13	1758.1	1719.9	3478.0	66.6	1777.3	1843.9	93.8	120.2	1824.7	3711.2	5535.9
2013-14	2057.1	1423.9	3481.0	74.3	2543.0	2617.3	111.9	587.9	2131.4	4666.7	6798.1
2014-15	2337.2	1310.8	3648.0	74.5	2578.1	2652.6	131.0	571.2	2411.7	4591.1	7002.8
2015-16	2279.2	1222.8	3502.0	84.8	2488.0	2572.8	153.8	572.7	2364.0	4437.3	6801.3
2016-17	2524.4	950.6	3475.0	78.0	2583.6	2661.6	158.2	554.5	2602.4	4246.9	6849.3
2017-18	2816.6	1081.4	3898.0	76.0	2774.5	2850.5	147.5	553.8	2892.6	4557.2	7449.8
2018-19	2949.2	1029.8	3979.0	79.0	2492.0	2571.0	153.8	498.1	3028.2	4173.7	7201.9
2019-20	3244.0	899.7	4143.7	78.8	2497.7	2576.5	158.5	535.0	3322.8	4090.9	7413.7
2020-21	4014.2	1287.2	5301.4	161.4	2254.7	2416.1	158.5	543.7	4175.6	4244.1	8419.7
2021-22	3647.1	2118.5	5765.6	103.9	2526.7	2630.6	155.5	524.7	3751.0	5325.4	9076.4

Sources **1. For 2011-12 to 2020-21, Rice Paddy Policy Analysis for Crop of API, M/o NFS&R Islamabad.**

2. For 2021-22 : Second estimates of Punjab, Sindh, KPK and Balochistan provided by concerned Provincial Agriculture Depts.

ANNEX-I-A

AREA, YIELD AND PRODUCTION OF RICE BY VARIETY AND PROVINCE: 2011-12 TO 2021-22

Year	PUNJAB			SINDH			KPK Total	Baloch Total	Pakistan		
	Basmati	Non Bas	Total	Basmati	Non Bas	Total	(Non Bas)	(Non Bas)	Basmati	Non Bas	Total
AREA	---------- Thousand acres ----------										
2011-12	2770.1	1465.9	4236.0	181.6	1389.4	1571.1	123.8	422.8	2951.7	3401.9	6353.6
2012-13	2459.0	1770.0	4229.0	114.4	1148.6	1263.0	120.6	92.7	2573.4	3131.9	5705.3
2013-14	2947.0	1522.9	4470.0	137.4	1704.8	1842.2	136.7	443.6	3084.4	3808.0	6892.4
2014-15	3261.9	1378.1	4640.0	138.6	1792.5	1931.2	140.6	430.7	3400.5	3742.0	7142.5
2015-16	3099.0	1300.0	4399.1	135.4	1643.2	1778.6	159.9	431.9	3234.4	3535.1	6769.5
2016-17	3342.9	948.2	4291.1	126.0	1728.6	1854.6	165.6	420.1	3468.9	3262.4	6731.3
2017-18	3500.1	1049.0	4549.0	136.4	1910.5	2046.9	152.2	419.6	3636.5	3531.3	7167.7
2018-19	3639.9	1065.0	4705.0	141.8	1563.7	1705.6	153.9	379.3	3781.8	3162.0	6943.8
2019-20	4107.0	907.1	5014.1	138.4	1778.8	1917.2	160.4	405.8	4245.3	3252.0	7497.4
2020-21	4624.9	1292.0	5916.9	239.0	1513.0	1751.9	160.4	413.2	4863.9	3378.5	8242.4
2021-22	4378.8	1934.9	6313.7	146.3	1683.6	1829.8	161.9	398.8	4525.1	4179.1	8704.2
YIELD	---------- kgs per acre ----------										
2011-12	682	947	774	563	1553	1439	765	1250	675	1226	970
2012-13	715	972	822	582	1547	1460	778	1297	709	1185	970
2013-14	698	935	779	541	1492	1421	819	1325	691	1226	986
2014-15	717	951	786	537	1438	1374	932	1326	709	1227	980
2015-16	735	941	796	626	1514	1446	962	1326	731	1255	1005
2016-17	755	1003	810	619	1495	1435	956	1320	750	1302	1018
2017-18	805	1031	857	557	1452	1393	969	1320	795	1291	1039
2018-19	810	967	846	557	1594	1507	999	1313	801	1320	1037
2019-20	790	992	826	569	1404	1344	988	1319	783	1258	989
2020-21	868	996	896	675	1490	1379	988	1316	858	1256	1022
2021-22	833	1095	913	710	1501	1438	961	1316	829	1274	1043
PRODUCTI(	---------- Thousand tonnes ----------										
2011-12	1889.1	1387.9	3277.0	102.2	2157.9	2260.1	94.7	528.6	1991.3	4169.1	6160.4
2012-13	1758.1	1719.9	3478.0	66.6	1777.3	1843.9	93.8	120.2	1824.7	3711.2	5535.9
2013-14	2057.1	1423.9	3481.0	74.3	2543.0	2617.3	111.9	587.9	2131.4	4666.7	6798.1
2014-15	2337.2	1310.8	3648.0	74.5	2578.1	2652.6	131.0	571.2	2411.7	4591.1	7002.8
2015-16	2279.2	1222.8	3502.0	84.8	2488.0	2572.8	153.8	572.7	2364.0	4437.3	6801.3
2016-17	2524.4	950.6	3475.0	78.0	2583.6	2661.6	158.2	554.5	2602.4	4246.9	6849.3
2017-18	2816.6	1081.4	3898.0	76.0	2774.5	2850.5	147.5	553.8	2892.6	4557.2	7449.8
2018-19	2949.2	1029.8	3979.0	79.0	2492.0	2571.0	153.8	498.1	3028.2	4173.7	7201.9
2019-20	3244.0	899.7	4143.7	78.8	2497.7	2576.5	158.5	535.0	3322.8	4090.9	7413.7
2020-21	4014.2	1287.2	5301.4	161.4	2254.7	2416.1	158.5	543.7	4175.6	4244.1	8419.7
2021-22	3647.1	2118.5	5765.6	103.9	2526.7	2630.6	155.5	524.7	3751.0	5325.4	9076.4

Sources 1. For 2011-12 to 2020-21, Rice Paddy Policy Analysis for Crop of API, M/o NFS&R Islamabad.
2. For 2021-22 : Second estimates of Punjab, Sindh, KPK and Balochistan provided by concerned Provincial Agriculture Depts.

Annex-II

DISTRICT-WISE PRODUCTION OF RICE BY VARIETY: AVERAGE OF 2019-20 TO 2021-22

"000"tonnes

S.No	Province/ District	Basmati	Non-Basmati	Total	Percent	S.No	Province/ District	Basmati	Non-Basmati	Total	Percent
	Punjab						**KPK**				
1	Gujranwala	155.3	391.0	545.6	6.6	1	D.I.Khan	-	33.9	33.9	0.4
2	Sheikhupura	384.1	77.1	461.3	5.6	2	Dir Lower	-	22.3	22.3	0.3
3	Okara	253.6	150.4	404.0	4.9	3	Swat	-	20.5	20.5	0.2
4	Hafizabad	273.0	57.7	331.3	4.0	4	Kurram AG.	-	18.9	18.9	0.2
5	Jhang	279.4	12.0	291.4	3.5	5	Dir Upper	-	14.4	14.4	0.2
6	Sialkot	255.2	29.9	285.1	3.4	6	Malakand	-	10.8	10.8	0.1
7	Nankana Sahib	229.9	37.0	266.9	3.2	7	Bajour AG.	-	7.0	7.0	0.1
8	Bahawalnagar	210.2	52.5	262.7	3.2	8	Bannu	-	5.3	5.3	0.1
9	Pakpattan	172.5	38.6	211.0	2.5	9	Chitral	-	5.3	5.3	0.1
10	Kasur	57.7	130.6	188.2	2.3	10	Mardan	-	4.1	4.1	0.0
11	M.B.Din	136.2	42.1	178.3	2.1	11	Mansehra	-	3.7	3.7	0.0
12	D.G.Khan	14.9	162.1	177.0	2.1	12	Battagram	-	3.5	3.5	0.0
13	Narowal	125.9	2.4	128.3	1.5	13	Shangla	-	2.8	2.8	0.0
14	T.T.Singh	120.8	1.7	122.5	1.5	14	Lakki Marwat	-	0.9	0.9	0.0
15	Khanewal	105.0	16.4	121.5	1.5	15	Peshawar	-	0.7	0.7	0.0
16	Chiniot	73.8	39.2	113.0	1.4	16	Tank	-	0.7	0.7	0.0
17	Vehari	86.3	22.6	108.8	1.3	17	Swabi	-	0.6	0.6	0.0
18	Sahiwal	86.8	1.9	88.6	1.1	18	Orakzai AG	-	0.6	0.6	0.0
19	Sargodha	69.5	18.8	88.2	1.1	19	Bunir	-	0.6	0.6	0.0
20	Faisalabad	77.2	8.9	86.2	1.0	20	Hangu	-	0.4	0.4	0.0
21	Muzaffargarh	59.5	23.8	83.3	1.0	21	Charsadda	-	0.2	0.2	0.0
22	Gujrat	65.0	7.9	72.9	0.9	22	N.Waziristan	-	0.1	0.1	0.0
23	Lahore	46.9	24.3	71.2	0.9	23	F.R.D.I.Khan	-	0.1	0.1	0.0
24	Multan	56.1	15.1	71.2	0.9	24	Kohistan	-	0.1	0.1	0.0
25	Rajanpur	10.8	56.9	67.6	0.8						
26	R.Y.Khan	63.3	1.0	64.3	0.8						
27	Khushab	49.9	0.0	49.9	0.6						
28	Lodhran	40.0	6.8	46.8	0.6						
29	Bahawalpur	36.6	5.7	42.3	0.5						
30	Layyah	20.7	1.0	21.7	0.3						
31	Mianwali	13.3	0.0	13.3	0.2						
32	Bhakkar	2.7	0.0	2.7	0.0						
33	Jhelum	2.7	0.0	2.7	0.0						
	Sub Total	**3635.1**	**1435.1**	**5070.1**	**61.1**		**Sub Total**	**0.0**	**157.5**	**157.5**	**1.9**
	Sindh						**Balochistan**				
1	Badin	0.0	427.9	427.9	5.2	1	Jaffarabad	-	308.1	308.1	3.7
2	Larkana	1.0	373.3	374.3	4.5	2	Nasirabad		219.8	219.8	2.6
3	Jacobabad	23.9	348.0	372.0	4.5	3	Khuzdar	-	2.9	2.9	0.0
4	Shikarpur	43.1	295.9	339.0	4.1	4	Turbat	-	2.1	2.1	0.0
5	Qambar	16.5	261.8	278.2	3.4	5	Awaran	-	0.6	0.6	0.0
6	Thatta	21.7	235.6	257.3	3.1	6	Jhal Magsi	-	0.5	0.5	0.0
7	Kashmore	7.1	235.5	242.7	2.9	7	Dera Budghti	-	0.2	0.2	0.0
8	Dadu	1.4	175.0	176.3	2.1	8	Harnai	-	0.1	0.1	0.0
9	T.M.Khan	0.0	48.7	48.7	0.6						
10	N.Feroze	0.0	12.4	12.4	0.1						
11	Nawabshah	0.0	6.7	6.7	0.1						
12	Hyderabad	0.0	3.2	3.2	0.0						
13	Sukkur	0.0	2.1	2.1	0.0						
14	Matiari	0.0	0.3	0.3	0.0						
	Sindh Total	**114.7**	**2426.3**	**2541.0**	**30.6**		**Balochistan Total**	**-**	**534.4**	**534.4**	**6.4**
							Pakistan Total	**3749.8**	**4553.4**	**8303.1**	**100.0**

Notes: 1. Data have been arranged in descending order on the basis of total production of rice in each district.
2. Percentage share calculated on the basis of country total.
3. Rounding may result in slight differences in figures.

Source: Respective Provincial Agriculture departments

ANNEX-III

AVERAGE PER CAPITA AVAILABILITY FOR CONSUMPTION OF RICE: 2018-19 to 2020-21

S.No	Items	2018-19	2019-20	2020-21
	Production	7202	7414	8419
2	Deduction for seed, feed and wastage @ 6 percent for production	432	445	505
3	Export	4120	4149	3724
4	Net availability	2650	2820	4190
		----------Millions----------		
5	Population	219.36	223.82	228.24
		----------Kgs----------		
6	Per capita availability (consumption)	12.08	12.60	18.36
7	Average per capita availability			
	Average (2018-19 to 2020-21)		**14.35**	

Sources:

1- For Imports and Exports: Federal Bureau of Statistics, Karachi

2- For Population of Pakistan: Economic Survey, 2020-21

ANNEX-IV

Average farmer's cost of production of Basmati paddy in Punjab: 2021-22 and 2022-23 crops

S. No	Operation/input	Unit	Avg. no of operation/ acre	Rate/ unit	Cost/ acre	Rate/ unit	Cost/ acre	Change in 2022-23 over
				2021-22		2022-23		
1	**Land preparation**			…....Rs…..		…....Rs…..		2021-22
	1.1 Dry ploughing	No./ acre	3.0	950.0	2850	1000.0	3000	150
	1.2 Dry planking	No./ acre	0.3	475.0	143	500.0	150	8
	1.3 Wet ploughing	No./ acre	3.0	1300.0	3900	1300.0	3900	0
	1.4 Wet planking	No./ acre	2.0	650.0	1300	650.0	1300	0
	1.5 Rotavator	No./ acre	0.4	1200.0	480	1500.0	600	120
	1.6 Levelling	Hrs./ acre	1.0	1000.0	1000	1050.0	1050	50
2	**Seed**							
	2.1 Cost of nursery (3.39 marlas)	Rs./ acre			2000		3000	1000
	2.2 Cost of nursery uprooting, transport and planting	Rs./acre			5500		7000	1500
3	**Labour for bund making**	M. D/acre	0.984	600	590	650	640	49
4	**Weeding**							
	4.1 Manual	No./ acre	1.15	600	690	650	748	57
	4.2 Weedicides	No. of	1	750	750	800	800	50
	4.3 Pesticides spray	No. of	1	1300	1300	1750	1750	450
5	**Irrigation**							
	5.1 Canal	Rs./ acre			95.72		95.72	0
	5.2 Private tube well	No. of	10	925	9250	930	9300	50
	5.3 Labour used for irrigation & water course cleaning	M. D acre	6.1	600	3660	650	3965	305
6	**FYM @ 25% of the actual cost including transport & application**	No.	1.34	3000	1005	3000	1005	0
7	**Fertilizer**							
	7.1 DAP	bag/ acre	1.0	6500	6500	9193	9193	2693
	7.2 Urea	"	2.0	1900	3800	2512	5024	1224
	7.3 NP	"	0.06	2800	168	5210	313	145
	7.4 Zinc sulphate	"	0.84	1100	924	819	688	-236
	7.5 Potash	"	0.07	4200	294	5475	383	89
	7.6 Fertilizer transport & application	Rs./ bag	3.97	135	536	194	770	234
8	***Traded inputs cost (Item 1 to 7)***	***Rs/ acre***			***46736***		***54674***	**7938**
9	**Mark up on investment @ 13 % for 6 months on item 8**	"			3388		3554	165
10	**Harvesting, threshing etc**	Rs/ acre			3000		4000	1000
11	**Management charges for 6 months**	Rs/ acre			2321		2553	232
12	**Land rent for 6 months**	Rs./acre		33000	16500	35000	17500	1000
13	**Land revenue, local rate, panchotra etc**	"			5		5	0
14	**Average land tax @ Rs 132 acre/ annum**	"		132	66	132	66	0
15	***Gross cost (item 1 to 14)***	***Rs./ acre***			***72016***		***82352***	10336
16	**Value of paddy straw**	Rs./acre			7000		7000	0
17	**Net cost of cultivation (item 15-16)**	Rs./acre						
	17.1 Including land rent	Rs./ acre			65016		75352	10336
	17.2 Excluding land rent	Rs./ acre			48516		57852	9336
18	**Yield**	Kg/ acre			1400		1600	200
19	**Cost of production at farm gate**	Rs./ 40 Kg						
	19.1 With land rent	Rs./ 40 Kg			1858		1884	26
	19.2 Without land rent	Rs./ 40 Kg			1386		1446	60
20	**Marketing chrages (Rs./ 40 Kg)**	Rs./ 40 Kg			60		60	0
21	**Cost of production at market level**	Rs./ 40 Kg						0
	21.1 With land rent	Rs./ 40 Kg			1918		1944	26
	21.2 Without land rent	Rs./ 40 Kg			1446		1506	60

Notes:

1. Cost of one tube well irrigation is derived by multiplying Rs 372/hour by 2.5 hours (time per irrigation).
2. Cost of FYM is 25% of actual expenditure incurred on purchase of manure, loading/ unloading and transport expenditure. Underlying assumption is that effect of FYM lasts for two years i.e 50% of it will be consumed by rice crop and rest of the 50% will be consumed by the following crops. Again 50% consumption by paddy is reduced to one half because paddy is a six month crop.
3. Calculation may have minor differences due to decimal fractions.

ANNEX-V

Average farmer's cost of production of Non-Basmati paddy in Punjab: 2021-22 and 2022-23 crops

S. No	Operation/input	Unit	Avg. no of operation/ acre	Rate/ unit	Cost/ acre	Rate/ unit	Cost/ acre	Change in 2021-22 over 2020-21
				2021-22		2022-23		
1	**Land preparation**			…...Rs.….		…....Rs.….		
	1.1 Dry ploughing	No./ acre	3.0	950.0	2850	1000.0	3000	150
	1.2 Dry planking	No./ acre	0.3	475.0	143	500.0	150	8
	1.3 Wet ploughing	No./ acre	3.0	1300.0	3900	1300.0	3900	0
	1.4 Wet planking	No./ acre	1.0	650.0	650	650.0	650	0
	1.5 Rotavator	No./ acre	0.2	1200.0	240	1500.0	300	60
	1.6 Levelling	Hrs./ acre	1.0	1000.0	1000	1050.0	1050	50
2	**Seed**							
	2.1 Cost of nursery (3.39 marlas)	Rs./ acre			1800		2000	200
	2.2 Cost of nursery uprooting, transport and planting	Rs./acre			5500		6000	500
3	**Labour for bund making**	M. D/ acre	0.984	600	590	650	640	49
4	**Weeding**							
	4.1 Manual	No./ acre	1.15	600	690	650	748	57
	4.2 Weedicides	No. of	1	750	750	800	800	50
	4.3 Pesticides spray	No. of	1	1300	1300	1500	1500	200
5	**Irrigation**							
	5.1 Canal	Rs./ acre			95.72		95.72	0
	5.2 Private tube well	No. of	10	925	9250	930	9300	50
	5.3 Labour used for irrigation & water course cleaning	M. D/ acre	6.1	600	3660	650	3965	305
6	**FYM @ 25% of the actual cost including transport & application**	No.	1.34	3000	1005	3000	1005	0
7	**Fertilizer**							
	7.1 DAP	bag/ acre	1.0	6500	6500	9193	9193	2693
	7.2 Urea	"	2.0	1900	3800	2512	5024	1224
	7.3 NP	"	0.06	2800	168	5210	313	145
	7.4 Zinc sulphate	"	0.84	1100	924	819	688	-236
	7.5 Potash	"	0.07	4200	294	5475	383	89
	7.6 Fertilizer transport & application	Rs./ bag	3.97	135	536	194	770	234
8	***Traded inputs cost (Item 1 to 7)***	*Rs/ acre*			*45646*		*51474*	5828
9	**Mark up on investment @ 13% for 6 months on item 8**	"			3309		3346	36
10	**Harvesting, threshing etc**	Rs/ acre			3000		3000	0
11	**Management charges for 6 months**	Rs/ acre			2849		3134	285
12	**Land rent for 6 months**	Rs./acre		33000	16500	35000	17500	1000
13	**Land revenue, local rate, panchotra etc**	"			5		5	0
14	**Average land tax @ Rs 132 acre/ annum**	"		132	66	132	66	0
15	***Gross cost (item 1 to 15)***	***Rs./ acre***			***71375***		***78525***	**7150**
16	**Value of paddy straw**	Rs./acre			7000		7000	0
17	**Net cost of cultivation (item 15-16)**	Rs./acre						
	17.1 Including land rent	Rs./ acre			64375		71525	7150
	17.2 Excluding land rent	Rs./ acre			47875		54025	6150
18	**Yield**	Kg/ acre			2000		2000	0
19	**Cost of production at farm gate**	Rs./ 40 Kg						
	19.1 With land rent	Rs./ 40 Kg			1287		1430	143
	19.2 Without land rent	Rs./ 40 Kg			957		1080	123
20	**Marketing chrages (Rs./ 40 Kg)**	Rs./ 40 Kg			60		60	0
21	**Cost of production at market level**	Rs./ 40 Kg						
	21.1 With land rent	Rs./ 40 Kg			1347		1490	143
	21.2 Without land rent	Rs./ 40 Kg			1017		1140	123

Notes:

1. Cost of one tube well irrigation is derived by multiplying Rs 372/hour by 2.5 hours (time per irrigation).
2. Cost of FYM is 25% of actual expenditure incurred on purchase of manure, loading/ unloading and transport expenditure. Underlying assumption is that effect of FYM lasts for two years i.e 50% of it will be consumed by rice crop and rest of the 50% will be consumed by the following crops. Again 50% consumption by paddy is reduced to one half because paddy is a six month crop.
3. Calculation may have minor differences due to decimal fractions.

ANNEX-VI

Average farmer's cost of production of Non-Basmati paddy in Sindh: 2021-22 and 2022-23 crops

S. No	operation/input	Unit	Avg. no of operations/ acre	Rate/ unit	Cost/ acre	Rate/ unit	Cost/ acre	Change in 2021-22 over
				2021-22		2022-23		
1	Land preparation			....Rs.....		....Rs.....		2020-21
	1.1 Dry ploughing	No	5.0	1100.0	5500	1200.0	6000	500
	1.2 Dry planking	"	1.0	550.0	550	600.0	600	50
	1.3 Levelling	Hr/acre	1.0	1100.0	1100	1200.0	1200	100
2	Nursery							
	2.1 Cost of nursery	Rs./ acre	1.0	5000	5000	5000	5500	500
	2.2 Cost of nursery uprooting, transport and planting	Rs./acre			4000		5000	1000
3	Labour for bund making	M.D/acre	2	600	1200	650	1300	100
4	Manual weeding	M.D/acre	2.4	600	1440	650	1560	120
5	Plant protection							
	5.1 Weedicide	No./ acre	0.73	1200	876	1200	876	0
	5.2 Formulated spray	No./ acre	0.39	1600	624	1750	683	59
6	FYM @ 25% of the actual cost including transport & application	No.	1	4000	1000	4000	1000	0
7	Fertilizer							
	7.1 DAP	bag/ acre	1.0	6500	6500	9069	9069	2569
	7.2 Urea	"	2.0	1900	3800	2737	5474	1674
	7.3 Zinc sulphate	"	0.1	1000	100	894	89	-11
	7.4 Fertilizer transport & application	Rs./ bag	3.1	140	434	200	620	186
8	Irrigation							
	8.1 Canal	irrig./ acre	17.9	-	95.7	-	95.7	
	8.2 Private tube well (Rs./ irrigation)	irrig./ acre	0.5	1000.0	500	1000.0	500	0
	8.3 Labor used for irrigation & water course cleaning	M.D/acre	5.6	600.0	3360	650.0	3640	280
9	*Traded inputs cost (Item 1 to 8 minus 8.1)*	Rs/ acre			**35984**		**43111**	**7127**
10	Mark up on investment @ 13% for 6 months on item 10				2339		2802	463
11	Harvesting, threshing etc	Rs/ acre			4000		6000	2000
12	Management charges for 6 months	Rs	-		2321		2553	232
13	Land rent for 6 months	Rs./acre		33000	16500	35000	17500	1000
14	Land revenue, local rate, panchotra etc	"		5	5	5	5	0
15	Average land tax @ Rs 132 acre/ annum	"		132	66	132	66	0
16	Drainage Cess			24	12	24	12	0
17	**Gross cost (item 1-17)**	Rs./ acre			**61322**		**72145**	10823
18	Value of paddy straw	Rs./acre			4000		6000	2000
19	Net cost of cultivation (item 18-19)	Rs./ acre			**57322**		**66145**	8823
20	Yield	Kg/ acre			**2200**		**2200**	0
21	Cost of production at farm gate (Rs./40 Kg)							
	21.1 With land rent	Rs./ 40 Kg			1042		1203	160
	21.2 Without land rent	Rs./ 40 Kg			742		884	142
22	Marketing chrages (Rs./ 40 Kg)	Rs./ 40 Kg			60		60	0
23	Cost of production at market level (Rs./40 Kg)	Rs./ 40 Kg						
	23.1 With land rent	Rs./ 40 Kg			1102		1263	160
	23.2 Without land rent	Rs./ 40 Kg			802		944	142

Source:

* API field surveys

Annex-VII

ECONOMICS OF RICE PADDY AND COMPETING CROPS AT PRICES REALIZED BY THE GROWERS: 2021-22 CROP

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	Basmati Paddy	180	58	69585	37172	75425	38253	5840	1.08	2.03	419	1300
2	Non-Basmati Paddy	180	62	72721	33748	79700	45952	6979	1.10	2.36	443	1285
3	Seed Cotton	210	22	84502	30416	119120	88704	34618	1.41	3.92	567	5415
4	Wheat	150	12	59081	20017	75069	55052	15988	1.27	3.75	500	6256
5	Sunflower (spring)	120	22	62272	24678	125454	100776	63182	2.01	5.08	1045	5702
7	Seed Cotton + Wheat	360	34	143583	50433	194189	143756	50606	1.35	3.85	539	5711
8	Seed Cotton+Sunflower	390	44	146774	55094	244574	189480	97800	1.67	4.44	627	5559
10	Basmati Paddy+Wheat	330	70	128665	57189	150494	93305	21829	1.17	2.63	456	2150
11	Basmati Paddy+Sunflower	360	80	131856	61850	200879	139029	69023	1.52	3.25	558	2511
13	Non-Basmati Paddy + Wheat	330	74	131802	53765	154769	101004	22967	1.17	2.88	469	2091
14	Non-Basmati Paddy+Sunflower	360	84	134993	58426	205154	146728	70161	1.52	3.51	570	2442
16	Sugarcane	394	48	133068	48100	165960	117860	32892	1.25	3.45	421	3458
	Sindh											
1	Non-Basmati Paddy	180	56	67854	24881	84245	59364	16391	1.24	3.39	468	1504
2	Seed Cotton	210	18	88942	29911	127561	97650	38619	1.43	4.26	607	7087
3	Wheat	150	12	63478	21439	81185	59746	17707	1.28	3.79	541	6765
4	Sunflower (spring)	120	22	49629	18308	60789	42481	11160	1.22	3.32	507	2763
6	Seed Cotton + Wheat	360	30	152420	51350	208746	157396	56326	1.37	4.07	580	6958
7	Seed Cotton+Sunflower	390	40	138571	51350	188350	137000	49779	1.36	3.67	483	4709
9	Non-Basmati Paddy+ Wheat	360	68	131332	46320	165430	119110	34098	1.26	3.57	460	2433
10	Non-Basmati Paddy+Sunflower	360	78	117483	43189	145034	101845	27551	1.23	3.36	403	1859
12	Sugarcane	488	71	127429	43442	162338	118896	34909	1.27	3.74	333	2286

Notes for Annex-VII:

1. The economic analysis presented in the above exercise is based on the input-output prices applicable for 2021-22 crops.

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, 2021-22 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 2021-22 crops. To incorporate the escalations in input prices, which occurred during the growing period of 2021-22 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 Wheat is Rs 2200 per 40 kgs, as maintained by the Punjab and Rs 2200 by Sindh for 2021-22 crop, have been adopted for the current analysis.

    4.2 The wholesale market prices of basmati paddy and Non-Basmati paddy during the post- harvest period in major producer area markets have averaged at Rs 2015 and Rs 1514 per 40 kgs, respectively. While, the average price of Non-Basmati paddy in Sindh is reported at Rs 1519 per 40 kgs.

    4.3 The wholesale market prices of seed cotton during the post-harvest months of 2021-22 in the main producer area markets have averaged at Rs 5996 per 40 kgs in the Punjab and Rs 5797 Sindh.

    4.4 The price of Sunflower crops has been reported hovering around Rs 4500/40 kgs and Rs 4500/40 kgs for Canola during 2021-22.

    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 260 per 40 kgs in Sindh. However, the prices notified by the provincial governments were lower i.e Rs 225 and 250 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 19.5 per 40 kgs in Punjab and Sindh for sugarcane, Rs 40 for seed cotton in Punjab and Sindh, Rs 60 for rice paddy in Punjab and Sindh, and for wheat and oilseeds, Rs 40 in Punjab and Rs 45 in Sindh.

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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-VIII

EXPORT PARITY PRICES OF BASMATI PADDY ON THE BASIS OF FOB (KARACHI) PRICE

S.No	Item	During March, 2022		
		Basmati		**IRRI-6**
		--------- US $ Per Tonne --------		
1.	Average fob (Karachi) prices of rice			
	US$ per tonne	971.40		468.93
	Current exchange rate (Rs per US$)	185.50		185.50
	Pak Rupees per tonne	180195		86987
		------- Rs per 40 kgs ------		
		7208		3479
2.	Expenses from sheller/ market to export point	175		100
3.	Producer area market level price of rice (item 1-item 2)	7033		3379
4.	Product recoveries per 100 kgs of paddy	.....Kgs.....		
	i) Rice	48.0		58.00
	ii) Brokens	5.0		5.0
	iii) Tips	3.5		2.5
	vi) Bran powder	8.8		25.0
	v) Husk	25.0		5.0
	vi) Dust and inert matter	9.7		4.5
5.	Prices of products	----------Rs per 40 kgs----------		
	i) Rice as calculated in item 3	7033		3379
	ii) Brokens	4220		2366
	iii) Tips	1000		1000
	vi) Bran powder	800		800
	v) Husk	250		252
	vi) Dust and inert matter	0.00		0.00
6.	Value of products recoverable from 100 kgs paddy	----------Rupees ----------		
	i) Rice as calculated in item 3	8439		4900
	ii) Broken (a)	527		296
	iii) Tips	88		63
	vi) Bran powder (b)	70		50
	v) Husk and dust	55		158
	vi) **Total value of all products**	**9179**		**5466**
7.	Husking/Processing /financial per 100 kgs	300		300
8.	Mill-gate price of paddy per 100 kgs	8879		5166
9.	**Mill-gate price of paddy per 40 kgs**	**3552**		**2066**

Sources:

1 Federal Bureau of Statistics, Karachi.

2 Rice Exporters/Millers for incidental charges.

Annex-IX

EXPORT PARITY PRICES OF BASMATI PADDY ON THE BASIS OF FOB (KARACHI) PRICE

S.No	Item	During 2021-22(Jul-Mar)		
		Basmati		**IRRI-6**
		--------- US $ Per Tonne --------		
1.	Average fob (Karachi) prices of rice			
	US$ per tonne	898.6		434.29
	Current exchange rate (Rs per US$)	185.50		185.50
	Pak Rupees per tonne	166690		80561
		------- Rs per 40 kgs ------		
		6668		3222
2.	Expenses from sheller/ market to export point	175		100
3.	Producer area market level price of rice (item 1-item 2)	6493		3122
4.	Product recoveries per 100 kgs of paddy	.....Kgs.....		
	i) Rice	48.0		58.00
	ii) Brokens	5.0		5.0
	iii) Tips	3.5		2.5
	vi) Bran powder	8.8		25.0
	v) Husk	25.0		5.0
	vi) Dust and inert matter	9.7		4.5
5.	Prices of products	----------Rs per 40 kgs----------		
	i) Rice as calculated in item 3	6493		3122
	ii) Brokens	3896		2186
	iii) Tips	1000		1000
	vi) Bran powder	800		800
	v) Husk	250		252
	vi) Dust and inert matter	0.00		0.00
6.	Value of products recoverable from 100 kgs paddy	----------Rupees ----------		
	i) Rice as calculated in item 3	7791		4528
	ii) Broken (a)	487		273
	iii) Tips	88		63
	vi) Bran powder (b)	70		50
	v) Husk and dust	55		158
	vi) **Total value of all products**	**8490**		**5071**
7.	Husking/Processing /financial per 100 kgs	300		300
8.	Mill-gate price of paddy per 100 kgs	8190		4771
9.	**Mill-gate price of paddy per 40 kgs**	**3276**		**1908**

Sources:

1 Federal Bureau of Statistics, Karachi.

2 Rice Exporters/Millers for incidental charges.

Annex-X

EXPORT PARITY PRICES OF BASMATI PADDY ON THE BASIS OF FOB (KARACHI) PRICE

S.No	Item	During 2018-19 to 2020-21		
		Basmati		**IRRI-6**
		--------- US $ Per Tonne --------		
1.	Average fob (Karachi) prices of rice			
	US$ per tonne	927.22		439.12
	Current exchange rate (Rs per US$)	185.50		185.50
	Pak Rupees per tonne	171999		81457
		------- Rs per 40 kgs ------		
		6880		3258
2.	Expenses from sheller/ market to export point	175		100
3.	Producer area market level price of rice (item 1-item 2)	6705		3158
4.	Product recoveries per 100 kgs of paddy	.....Kgs.....		
	i) Rice	48.0		58.00
	ii) Brokens	5.0		5.0
	iii) Tips	3.5		2.5
	vi) Bran powder	8.8		25.0
	v) Husk	25.0		5.0
	vi) Dust and inert matter	9.7		4.5
5.	Prices of products	----------Rs per 40 kgs----------		
	i) Rice as calculated in item 3	6705		3158
	ii) Brokens	4023		2211
	iii) Tips	1000		1000
	vi) Bran powder	800		800
	v) Husk	250		252
	vi) Dust and inert matter	0.00		0.00
6.	Value	----------Rupees ----------		
	i) Rice as calculated in item 3	8046		4579
	ii) Broken (a)	503		276
	iii) Tips	88		63
	vi) Bran powder (b)	70		50
	v) Husk and dust	55		158
	vi) **Total value of all products**	**8761**		**5126**
7.	Husking/Processing /financial per 100 kgs	300		300
8.	Mill-gate price of paddy per 100 kgs	8461		4826
9.	**Mill-gate price of paddy per 40 kgs**	**3384**		**1930**

Sources:

1 Federal Bureau of Statistics, Karachi.

2 Rice Exporters/Millers for incidental charges.

Annex- XI

REGION WISE EXPORT OF BASMATI AND COARSE RICE DURING : 2019-20 AND 2020-21

Region	Quantity			Value			% Share in in total export	
	2019-20	2020-21	%	2019-20	2020-21	%	2019-20	2020-21
	….000 tonnes…..		Change	...Million US $...		Change	Per cent	
A. Basmati Rice								
Asia	521.18	296.14	-43.18	470.84	268.35	-43.01	60.19	47.81
Oceania	22.68	16.45	-27.47	21.16	16.21	-23.39	2.62	2.66
Europe	129.11	124.34	-3.69	132.00	130.08	-1.45	14.91	20.07
Africa	100.74	97.98	-2.74	81.63	73.51	-9.95	11.63	15.82
America	59.54	32.84	-44.84	53.65	39.77	-25.87	6.88	5.30
CIS	32.70	51.69	58.07	24.86	39.28	58.00	3.78	8.34
Total	**865.95**	**619.44**	**-28.47**	**784.14**	**567.2**	**-27.67**	**100.00**	**100.00**
B. Coarse Rice								
Asia	700.24	1237.86	**76.78**	286.46	556.84	94.39	32.55	60.62
Oceania	1.47	0.28	**-80.95**	0.68	0.20	-70.59	0.07	0.01
Europe	25.50	17.43	**-31.65**	11.65	9.05	-22.32	1.19	0.85
Africa	1302.34	704.08	**-45.94**	502.80	311.97	-37.95	60.54	34.48
America	91.14	52.64	**-42.24**	37.30	22.72	-39.09	4.24	2.58
CIS	30.53	29.61	**-3.01**	12.20	17.16	40.66	1.42	1.45
Total	**2151.22**	**2041.90**	**-5.08**	**851.10**	**917.94**	**7.85**	**100.00**	**100.00**
Grand Total	**3017.17**	**2661.34**	**-11.79**	**1635.24**	**1485.14**	**-9.18**		

Source: FBS, Karachi

Annex-XII

ECONOMIC EFFICIENCY OF RESOURCE USE IN BASMATI (PADDY) PRODUCTION IN PUNJAB

Based on export parity prices

Description	Revenues	Traded Input Cost	Domestic Factor Cost	Profits
		--------- Rupees per acre ---------		
2016-17				
Private Prices	43000	16230	26447	324
Social Prices	68290	16877	26668	24745
Transfers	-25290	-647	-221	-24421
2017-18				
Private Prices	55690	15361	27137	13192
Social Prices	96460	16158	27358	52943
Transfers	-40770	-797	-221	-39751
2018-19				
Private Prices	67080	20763	31765	14552
Social Prices	100768	21732	31986	47050
Transfers	-33688	-969	-221	-32498
2019-20				
Private Prices	82839	26780	34878	21181
Social Prices	103420	27772	35100	40548
Transfers	-20581	-992	-221	-19368
2020-21				
Private Prices	75061	27084	36204	11773
Social Prices	104297	28009	36425	39863
Transfers	-29236	-924	-221	-28091
2021-22				
Private Prices	91560	32078	39938	19544
Social Prices	119560	33190	40159	46211
Transfers	-28000	-1112	-221	-26667

Annex-XIII

ECONOMIC EFFICIENCY OF RESOURCE USE IN NON-BASMATI (PADDY) PRODUCTION IN SINDH

Based on export parity prices

Description	Revenues	Traded Input Cost	Domestic Factor Cost	Profits
		--------- Rupees per acre ---------		
2015-16				
Private Prices	37472	14872	23255	-655
Social Prices	29255	14069	23409	-8223
Transfers	8216	803	-154	7568
2016-17				
Private Prices	47260	10727	23702	12831
Social Prices	29330	10174	23877	-4721
Transfers	17930	553	-175	17552
2017-18				
Private Prices	50835	10695	23693	16447
Social Prices	42145	10149	23868	8128
Transfers	8690	546	-175	8319
2018-19				
Private Prices	59750	14277	27134	18339
Social Prices	77550	13764	27343	36443
Transfers	-17800	513	-209	-18104
2019-20				
Private Prices	67400	17076	31375	18950
Social Prices	84550	16316	31584	36650
Transfers	-17150	759	-209	-17700
2020-21				
Private Prices	79950	18191	32231	29528
Social Prices	93700	17310	32440	43950
Transfers	-13750	881	-209	-14422
2021-22				
Private Prices	83145	23278	38045	21822
Social Prices	105640	22330	38254	45056
Transfers	-22495	948	-209	-23234

ANNEX-XIV

AREA AND PRODUCTION OF MAJOR RICE PRODUCING COUNTRIES IN THE WORLD: 2020 CROP

S.NO.	NAME OF COUNTRY	Area Million (ha)	Percent share
1	India	45.00	29.69
2	China, mainland	30.08	19.85
3	Bangladesh	11.42	7.53
4	Indonesia	10.66	7.03
5	Thailand	10.41	6.87
6	Viet Nam	7.57	4.99
7	Philippines	4.80	3.17
8	Nigeria	3.35	2.21
9	Cambodia	2.92	1.92
10	Pakistan	2.81	1.85
11	Guinea	1.97	1.30
12	Brazil	1.68	1.11
13	Madagascar	1.68	1.11
14	Japan	1.46	0.96
15	Democratic Republic of the Congo	1.32	0.87
16	United Republic of Tanzania	1.20	0.79
17	United States of America	1.18	0.78
Total of 17 countries		**139.49**	**92.03**
World Total 107 countries		**151.57**	**100.00**

S.NO.	NAME OF COUNTRY	Production Million (tonnes)	Percent share
1	China, mainland	141.24	29.41
2	India	118.87	24.75
3	Bangladesh	36.60	7.62
4	Indonesia	36.43	7.59
5	Viet Nam	29.36	6.11
6	Thailand	21.46	4.47
7	Philippines	12.71	2.65
8	Brazil	7.39	1.54
9	Cambodia	7.31	1.52
10	Pakistan	7.20	1.50
11	United States of America	6.78	1.41
12	Japan	6.47	1.35
13	Nigeria	4.54	0.95
14	Republic of Korea	3.46	0.72
15	Egypt	3.26	0.68
16	Madagascar	2.82	0.59
17	Sri Lanka	2.62	0.55
Total of 17 countries		**448.52**	**93.41**
World Total 107 countries		**480.29**	**100.00**

Source: FAO Stat.

Note: Rice production has worked out from paddy production assuming rice paddy ratio is 2/3.

ANNEX-XV

YIELD PER HECTARE OF MAJOR RICE PRODUCING COUNTRIES IN THE WORLD: 2020 CROP

KGS/HA

S.NO.	NAME OF COUNTRY	YIELD	S.NO.	NAME OF COUNTRY	YIELD
1	Australia	6687	46	Ecuador	2848
2	Tajikistan	5920	47	Bhutan	2843
3	Egypt	5887	48	Romania	2741
4	Uruguay	5745	49	Philippines	2726
5	United States of America	5693	**50**	**India**	**2642**
6	Peru	5486	51	Rwanda	2625
7	Morocco	5330	52	Benin	2624
8	Greece	5309	53	Hungary	2618
9	Turkey	5210	54	Panama	2614
10	El Salvador	5102	55	Nepal	2537
11	Spain	4829	56	Honduras	2535
12	China, mainland	4695	57	Myanmar	2514
13	China, Taiwan Province of	4458	58	Cambodia	2505
14	Japan	4426	59	Kyrgyzstan	2486
15	Italy	4421	60	Guyana	2468
16	Brazil	4407	61	Costa Rica	2447
17	Argentina	4400	62	Malaysia	2398
18	Paraguay	4399	63	Cuba	2383
19	Republic of Korea	4325	64	Venezuela (Bolivarian Republic of)	2338
20	Nicaragua	4298	65	Fiji	2333
21	Chile	4286	66	Mali	2234
22	Kenya	4265	67	Senegal	2229
23	Mexico	4140	68	Timor-Leste	2220
24	Uzbekistan	4125	69	Eswatini	2186
25	North Macedonia	4096	70	Burundi	2119
26	Viet Nam	3947	71	Azerbaijan	2088
27	Russian Federation	3885	72	Haiti	2022
28	Colombia	3827	73	Ethiopia	2021
29	Kazakhstan	3629	74	Afghanistan	1986
30	Ukraine	3612	75	Guatemala	1975
31	Bulgaria	3552	76	Brunei Darussalam	1962
32	Mauritania	3514	77	Ghana	1957
33	France	3436	78	Uganda	1948
34	Indonesia	3419	79	Sudan	1943
35	Portugal	3413	80	Thailand	1938
36	Dominican Republic	3341	81	United Republic of Tanzania	1902
37	Bangladesh	3206	82	Côte d'Ivoire	1900
38	Sri Lanka	3201	83	Gabon	1886
39	Niger	3161	84	South Africa	1878
40	Iran (Islamic Republic of)	3154	85	Bolivia (Plurinational State of)	1841
41	Suriname	3093	86	Madagascar	1684
42	Iraq	3042	***87***	***Pakistan***	***1683***
43	Belize	3017			
44	Democratic People's Republic of Kore	2995			
45	Lao People's Democratic Republic	2993			

Source: FAO, Statistic Division

Annex- XVI

AVAILABILITY OF CERTIFIED SEED OF RICE PADDY: 2016-17 TO 2021-22

Year	Province	Area			Seed requirement at		Total Seed available	Availibility of seed	
		Basmati	Non-Basmati	Total	Gross	Replacement @ 20 %		Gross requirement	Replacement requirement
		------- 000 hect --------			---------- tonnes ----------			(per cent)	
2016-17	Punjab	1352.8	383.7	1736.5	25826.1	5165.2	44468.5	172.2	860.9
	Sindh	0.0	750.5	750.5	18763.0	3752.6	7042.8	37.5	187.7
	KPK	0.0	67.0	67.0	1675.0	335.0	23.2	1.4	6.9
	Balochistan	0.0	170.0	170.0	4250.0	850.0	0.0	0.0	0.0
	Total	**1352.8**	**1371.2**	**2724.0**	**50514.1**	**10102.8**	**51534.6**	**102.0**	**510.1**
2017-18	Punjab	1416.4	424.5	1840.9	27609.3	5521.9	44468.5	161.1	805.3
	Sindh	0.0	828.3	828.3	20707.5	4141.5	7042.8	34.0	170.1
	KPK	0.0	61.6	61.6	1540.0	308.0	67.0	4.4	21.8
	Balochistan	0.0	169.8	169.8	4245.0	849.0	0.0	0.0	0.0
	Total	**1416.4**	**1484.2**	**2900.6**	**54101.8**	**10820.4**	**51578.3**	**95.3**	**476.7**
2018-19	Punjab	1494.1	429.7	1923.8	28671.7	5734.3	59058.0	206.0	1029.9
	Sindh	0.0	690.2	690.2	17255.0	3451.0	6486.4	37.6	188.0
	KPK	0.0	62.3	62.3	1557.5	311.5	33.3	2.1	10.7
	Balochistan	0.0	153.5	153.5	3837.5	767.5	0.0	0.0	0.0
	Total	**1494.1**	**1335.7**	**2829.8**	**51321.7**	**10264.3**	**65577.7**	**127.8**	**638.9**
2019-20	Punjab	1662.0	367.1	2029.1	29121.5	5824.3	40966.4	140.7	703.4
	Sindh	0.0	775.8	775.8	19395.8	3879.2	2355.0	12.1	60.7
	KPK	0.0	65.1	65.1	1627.5	325.5	695.0	42.7	213.5
	Balochistan	0.0	164.2	164.2	4105.0	821.0	210.0	5.1	25.6
	Total	**1662.0**	**1372.2**	**3034.2**	**54249.8**	**10850.0**	**44226.4**	**81.5**	**407.6**
2020-21	Punjab	1871.6	522.8	2394.4	35530.2	7106.0	64125.1	180.5	902.4
	Sindh	0.0	709.0	709.0	17724.2	3544.8	4690.8	26.5	132.3
	KPK	0.0	64.9	64.9	1622.5	324.5	1403.8	86.5	432.6
	Balochistan	0.0	167.2	167.2	4180.0	836.0	900.0	21.5	107.7
	Total	**1871.6**	**1463.9**	**3335.5**	**59056.9**	**11811.4**	**71119.7**	**120.4**	**602.1**
2021-22	Punjab	1772.0	783.0	2555.0	40839.0	8167.8	47347.4	115.9	579.7
	Sindh	59.2	681.3	740.5	17742.9	3548.6	6422.2	36.2	181.0
	KPK	0.0	65.5	65.5	1637.5	327.5	2094.8	127.9	639.6
	Balochistan	0.0	161.4	161.4	4035.0	807.0	0.0	0.0	0.0
	Total	**1831.2**	**1691.2**	**3522.4**	**64254.4**	**12850.9**	**55864.4**	**86.9**	**434.7**

Notes:

1- The area under rice for the Punjab and Sindh province represent area under basmati and Non-Basmati varieties while that of KPK and Baluchistan represent the area under Non-Basmati varieties.

2- The seed requirement has been worked by using the seed rate of 12 kgs per hectare for basmati and 25 kgs per hectare for Non-Basmati varieties.

Sources:

For Area: Annex-I

For Seed: FSC&RD, Islamabad