**Indian Journal
of Pure & Applied
Biosciences**

Peer-Reviewed, Refereed, Open Access Journal

Rice (*Oryza sativa*) Production Profitability in Dera Ismail Khan District

Muhammad Ehsan Elahi[1*], Nabila Inayat[2], Noman Latif[1], Muhammad Jamil[1], Amanullah Khan[1], Muhammad Arshad Khan[1], Muhammad Adeel Ahmad[1] and Muhammad Kashan[1]

[1]Arid Zone Research Centre, Pakistan Agricultural Research Council (PARC), D. I. Khan, Pakistan
[2]Govt Girls Degree College, Kulachi, D. I. Khan, Pakistan
*Corresponding Author E-mail: niazidk@hotmail.com
Received: 21.02.2021 | Revised: 25.03.2021 | Accepted: 03.04.2021

ABSTRACT

At the PARC Arid Zone Research Centre, a study has been conducted to determine the cost and returns (profit) of rice cultivation in D. I. Khan District, Province Khyber Pakhtunkhwa in 2020. The fundamental underlying principle of the viability of rice cultivation was that rice would only be grown by individuals/farmers if it had a positive effect on their financial condition. A comprehensive survey was performed involving 200 respondents from 10 sampled D. I. Khan villages, i.e. Rangpur, Paharpur, Daraban, and Prova. Besides, farm budgeting methodology was used to predict expense, return and benefit. The results showed that the per-acre average cost was Rs. 31,220, and it was calculated that the average rice production (output) was 1800kg per acre. The total return of the production of rice was, thus Rs. 70,500 per acre. Therefore, the analysis demonstrates that there is a positive effect between the return price and the export of rice, while the import cost of rice harms the production of rice, on the other hand.

Key words: *Arid Zone Research Centre, Rice, Cost, Return, Profit.*

INTRODUCTION

Rice, which is the second main staple food crop, plays a significant role in Pakistan's economy. This accounts for 3.2% of the added value of agriculture and 0.7 percent of GDP. In the period 2019-2020, rice exports gained US$ 2.2 billion in foreign exchange. Rice was sown on an area of 2899 thousand hectares. Recorded production of 7442 thousand tones GOP. Due to the use of hybrid seeds and more land brought under cultivation, rice production increased.

Pakistan Economic Survey 2019-20 (5)
Wheat, rice, corn, sugarcane, and vegetables are the primary crops grown in the district of D. I. Khan. Rice crops are mainly grown in the Kharif season in an area under the influence of the Chashma Right Bank Canal Canal (CRBC). The season for sowing begins in April-June, while harvesting begins in November. Super 86, Kainat, and Irri-6 is the most widely used rice varieties.

Most scientists have presented their studies covering the economic implications of different crops, including rice. Santha (Sanha, 1993) analyzed the economics of Indian rice farming and compared the rate, input, and revenue of rice production over three seasons. He suggested that in terms of profit cost ratio and output cost, the Viruppu crop performed higher. (Dash et al., 1995) measured the expense, profit, and input per hectare used in summer rice production and noted that the average cost of cultivation per hectare was Rs. 17,113 and the average yield per hectare was around 56 quintals, ranging from 52.71 to 58 quintals on sample farms. Rs. 18923 and Rs. 1920, respectively, were the estimated gross and net returns per hectare.

(Logano & Mari, 2005) analyzed the onion crop input-output relationship in the district of Hyderabad using the production function of Cobb-Douglas and found that the onion crop input-output relationship was defined by constant returns to scale. (Ahmed et al., 2005) measured and contrasted the costs and benefits of potato crops for two districts of Punjab (Okara & Kasur). In two districts, they discovered major cost and benefit variations in these crops. (Ali, 1989) and et al stated that farm-specific benefit inefficiency was calculated from the variable-coefficient profit frontier among Basmati rice farmers. With a broad range of 5-87 percent, the mean level of inefficiency at farm capital and price levels was 28 percent. The total earnings loss was Rs 1,222 per hectare. Education of the farm household, non-agricultural jobs, and a credit cap were socioeconomic factors correlated with profit loss. A water cap and the late application of fertilizer were administrative determinants of the benefit loss. There are major Punjab-wide benefits of increasing the profit productivity of farmers; a 25 percent decrease in profit loss among Basmati rice producers will generate more than Rs 240 million in additional income per rice season.

MATERIALS AND METHODS

The research was performed during 2019-20 at Arid Zone Research Center, D. I. Khan. For data collection, only major rice production areas were used in district D. I. Khan. These areas, including Paharpur, Rangpur, Daraban, and Prova were randomly chosen. These villages are located under the Chashma Right Bank Canal (CRBC) command area, D. I. Khan. The attributes that are favorable for rice cultivation. Such places are located close by. The study is based on the primary details. For the study, 200 farmers from major rice producers in these areas were considered as samples. Respondents were randomly chosen as well. The required information from farmers in their fields or at home was obtained via the questionnaire. To get the real results, the questionnaire was pre-tested. Maximum details such as land ownership, total area under cultivation, area under rice cultivation were used. The main concern, however, was on the different inputs used in the processing of rice, which had an impact on its profitability.

Statistical Analysis:

The data was analyzed through software i.e Econometric view (E-Views). Detail sare given as under:

Profit Function:

$$\Pi = \text{Total Revenue (TR)} - \text{Total Cost (TC)}$$

$$\Pi = TR\text{-}TC \ldots\ldots\ldots\ldots\ldots (1)$$

Where,

$$TR = P*Q \quad (P = \text{Price of Produce } \& Q = \text{Produce})$$

$$TC = V*X \quad (V = \text{Input price and } X = \text{Input purchased})$$

Therefore,

$$\Pi = PQ - VC \ldots\ldots\ldots\ldots\ldots (2)$$

Model of the profit function

Econometric form of an empirical model of crop profit function in econometric is as:

$$\Pi = \alpha + \beta_1 P + \beta_2 Q + \beta_3 C \ldots\ldots\ldots (3)$$

The model described (Π) is determined by 3 major factors, given as:

$$P = \text{Produce Price}$$

$$Q = \text{Produced}$$

$$C = \text{Produced Cost}$$

The 1, 2equationis used to make3rd the equation. This indicates that profit (Π) depends on produced price (P), total produce (Q), and per-unit cost (C) of produced. B_s are parameters to be measured/estimated. The said model was also used by (Derbertin, 2012), (Samiullah et al. 2014), (da, 2006), Hussain [2007], Khan (2009), and to dorovic (2010).

RESULT AND DISCUSSION

Variable costs include the preparation of land, crops, chemical/fertilizer additives, water for drainage, weeding/hoeing, harvesting and threshing charges, etc. Due to variance in the usage of inputs, some variation in the cost of rice production from the respondents was noted. The overall total cost of rice production per acre was Rs. 31,220 (Table-1) and an average production of rice of 45 MD per acre (md=40kg) is obtained (Table -2). Therefore, the total return per acre from rice production was Rs. 70,500. As an incidental gain, rice bhusa was also measured, while a limited portion was kept for livestock and other domestic purposes.

Net Return per acre of rice production

Net return is determined as under: by using equation No. 1:

Net return	=	Total return per	-	Total Cost per acre
Net return	=	70,500	-	31,220
Net return	=	**39,280**		

The key factors that have determined the net return per acre from rice production are:

(1)   P   =   Output Price
(2)   Q   =   Output (Production)
(3)   C   =   Cost of production

Estimated Model…………… (3)

$$\Pi = -0.0006 + 0.899\,P + 0.051\,Q + 1.000\,C$$

Standard Error $= \{0.003\}\ \{6.65\ E^{05}\}\{0.07)\ \{1.33\ E^{-08}\}$

t-ratio $= \{-1.69\}\ \{1548.13\}\{0.75\}\{-753562\}$

$R^2 = 1.00,$
R^2 (adjusted) $= 1.00$
$F = 7.86\ E^{20}$

The overall fit/significance efficiency of the model is calculated by the F-test. From the above model, it is obvious that the f-test is of very high importance.

$F_{\text{calculated}} = 7.86\ E_{20}$ >   F tabulated= 3.32

That is, the estimated f-statistic value is greater than the tabulated f-statistic value.

The model thus demonstrates overall significance.

The determination coefficient (R^2) means that the independent variables have been explained by the 100 percent difference in the dependent variable. The indication of independent variables means that the hypothesis is based on the influence of explanatory variables. The principle notes that cost is negative; there is also a favorable relationship between benefit and production costs. Calculated> tabulated =1.895, indicates that the t-ratios of the rice profitability model factors confirm that the benefit from the output of rice (π) is greatly determined by the three model factors already listed, holding all other inputs constant. Thus, one rupee increase in Rice per acre operation (P) will increase the income by Rs. 0.18, creating another kg of production (Q) will increase the benefit by Rs 0.06, and each additional unit of cost per kg (C) will reduce the profit by Rs. 1. The profit function calculation showed that profit is greatly influenced by the three factors listed above. The cost influence, however, is greater than the price and production impact of rice.

Table a. Average Production Cost of Rice at D. I. Khan

SNo	Items/ Input etc	Measuring Unit	Qty	Unit rate Rs.	Expenditure
a.	Land development (All inclusive)	Acre	1	1200	1200
b.	Variety Seed	Kg	8.0	55	440
c.	Labor employment (start to end)	Day	8	500	4000
d	**Fertilizer**				
d.1	Diammonium phosphate	Bag	1	1800	1800
d.2	Urea (Fertilizer)	Bag	2	1600	3200
d.3	Potash (Potassium)	Bag	1	400	400
d.4	Zink	kg	8	60	480
e	Water Irrigation cost (Canal System)	Seasonal	1	600	600
f	**Pesticide**				
g.1	Insecticide	Kg	8	80	640
g.2	Weedecide	Litr	1	800	800
h	**HarvestorCombined**	Acre	1	2200	2200
i	bags (Empty)	Nos.	10	50	500
j	Land (Rent)	Acres	1	15000	15000
	Grand Total Cost	-	-	-	**31,220**

Table b. Average Revenue (Total & Net) of Rice at D. I. Khan

Items	Qty Maund*	Unit rate Rs. /maund*	Revenue Amount Rs.
Out Put (Produce)	45	1500	67,500
Bhusa (Straw)	-	3000	3000
Revenue Total	-	-	**70,500**
Net Revenue	-	-	**39,280**

*   Maund   =   40 kg

CONCLUSION

Therefore, the report concluded that profit is under the direct net positive profit impact of rice prices and demand, while rice profitability was negatively influenced by cost. To achieve optimum productivity and reap more benefits, a well-planned strategy should be developed for the timely delivery of inputs at stable prices, which will effectively increase the socio-economic status of the farming communities and thus add to GDP as well.

REFERENCES

Ahmed, B. S., Hasan, K., Bakhsh & Ahmed, W. (2005). Profitability and various constraints in potato cultivation. *Pak. J. Agric. Sci. 43*(3), 68-73.

Ali. M. (1989). Profit Efficiency Among Basmati Rice Producers in Pakistan Punjab, *J. Agr. Econ. 71*(2), 303-310.doi: 10.2307/1241587.

Bakhsh, K., Husssa, I., Khurshid, W., & Hassan, S. (2012). Econometric analysis of adoption of water conservation practices: a case of cotton crop. *Journal of Agriculture Research. 50*, 445-455.

Dash, J. K., Singh, R. P., & Pandy, R. K. (1995). Economic analysis of summer rice production in Baharagora block of Singhbhum district, Bihar- A case study. *J. Res. Birsa Agric. Univ. 7*(2), 131-135.

Debertin, D. L. (2012). Agricultural Production Economics. 2 edn. Macmillion Publishing Company, New York, USA. 413p.

GOP, Economic Survey of Pakistan, Economic Advisory Wing, Government of Pakistan.

Hussain, A., & Khattak, N. R. (2011). Economic analysis of sugarcane crop in district Charsada. *J. Agric. Res. 49*(1), 153-163.

Khan, M. A., Awan, I. U., & Zafar, J. (2009). Energy requirement and economic

analysis of rice production in western part of Pakistan. *Soil & Environment. 28*, 60-67.

Lohano, H., & Mar, F. (2005). Mearuing the degree of return to scale for onion production in Sindh. *Indus. J. Biol. Sci. 2*(4), 532-535.

Sanha, A. M. (1993). A comparative analysis of cost and returns of paddy cultivation for different seasons in Trichur, Kerala. Madras Agriculture. *Journal. 80*, 41-44.

Samiullah, M., Shah, K., Ullah, R., & Ullah & Ibrarullah, (2014). Profitability of Wheat Production in Dera Ismail Khan. *Pak. J. Agric. Res. 27*(3), 244-249.

Sustainability and profitability of aerobic rice production in Brazil, B., da, S., Pinheiro, E., da, M., de Castro, C. M., Guimarães Field Crops Research *97*(1), 5 May 2006, Pages 34–42.

Todorovic, S. Z., & Filipovic, N. S. (2010). Economic analysis of wheat production on family farms. *J. Agric. Sci. 55*(1), 79-87.