

## Research Article

# Economics of rice production in Pyuthan district of Nepal

Sagar Bhusal<sup>1\*</sup>, Rupak Karn<sup>1</sup>, Ritesh Kumar Jha<sup>1</sup> and Ankit Ojha<sup>1</sup>

<sup>1</sup>Agriculture and Forestry University, Rampur, Chitwan, Nepal

\*Correspondence: [sbhusal336@gmail.com](mailto:sbhusal336@gmail.com)

ORCID: <https://orcid.org/0000-0002-2599-0704>

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## ABSTRACT

A research was conducted at Pyuthan district in order to access the profitability of rice production in Pyuthan during the summer season of 2018-2019. Altogether of 70 respondents were selected randomly and surveyed with semi-structured interview schedule. The results revealed that the average land holding was 0.45 hectare, and the average rice cultivation area was 0.34 hectare. On the basis of average rice cultivation area, farmers were categorized as small (39) and large (31). The cost and return was calculated among both the category. t-test was used to compare the mean costs of inputs between small and large farmers. Cost for agronomic operations was found far higher (more than 70%) in both the category in compared to the cost of inputs. Contribution of rice grains and straw to overall return was 72.65% and 27.35% respectively. Benefit Cost ratio was found greater among large farmers. The average B:C ratio was 1.51, which was fairly higher than 1.14 in Dang district indicating the investment of rice production is expected to deliver a positive net return to the farmers of the study area. In a nutshell, rice cultivation is an important enterprise that should be encouraged, considering the fact that it is a major staple crop.

**Keywords:** B:C ratio, rice, productivity

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## INTRODUCTION

Rice is grown in three distinct ecological zones, namely, Terai and Inner Terai (60-900 masl), mid hills (900-1,500 masl) and Mountains/high hills (1,500 - 3,050 masl). Terai and Inner Terai consist of major portion (69.7%) followed by Mid-hills (25.8%) and the mountains (4.4%) of total rice cultivation area in Nepal (CDD, 2015). Major portion of the rice is produced from terai region so terai is known as 'Grain basket of Nepal'. Pyuthan is the hill district of Nepal with potential for rice production. It lies between 27° 52' to 28° 21' N latitude and 82°36' to 83°6' E longitude. The district is 350-3659 m above sea level. It is characterized by maximum average temperature of 24.1°C and minimum average temperature of 14.8°C with an annual rainfall of 1350mm. It holds 33.96% of cultivable land and 51.85% of which is cultivated (PMAMP, Rice zone Profile, 2074/75).

Pyuthan district has been declared as Rice Zone under Prime Minister Agriculture Modernization Project. But, documentation about the financial aspects of agriculture activities is still lacking. So, this research is mainly focused to check the profitability of rice production in Pyuthan. Similar research should be carried in other districts also, so that we can compare the results. Inadequate and untimely supply of quality seeds and fertilizers, inadequate irrigation and drainage, incidence of disease-pests, inefficient pricing system, lack of proper storage, are the major constraints of rice production. Likewise, size of landholdings is becoming smaller due to land fragmentation. Labor migration to urban and golf countries have serious negative impacts on rice production. Farmers are facing sharp increase in the price of production inputs such as: labor, fertilizers, seed, irrigation, etc. As a result of these, the cost of production of rice is increasing while realization of benefits is decreasing due to low price of the rice grains. Acidic nature of soil due to continuous use of chemical fertilizers has resulted decrease in rice production due to the poor soil health. Erratic rainfall pattern and unstable monsoon pattern has also created problems in rice production, which have created fluctuation in planting time.

Farmers are still performing rice cultivation in subsistence way, they are usually growing rice for sustaining family need only. There is no such documentation or record keeping process during production process. So, this research aims to fill the gaps, and to document the record of cost, benefit (financial analysis) during the production process.

## MATERIALS AND METHODS

### Research site

Pyuthan municipality wards. 4 and 8 were selected for the research. The area was purposively selected for the study, as it was major rice growing hub of the district.

### Selection of Respondents, Sources of data collection and Survey design

Registered name list of rice growing farmers was obtained from Rice Zone, Khalanga, Pyuthan. From that list, altogether 70 farmers were selected randomly, as it was representative of whole population of the study area, comprising of more than 10% of total

population. Simple random sampling technique without replacement was followed. Both the primary and secondary data were used. Primary data was obtained through household survey.

### Methods and techniques of data analysis

The information collected from the field was first coded and entered into the computer. Data analysis was performed using computer software i.e. Statistical Package for Social Science (SPSS) version 23.0.

The farmers were first categorized into two categories on the basis of mean of rice cultivation area:

- a. Small farmers (Rice cultivation area less than the mean value)
- b. Large farmers (Rice cultivation area more than the mean value)

T-test was used to compare the mean costs of inputs between small and large farmers. The obtained data were presented in tabular form.

### Gross margin

Gross margin is the value of output by producer, which is computed at the return minus the total variable cost.

$$\text{Gross margin} = \text{Gross return} - \text{Total variable cost}$$

Where,  $\text{Gross return} = \text{Price} \times \text{total quantity marketed}$

$$\text{Total variable cost} = \text{Summation of cost incurred in all the variable items}$$

Similarly,

$$\text{Gross Profit Ratio (GPR)} = \text{Gross Margin} / \text{Total Revenue (Bwala \& John, 2018)}.$$

### Benefit cost analysis

Benefit cost analysis was done after calculating the total cost and gross return from rice cultivation. Cost of production was calculated by summing the variable cost items in the production process. For calculating gross return, income from product sale was accounted. Therefore, the benefit cost analysis was carried out by using formula:

$$\frac{B}{C} \text{ ratio} = \frac{\text{Gross return}}{\text{Total cost}}$$

### Analysis on the basis of B: C ratio;

If B: C ratio < 1 then, enterprise is in **Bankrupt** condition.

If B: C ratio = 1 then, enterprise is in **Just solvent** condition.

If B: C ratio > 1 then, enterprise is in **Solvent** condition.

## RESULTS AND DISCUSSION

### Financial Analysis of Rice Production

Rice is the major cereal crop of the study area. This section mainly deals with the analysis of production situation, cost of production, gross return, gross margin and benefit-cost ratio.

#### Cost of production

Production process is itself an income generating process. Under this process, we invest our fund in order to get the return (output). Cost is incurred for the inputs required for production process. Since, rice is the annual crop, and we get return within a season; so we generally consider the cost of variable items for the production of rice.

On the research, cost of production has been categorized under two headings:

a) Cost of inputs: This heading mainly includes the cost of seeds, farmyard manure, Chemical fertilizers (Urea, DAP and MOP), pesticides and micronutrient ( $ZnSO_4$ ).

b) Cost for agronomic operations: This heading comprises of the cost incurred for performing agronomic operations like seed bed preparation, land preparation, planting, weeding, harvesting and threshing. As Pyuthan is the hilly district, land preparation is mainly performed by bullocks, so cost of agronomic operations mainly includes the labor cost.

The average cost per hectare was calculated from the collected data from the respondents and it was compared among the small and large farmers. This operation was performed using the t-test.

**Table 1. Cost of production per hectare**

Variables	Small farmers (n=39)	Large farmers (n=31)	Overall (N=70)	t-value
<b>1. Cost of inputs (NRs.)</b>				
a. Seed	3406.72(3.31)	3614.03(4.25)	3498.49(3.69)	-1.243
b. Farmyard manure	5542.28(5.4)	5684.16(6.69)	5605.16(5.91)	-1.608
c. Chemical fertilizers(Urea, DAP and MOP)	6960.82(6.78)	6599.85(7.77)	6800.87(7.17)	0.843
d. Pesticides	2744.91(2.67)	2397.10(2.82)	2590.85(2.73)	2.20**
e. Micronutrient ( $ZnSO_4$ )	3580.62(3.49)	3669.24(4.32)	3619.92(3.81)	-1.69*
<b>2. Cost for agronomic operation/labor cost (seed bed preparation, land preparation, transplanting, weeding, harvesting, threshing) (NRs.)</b>	<b>80423.32(78.34)</b>	<b>62972.16(74.14)</b>	<b>72694.78(76.67)</b>	<b>5.76***</b>
<b>Total</b>	<b>102658.67(100)</b>	<b>84936.54(100)</b>	<b>94810.07(100)</b>	

Figures in parentheses indicate the percentage to their respective columns. \*, \*\* and \*\*\* indicate significant at 10%, 5% and 1% level of significance respectively.

(Source: Field Survey, 2019)

From, the above table it can be clearly seen that the maximum cost of production is incurred in the agronomic operations, i.e. labor cost, as this operations require a large number of

manpower from seed bed preparation to final threshing. According to (Adhikari, 2011), labor cost has greater contribution to the total cost of production. Among the farmers category, cost for agronomic operations was found significantly lower in large farmers than that of small farmers. This is due to more efficiency of inputs in case of large farmers.

### Return from production

Return is the output that is obtained from the production. It is the reward of our investment process. During the study period, it was found that the return from rice production was from both the grains as well as straw. It was found that the return from straw was quite better than the terai as the straw gets better price over the study area. The average rice production around the study area was found to be 192.24 kg/ropani, which gives the productivity of 3.77 t/ha.

**Table 2. Return from Rice cultivation (per hectare)**

Variables	Small farmers (n=39)	Large farmers (n=31)	Overall (N=70)	t-value
1.Return (NRs.)				
a. Rice grain	103781.48(72.91)	104100.98(72.32)	103922.96(72.65)	-0.087
b. Straw	38557.43(27.09)	39842.14(27.68)	39126.49(27.35)	-0.529
Total	142338.90(100)	143943.13(100)	143049.45(100)	

Figures in parentheses indicate the percentage to their respective columns. (Source: Field Survey, 2019)

From the above table, we can clearly see that major contribution for return from rice was from grains i.e. 72.65%, although straw has also contribution in return i.e. 27.35% in overall.

**Table 3. Gross margin, Gross Profit ratio and Benefit cost ratio**

Variables	Small farmers (n=39)	Large farmers (n=31)	Overall (N=70)
Gross profit per hectare(NRs.)	39680.23	59006.59	48239.38
Gross Profit ratio	0.28	0.41	0.34
B:C ratio	1.39	1.69	1.51

(Source: Field Survey, 2019)

The gross profit ratio obtained was lower than the gross profit obtained in Nigeria state, which was 0.45 (Bwala & John, 2018).

B: C ratio was found greater in large farmers than in small farmers. Similar, result was obtained from a research carried in Bangladesh with varying B: C ratio among small, medium and large farmers; having greater value of B: C ratio among the large farmers (Akter et al., 2019).

Gross margin is positive and B: C ratio is greater than 1, so this particular enterprise (i.e. Rice Production) can be considered as profitable in the study area.

Here, overall B: C ratio is 1.51, i.e. If we invest one rupee, then we can get the returns of Rs. 1.51 from the business, which indicate that our investment is financially feasible. The B: C ratio, 1.51 was found greater than 1.14 in Dang district (Thapa et al., 2018).So; rice production can run smoothly at Pyuthan.

## CONCLUSION

This particular enterprise, i.e. rice cultivation was found solvent in Pyuthan district with overall B: C ratio greater than 1. Rice cultivation was found profitable in both of the category of farmers, but in case of large farmers, slightly higher Benefit Cost ratio was observed in comparison to small farmers. Return almost being same, reduction in overall agronomic cost gives more benefit in case of large farmers. So, the rice cultivation was recommended to perform at large scale as it is more profitable and can also promote food security. Similar type of research should be carried in other districts also, so that we can compare the results.

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## Authors contributions

S. Bhusal	Performed survey, analyzed data and wrote the paper
R. Karn	Aanalyzed data and wrote and edit paper
R.K. Jha	Performed survey and contributed in manuscript preparation
A. Ojha	Supervision of survey

## Conflict of interest

The authors declare that there is no conflicts of interest regarding publication of this manuscript.

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