



Research Article

Benefit Cost Analysis of Different Rice Varieties in Kapilvastu District, Nepal

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Abstract

Rice is an annual plant belongs to family Poaceae. It is the major staple food crop of Nepal and can be grown from plain to mountainous regions of Nepal. The crop varieties differ from each other in terms of production cost, gross return and gross margin. The objective of this study was to analyze benefit cost ratio for production of different rice varieties. The study was carried out in Kapilvastu district of Nepal in 2018. A sample size of 120 respondents were selected randomly. Four different rice varieties: Gorakhnath, Radha-4, Ramdhan, and Sawa were used for the study. The primary data were collected through household survey using interview schedule. The data were analyzed using Statistical Package for Social Sciences and Microsoft Excel. The average cost of production was amounted to NRs. 77,100/ha for all four rice varieties. Sawa variety had the highest gross return (NRs. 1,01,212.5/ha). The benefit cost ratio was observed highest for Sawa (1.312) and lowest for Radha-4 variety (1.005). Sawa is the most economic rice variety in terms of gross and net production in the study area. The findings will help farmers to choose and cultivate rice variety with greater profitability. It is recommended that concerned authorities should give emphasis on subsidies, farmers training and ensuring floor price of rice.

Keywords: Rice; Production; Benefit Cost ratio

Introduction

Rice (*Oryza sativa* L.) is an annual plant belongs to family Poaceae. Two species of rice: *Oryza sativa* (Asian rice) and *Oryza glaberrima* (African rice) are known for their commercial cultivation value. *Oryza sativa* is the main species of rice widely grown throughout the world (Mae, 1997). Rice is the most important staple food for more than half of the world population (Fageria, 2007; Santos et al., 2003). More than 90 % of the world's rice is grown in Asia, Africa and Latin America (Fageria, 2007). Nepal is an agricultural country having suitable climate for rice

production. Rice ranks the first staple food of Nepal which contributes about one-fifth of agricultural GDP (Gauchan et al., 2014). Rice provides more than 50% of total calories to the Nepalese diet. It is grown from 50 to 3,000 meters above sea level (Basnet, 2008; Gauchan et al., 2014). Rice occupies 44.12 % of total cereal cultivated land and 53.52 % of total food grain production of Nepal (AICC, 2018). Kapilvastu is one of the major rice producing districts of Nepal. The total area of rice production in Kapilvastu was 70,560 ha with a total production of 1,54,230 t/ha (DADO, 2016).

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Modern rice varieties were introduced in Nepal during the late 1960s (Joshi and Pandey, 2006). Sawa, Ramdhan, Radha-4, and Gorakhnath were the most popular rice varieties grown in Kapilvastu district. However, other varieties such as Golden Mansuli, Loknath, Hybrid (6444), Hardinath, Sukha-3, Sabitri, Kalanamak, Mayur, Motisabha, Mahima, Sindhur, Sawa Saba-1, and Swarna Sawa-1 were also grown in the district (DADO, 2016). Plant varieties differ from each other in terms of production cost, gross return and gross margin (Hussain et al., 2008). Due to environmental conditions and cultivation practices, production of rice varieties significantly varies from each other in Kapilvastu district (DADO, 2015). Currently, a few studies are available in production cost, gross return and profitability analysis of rice varieties in Nepal. There is a need to analyze the economic aspects of rice varieties grown in the district to enhance farm production. The present study aims to analyze benefit cost ratio of different rice varieties in Banganga municipality of Kapilvastu district.

Materials and Methods

Study Site

Kapilvastu district of Nepal was purposively selected for the study in 2018 as the area was noted for high rice production potential. Banganga municipality was purposively selected based on the criteria that farmers had grown different rice varieties. The study site is located at latitude of 27°25'-27°84'N and longitude of 82°75'-83°14' E. The mean annual precipitation, minimum and maximum temperature of the study site are 1285 mm, 6° C and 38° C respectively.

Selection of Rice Farmers

The population size of the study area was 500 rice farmers. The list of rice farmers was obtained from Rice Implementation Zone Kapilvastu, Kapilvastu. One hundred twenty rice farmers (30 farmers for each four varieties: Gorakhnath, Radha-4, Ramdhan, and Sawa) were selected using simple random technique.

Data Collection and Analysis

Primary data were collected through household survey using interview schedule. The raw data obtained were coded and entered into the computer. The local measurements were converted into standard units and final analyses were done using Microsoft Excel and Statistical Package for Social Sciences (SPSS, 2009). The descriptive statistics such as mean, frequency, percentage, and standard deviation were used to analyze socio-economic characteristics of the farmers.

Cost of Production

Total cost of production was computed by adding cost on all variable inputs and opportunity cost. The variable cost includes expenses on seed, farmyard manure (FYM), fertilizer, human labor, machinery and irrigation.

Opportunity cost includes expenses for land rent and use of own implements.

Total cost = total variable cost + opportunity cost

Gross Return

Gross return was calculated by adding return from grain and straw. Rice grain and straw were valued at a local market price during harvest.

Gross return = grain return + straw return

Grain return = total grain produced (tons) x price per tons

Straw return = total straw produced (bundles) x price per bundles

Gross Margin

Gross margin was calculated by subtracting total variable cost from gross return for each variety.

Gross margin = gross return – total variable cost

Benefit Cost (B:C) Analysis

Benefit cost ratio is the ratio of gross return and total cost incurred.

B: C ratio = gross return/total cost

Results and Discussion

Socio-Economic Characteristics of the Farmers

The studied socio-economic variables were gender, age, education, and total land holding. Fifty-three percent of the household heads were male while 47 % were female indicating that most households are male headed (Table 1). This implies that rice farming community is dominated by males. Majority (60 %) of the rice farmers were between the age of 37 to 59 years (Table 1). Fourteen percent of the household heads were illiterate while only 11 % had gained higher secondary education (Table 1). Low literacy level thus can have negative impacts on rice production. Nwele (2016) reported that education can influence decision making process of the farmers such as adoption of farm innovation. Educated farmers can deal with traders in a better way. Seventy-four percent of the farmers had medium land holding (0.27 to 0.77 ha).

Yield of Rice Varieties

The highest grain yield was obtained from Ramdhan variety (4.95 t/ha) followed by Gorakhnath (4.2 t/ha), Sawa (3.75 t/ha), and Rhada-4 (3.15 t/ha) in Banganga municipality of Kapilvastu district as shown in Figure 1. Yield variation among rice varieties may be associated with genetic traits, degree of disease and pest incidence, and crop adaptation to the environment. Chendge et al. (2017) mentioned that the genetic makeup of crop controls its growth and yield. The production potential of rice varieties: Radha-4, Ramdhan, and Sawa at national level are 3.2 t/ha, 4 to 7.2 t/ha, and 3.5 to 4 t/ha respectively (AICC, 2018). In the study area, yield of Rhada-4 was slightly lower than the national potential

yield while yield of Sawa was slightly higher than the national potential yield. The highest straw yield was obtained from Radha-4 variety (105 bundles/ha) as shown in Figure 2.

Table 1: Socio-economic characteristics of the farmers (N =120)

Parameters	Frequency	Percent
Gender		
Male	64	53
Female	56	47
Age (years)		
Less than 37	22	18
37 to 59	72	60
Greater than 59	26	22
Education		
Illiterate	17	14
Pre-primary (up to 2)	30	25
Primary (up to 5)	34	28
Secondary (up to 10)	26	22
Higher secondary and further (greater than 10)	13	11
Total land holding (ha)		
Small (less than 0.27)	12	10
Medium (0.27 to 0.77)	89	74
Large (greater than 0.77)	19	16

Source: Field Survey, 2018.

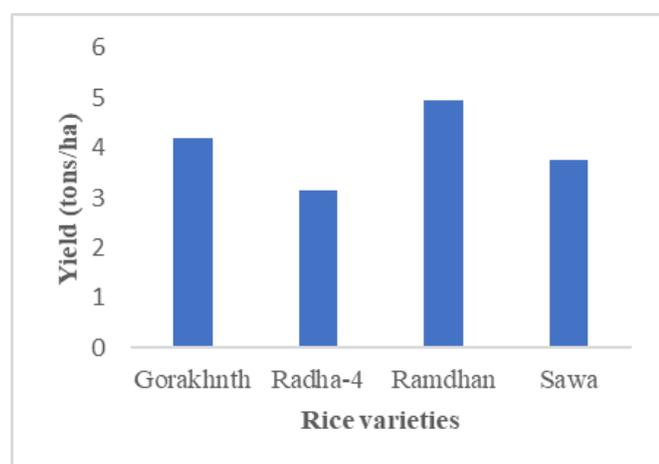


Fig. 1: Grain yield of different rice varieties in Banganga, Kapilvastu

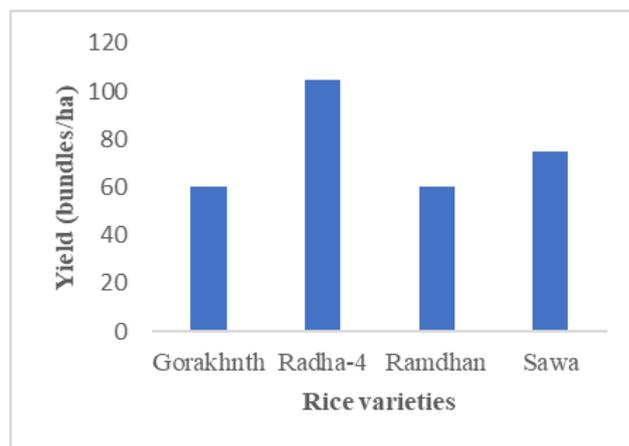


Fig. 2: Straw yield of different rice varieties in Banganga, Kapilvastu

Table 2: Average cost of production (per ha) for different rice varieties

Particular	Cost per hectare (NRs)	Percentage (%)
Seed	1650	2.14
FYM	10800	14
Fertilizer	4500	5.84
Human Labor	36000	46.69
Machinery	13350	17.32
Irrigation	600	0.78
Opportunity Cost	10200	13.22
Total	77100	100

Source: Field survey, 2018

Cost of Production

The average cost of production was approximately same for all four rice varieties (NRs. 77,100/ha). Expenditure on seed, FYM, fertilizer, human labor, machinery and irrigation accounted for 2.14 %, 14 %, 5.84 %, 46.69 %, 17.32 % and 0.78 % of total variable cost incurred respectively as shown in Table 2. Out of total expenditure, variable cost accounted for 86.78 % whereas opportunity cost accounted for 13.22 %. Human labor, machinery, and FYM formed major components of total variable cost as shown in Table 2. Adhikari (2011) mentioned that the minimum, average and maximum cost of organic rice production in Phoolbari, Chitwan were NRs. 19,485, 32,249.91 and 74,005/ha respectively. The average cost of rice production in the Banganga, Kapilvastu was observed almost similar to maximum cost of rice production in Phoolbari, Chitwan. However, Joshi et al. (2011) reported that the average cost of rice production in Nepal was NRs. 23,495/ha whereas average cost of rice production in western development region of Nepal was NRs. 27,068/ha. The probable reasons for high production cost in the study area may include inflating price of fertilizer, increasing machinery cost, and accelerating labor wage. Hussain et al.

(2008) found that the average cost for rice production was Rs. 33,505.55/ha. in Swat district of Pakistan. Similarly, Mehmood et al. (2011) reported that the average cost of organic and inorganic rice production in Pakistan were Rs. 39,418.73/ha and 47,925.4/ha respectively. The pesticides application was negligible for rice cultivation in the study area.

Gross Return from Rice Production

A higher grain return was obtained from Sawa variety (NRs. 92,812.5/ha) followed by Ramdhan (NRs. 89,100/ha), Gorakhnath (NRs. 84,000/ha) and Radha-4 (NRs. 56,227.5/ha) as shown in Table 3. Although yield of Sawa variety was relatively lower (3.75 t/ha), market price fetched by Sawa was higher compared to other studied rice varieties. High market price of Sawa variety may be associated with high cooking quality including taste and aroma.

Furthermore, average straw return was higher in Radha-4 variety (NRs. 21,000/ha) followed by Gorakhnath (NRs. 9,000/ha), Sawa (NRs. 8,400/ha) and Ramdhan (NRs. 7,200/ha). The straw of Radha-4 rice fetched high price due to its excellent quality including long length, dry texture, and high nutritional value. Overall, Sawa variety had highest gross return (NRs. 1,01,212.5/ha) whereas Radha-4 had lowest gross return (NRs. 77,527.5/ha) as shown in Table 3. The total revenue from organic rice production in Phoolbari, Chitwan was NRs. 66,597.07/ha (Adhikari, 2011).

The results revealed that Sawa variety is superior to other rice varieties in terms of gross margin (NRs. 24,112.5/ha). This finding was supported by Adhikari (2011), who reported that the average gross margin from organic rice production was NRs. 34,347.16/ha in Phoolbari, Chitwan. Although Radha-4 had relatively lower gross margin, it is still popular among farmers, as it can tolerate drought and suitable to make beaten rice. Farm production can be improved by introducing high yielding drought tolerant rice varieties in the study area.

Benefit Cost (B:C) Analysis

All four rice varieties had B:C ratio above 1 as shown in Fig. 3, which indicates that rice farming is profitable in Kapilvastu district of Nepal. The highest benefit cost ratio was observed for Sawa variety (1.312) which implies that farmers are getting NRs. 1.312 on an average investment of NRs. 1 in Sawa variety. Joshi et al. (2011) reported that the average benefit cost ratio from rice production in western development region of Nepal was 1.5. Compared to others, Sawa was more profitable and economically superior rice variety in Banganga municipality of Kapilvastu district. The average benefit cost ratio for Gorakhnath variety was 1.202 followed by Ramdhan (1.24) as shown in Table 4. The lowest B:C ratio was observed for Radha-4 variety (1.005). Relatively higher yield, high market price and higher B:C ratio made Sawa the most profitable rice variety in Banganga, Kapilvastu.

Table 3: Average return (per ha) for different rice varieties

Particulars	Rice varieties			
	Gorakhnath	Radha-4	Ramdhan	Sawa
Average grain yield (tons/hectare)	4.2	3.15	4.95	3.75
Price (NRs/tons)	20,000	17,850	18,000	24,750
Grain return (NRs/ha)	84,000	56,227.5	89,100	92,812.5
Straw yield (bundles/ha)	60	105	60	75
Price (NRs/bundles)	150	200	120	110
Straw return (NRs/ha)	9,000	21,000	7,200	8,400
Gross return (NRs/ha)	93,000	77,527.5	96,300	1,01,212.5
Gross margin (NRs/ha)	15,900	427.5	19,200	24,112.5

Source: Field survey, 2018

Table 4: B:C ratio for different rice varieties

Rice varieties	Gross cost (NRs)	Gross return (NRs)	B:C ratio
Gorakhnath	2,570	3,100	1.202
Radha-4	2,570	2,584.25	1.005
Ramdhan	2,570	3,210	1.240
Sawa	2,570	3,373	1.312
Mean	2,570	3,066.81	1.189

Source: Field Survey, 2018.

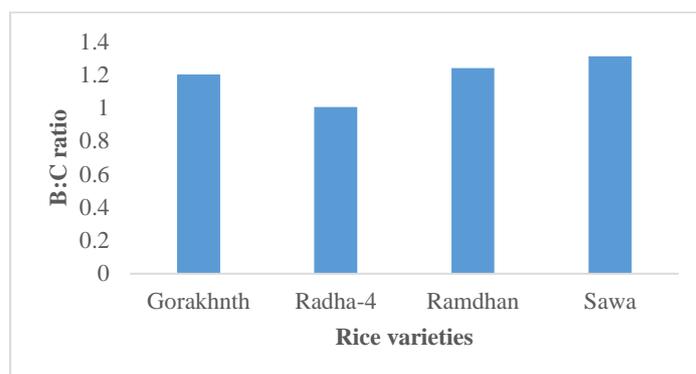


Fig. 3: B:C ratio for different rice varieties in Banganga, Kapilvastu

Conclusion and Recommendation

The average cost of production for all four rice varieties in Banganga, Kapilvastu was very high. The majority of the farmers had obtained very low benefit compared to necessary investment for rice cultivation. Sawa is the most economic rice variety in terms of gross and net production in Banganga, Kapilvastu. Benefit cost analysis provide valuable information to rice growers and agriculture economists to understand cost and return aspects of rice production. This finding will help farmers to choose and cultivate rice variety with greater profitability. Following recommendations are suggested to increase rice production in Kapilvastu, Nepal.

- Awareness on high yielding rice varieties should be made.
- Government should provide subsidies on seed, fertilizers and other inputs.
- Farmers should adopt proper cultivation practices so that crop varieties could express to their fullest genetic production potential.
- Training on varietal selection and performance should be provided to the farmers.
- Development of new technologies and provision of subsidies to the farmers will enhance farm production.

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