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

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Abstract: The present study was conducted at Arid Zone Research Centre (AZRC), Dera Ismail Khan (D.I.Khan) to assess the cost and returns (profit) of rice cultivation in district Dera Ismail Khan, Khyber Pakhtunkhwa during 2014. The basic underlying assumption of profitability of rice production was that the people / farmers will cultivate rice only if there is positive impact on their financial situation. A thorough survey involving 50 respondents from 5 sampled villages of D.I.Khan i.e Paharpur, Rangpur, Log Dakna, Paroa and Adil Sipra were interviewed. Moreover, farm budgeting technique for estimating cost, return and profit was applied. The results showed that the average cost per acre was Rs. 31,040 and average production (output) of rice was estimated to be 1840 kg per acre. Therefore, the gross return of rice production was Rs. 44468 per acre. The study, therefore, indicated that there is positive influence between return price and output of rice whereas on the other hand the input cost of rice had negatively affected the rice production.

Key words: Rice · Cost · Return · Profit · Arid Zone Research Centre

INTRODUCTION

Being second largest staple food crop, rice plays an important role in the economy of Pakistan. It accounts for 3.2 percent in the value added in agriculture and 0.7 percent of growth domestic product (GDP). Rice export earned foreign exchange of US$ 1.53 billion during 2014-15. Rice was cultivated on an area of 2891 thousand hectares showing an increase of 3.6 percent over last year's area of 2789 thousand hectares. It was record produce of 7005 thousand tones, which is 3.0 percent more than the last year's production which was 6798 thousand tones. Rice production increased due to due to use of hybrid seed and more area brought under cultivation [1].

The major crops cultivated in district D.I.Khan are wheat, rice, maize, sugarcane and vegetable. In Kharif season, rice crop is mainly grown on an area fall under the command of Chashma Right Bank Canal (CRBC). The sowing season starts from April-June while harvesting starts in November. The most commonly used rice varieties are Super 86, Kainat and Irri-6.

Majority of researchers presented their studies covering economic aspects of various crops including rice. Santha [2] studied the economics of rice cultivation in India and compared rice production cost, input and its revenue in three seasons. He indicated that the Viruppu crop performed better in terms of benefit cost ratio and cost of production. Dash *et al*. [3] calculated per hectare cost and benefit and input used in production for summer rice and observed that an average per hectare cost of cultivation was Rs. 17113 and average yield per hectare was about 56 quintals, which varied from 52.71 to 58 quintals on sample farms. The average gross and net returns per hectare were Rs. 18923 and Rs. 1920, respectively.

Lohano and Mari [4] studied the input-output relationship of onion crop in Hyderabad district using Cobb-Douglas production function and found that input-output relationship of onion crop was characterized by constant returns to scale. Ahmed *et al*. [5] assessed the cost and benefit for potato crop and compared it for two district of Punjab (Okara and kasur). They found significant difference in cost and benefit in these crops in two districts.

Ali [6] reported that farm-specific profit inefficiency among Basmati rice producers was estimated from a variable-coefficient profit frontier. The mean level of

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inefficiency at farm resources and price levels was 28%, with a wide range of 5-87%. Average loss of profit was Rs 1,222 per hectare. Socioeconomic factors related to profit loss were the farm household's education, nonagricultural employment and a credit constraint. Institutional determinants of profit loss were a water constraint and the late application of fertilizer. Punjab-wide benefits of increasing farmer's profit efficiency are large; a 25% reduction in profit loss among Basmati rice producers may generate over Rs 240 million in extra profits each rice season.

MATERIALS AND METHODS

The study was conducted at Arid Zone Research Centre, D.I.Khan during 2014. Only Major areas producing rice in District D.I.Khan was used for data collection. These areas were selected randomly including Paharpur, Rangpur, Lok Dakna, Prova and Adil Sipra. These villages situated under the command area of Chashma Right Bank Canal (CRBC), D.I.Khan. The characteristics favorable for rice cultivation. These areas are situated near. The analysis is based on the primary data. Fifty (50) farmers out of major rice growers of these areas were considered as sample for study. Respondents were also selected randomly. Through questionnaire necessary information from farmers were collected at their field or home. The questionnaire was pre-tested to get the actual data. It included maximum information such as land holding, total cultivated area and area under rice cultivation. However, main focus was on various inputs used in rice crop production which has an impact on its profitability.

Statistical Analysis: Econometric view (E-Views) package was used for data analysis. The detail is given below:

Profit Function:

Π = Total Revenue (TR)-Total Cost (TC)

$$\Pi = TR - TC \quad (1)$$

where,
TR = P*Q (P= Price of output and Q = Output)
TC = V*X (V = Input price and X = Input purchased)

Therefore,

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

Model of Profit Function: Empirical model of crop profit function in econometric form may be given as:

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

The above model described that (Π) is determined by the three major factors, which are as under:

P = Output Price
Q = Output Produced
C = Output Cost

Equations (1), (2) are used to generate equation (3) above. It indicates that profit (Π) depends on output price (P), total output (Q) and cost per unit (C) of output produced. B_s are the parameters to be estimated and measure the change in (Π) with a unit change in the variables on right hand side as the case may be. This model was also used by Derbertin [7] and Samiullah [8].

RESULT AND DISCUSSION

Variable cost is a major cost (investment) which included land preparation, seed, chemical / fertilizer pesticide, irrigation water, weeding/hoeing, harvesting and threshing charges etc. Some variation was noted in cost of rice production from the respondents because of variation in use of inputs. Average total cost of rice production per acre was Rs. 31,040 (Table 1) and an average rice produced (output) of 46 md per acres (md=40kg) is obtained (Table 2). Thus gross return from the rice production per acre was Rs. 44,468. Rice bhusa was also calculated as additional benefit while a small portion was kept for animals and other domestic purposes.

Net Return of Rice Production per Acre:

By using equation No. 1, net return is calculated as under:

Net return = Total return per - Total Cost per acre
Net return = 75,500 - 31,040
Net return = 44,468

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

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

Table 1: Cost of production of rice in Dera Ismail Khan

S.#	Item/ Inputs	Unit	Quantity	Rate (Rs.)/unit	Total expenditure
1.	Land Preparation Nursery, Transplantation, Ploughing, Puddling etc	Acre	1	1000	1000
2.	Seed	Kg	8	50	400
3.	Labor (Maintenance, Cleaning, handling, sprays and transplantation etc	Day	10	150	1500
4	Fertilizer				
4.1	Diammonium phosphate (DAP)	Bag	2	900	1800
4.2	Urea	Bag	2	1800	3600
4.3	Potash	Bag	1	450	450
4.4	Zinc	kg	10	70	700
5	Water charges (Canal System)	Seasonal	1	800	800
6	Pesticide				
6.1	Furadan (Insecticide)	Kg	10	90	900
6.2	Monocrotophus (Weedecide)	Litr	1	700	700
7	Combined harvestor	Acre	1	2500	2500
8	Empty bags	Per bags	15	46	690
9	Rent of hired land	Kanal	8	2000	16000
	Total cost	-	-	-	31,040

Table 2: Average Total and Net Revenue of Rice

Item	Quantity (Maund*)	Rate (Rs/maund*)	Total Amount (Rs.)
Produce	46	1550	71300
Straw Bhusa	-	4200	4200
Total Revenue	-	-	75,500
Net Revenue	-	-	44,460

* Maund = 40 kg

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}

F-test determines the overall goodness of fit/significance of the model. It is clear from the above model that the value of f-test is very high.

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

i.e. Calculated value of f-statistic is greater than tabulated value of f-statistic.

Thus the model shows overall significance.

The co-efficient of determination (R^2), indicates that the 100 % variation in the dependent variable has been explained by the independent variables. The sign of independent variables shows that effects of explanatory variables are according to the theory. The theory states that cost is negative; relationship between the profit and price of output is also positive.

$t_{calculated} > t_{tabulated}$ = 1.895, shows that the t-ratios of the factors in the model of rice profitability confirms that, profit of the rice production (ð) is significantly determined by the three already mentioned factors of the model keeping all the other inputs constant. Thus, one rupee increase in per acre process (P) of Rice will increase the profits by Rs. 0.18, producing another kg of output (Q) will increase the profit by Rs 0.06 while each additional unit of per kg cost (C) will decrease the profit by Rs. 1. The estimation of the profit function revealed that profit is significantly affected by the above three mentioned factors. However, the effect of cost is higher than the effect of price and output of rice.

CONCLUSION

The study, therefore, concluded that profit is under the direct positive influence of price and output of rice whereas cost had negatively affected the rice profitability. A well planned policy should be devised for timely supply of inputs with stable prices to obtain maximum production and earn more profit, which ultimately will improve the socio economic status pf the farming communities and thus added in GDP as well.

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