



RESEARCH ARTICLE

Cost and return of rice cultivation in Assam

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ABSTRACT

In India, looking at the different components of the rural economy, agriculture remains the mainstay of the rural sector. Agriculture in Assam is popularly known as rice culture, because it is dominated by rice as the most important cereal crop in terms of area, production and productivity. The study has examined the cost and returns of rice cultivation in Assam. It is found that the large size farmers had highest rate of gross margin followed by medium marginal and small farmer per hectare. The large farmers found to be highest profitable because of fact that they could properly and economically expenditures on inputs as well as per hectare of yield has found to be high in the study area.

Keywords: Cost, gross margin, profitable, rice cultivation, return

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INTRODUCTION

In India, looking at the different components of the rural economy, agriculture remains the mainstay of the rural sector. The compound growth rate in agricultural production has been 2.7 percent per annum since independence. Agriculture in Assam is popularly known as rice culture, because it is dominated by rice as the most important cereal crop in terms of area, production and productivity (Bezbaruah, 1994). It played a leading role in improving food security in the state of Assam. Rice is consumed by about 90 percent of the state population and is grown over an area of 26.46 lakh hectares occupying around 74.25 percent of the cropped area (Basic Agricultural Statistics, 1991-92 to 2019-20).

Rice has three broad groups according to the season of harvest, viz, winter rice known as Sali rice, summer rice known as Boro rice and the autumn rice known as Ahu rice. Deep-water rice locally known as Bao rice is another rice crop being cultivated in the state in few small pockets of marshy land with high water depth once in a year. Sali rice being blessed with rainy season establishes itself as the major rice crop accounting for more than 68 percent of total rice crop area in the state. Boro and Ahu rice are the lean season (November-December to June-July) crops partially favoured by rainfall but they depend to a greater extent on irrigation for their cultivation. Though rice occupies the dominant portion of the cropped area, the productivity of rice is only 1.4 t/ha (2018-19), which is low in comparison to the adjoining state of West Bengal (1.9 t/ha) and all India average of 1.75 t/ha. The reasons for low productivity of rice are very low amount of fertilizer consumption, slow growth of area under irrigation and area under HYV seeds. The share of HYV area to total rice has increased from 10 percent in 1971-72 to 43 percent in 1994-95 and further it increased to 67% in 2018-19. The share of irrigated area to total rice area was found to have increased

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from 1.2 percent in 1971-72 to 9.6 in 1986-87; however, it has gradually decreased from 8.5 percent in 1991-92 to 6.0 percent in 1994-95 and further it increased to 29% in 2018-19.

Fertilizer consumption per hectare of rice area was 3.96 kg in 1971-72 that increased to 10.2 kg in 1994-95 and increased to 65.41 kg in 2010-11 and further it increased to 72.683 in 2018-19 (Statistical Handbook of Assam, 1991-91 to 2019-20). However, the recommended dose of fertilizer is 40:20:20 kg N: P: K per hectare. This showed that there is vast scope to increase the amount of fertilizer along with increase in HYV and limited area, which could contribute to an enhanced yield of rice (Ali and Flinn, 1980). There exists yield gap between full adoption of technology and the partial adoption as well as non-adoption of technology in state of Assam (Phukan, 1990). Productivity differences across farms which produce a single output with multiple inputs also occur because some of the them cannot use available technology efficiently, because of failure to combine inputs and correct proportions at given factor prices or because of uncontrollable factors such as variation in land situation, natural, bio physical and human factors such as soil type, erratic rainfall, flood, drought, outbreak of pest and diseases (Dabai et al., 2015).

Resource use efficiency means how efficiently the farmer can use his resource in the production process. Efficiency is one of the important dimensions of productivity and growth especially in agricultural economies where resources are merged and opportunities for developing and adapting better technologies have lately started dwindling (Usman, 2018). Such economies can benefit a great deal from inefficiency studies, which show that it is still possible to raise productivity by improving efficiency, a usually neglected source of productivity (Hague, 2006).

Inefficiency in rice cultivation in the state of Assam is a known phenomenon, which might be due to differences in quantum of resource use, the difference in their mode of application, structural and organizational weakness in the farm etc. (Dhar, 2012). Therefore, it is important to estimate the cost and returns in rice production across size groups in the North Bank of the Brahmaputra Valley in the state.

MATERIALS AND METHODS

The study is conducted in one agro-climatic zone of Assam, India namely; North-Bank plains zone (NBPZ). This zone comprises the districts of Lakhimpur, Darrang, Dhemaji and Sonitpur with an area of 14421 sq. km. comprising 18.37 percent of the state. This zone occupies 12.75 percent of the total cropped area of the state. It has the population of 39, 22,566, which is 14.71 percent of the state total and has density of 328 persons per sq. km (Census of India, 2011). The cultivated land of this valley can be divided in to three distinct type's viz. upland, medium and low land based on use capability of land. Uplands are generally suitable for crops like sugarcane, rape and mustard, potato etc. where in medium land crops like rice, potato, sesamum and pulses etc. are grown while in low or medium low lands crops generally grown are Bao rice, Boro rice, jute and some extent Wheat.

Only one agro-climatic situation viz. NBPZ is selected purposively for the study. A multistage random sampling technique is used to draw the ultimate sample. First of all, selection of Agro- climatic zone is done, i.e. North Bank-Plains zone is selected in my study among the six Agroclimatic Zone, which comprises of four districts – Lakhimpur, Dhemaji, Sonitpur and Darrang. Then, only Lakhimpur district have been focused purposively. No attempt has so far been made to study the resource use efficiency in Assam agriculture in the Lakhimpur district. In this district instability of rice cultivation is very high in respect to area, yield and production. The one reason for instability in this district might be due to improper utilization of scarce resources like water, manures and fertilizers, labour, land etc. Moreover, a high percentage of population depends on rice cultivation due

to lack of the other sources of livelihood in this area. Therefore, for raising farm income, it is important to study the utilization of scarce resources in the Lakhimpur district. At the second stage, 2 Development Block is selected out of each district based on proportion of rice area under each situation. In the third stage, samples of three villages are select from each block, which result in 6 villages under zone. Then a list of farmers of the selected villages under each situation was prepared. In the fourth stage, a sample of 5% to 6% farmers were randomly selected and categorized into 4 major size groups based on their operational holding viz. marginal(up to 1 ha.), small (1-2 ha.) medium (2-3 ha) and large(greater than 3 ha.). The farmers were categorized according to the standard norms of the State Agriculture Department and the selected farm households were collected through personal interview method by using a pre-tested questionnaire and schedule. A total of 150 respondents constituted the final sample. The data generated from the field survey will be analyzed using appropriate statistical tools to find answers to the objectives cited above.

Gross margin Analysis is a model that is used to estimate the costs, returns, profitability or loss per hectare. The total revenue represents the value of the output from the farm (e.g. physical quantity of the rice multiplied by the unit price). The total cost, on the other hand is made up of “variable” and “fixed” components. Variable cost also called specific costs varies directly with the level of production and includes expenditure on seeds, fertilizer, chemical, hired labour etc. Fixed costs are known as overhead cost that do not vary with the level of output and consist of cash expenses (on repairs and maintenance, interest on long term loan etc) and non-cash adjustment (depreciation on farm tools, equipment and machinery) (Choumbou et al., 2015).

The Gross Margin (GM) analysis of Rice cultivation in NBPZ was expressed as:

$$GM = TR - TVC$$

Where GM= Gross Margin

TR= Total Revenue

TVC= Total Variable Cost

GM = Total revenue from rice production minus Total variable costs incurred in the course of production of one hectare of rice area.

This estimation will serve as a profit index of rice farmers in the study area. The higher the GM the more likely a farm is considered to be profitable and the smaller the GM, the lesser the profit possibility.

Profile of Sample farms in the North Bank Plains Zone

The sample size consisted of 150 farm households and farmers were categorized to four major size group viz., marginal (<1 ha), small (1-2 ha), medium (2-3 ha) and large (>3 ha). In this zone, there were 60 marginal, 40 small, 30 medium and 20 large farmers totaling 150 farmers. The average age of household heads were 47, 50, 55 and 54 for marginal, small, medium and large farmers. Out of the 60 household head under marginal farmers 3 heads were educated up to primary levels, 24 heads up to high school levels, 22 heads up to matriculation and graduation levels and 6 heads were up to graduation and above. There were 5 household heads with no education. Among the 40 household heads under small farmers, 9 household heads found illiterate, 3 heads had education up to primary level, 13 heads up to high school level, 12 heads had up to matriculation and graduation level and 3 heads up to graduation and above . It was observed that under medium farmers which consisted of 30

households, 2 head had education up to primary level, 10 heads up to high school level, 7 heads had up to matriculation and graduation level and 4 heads up to graduation and above. There were 7 household heads with no education under the medium farmers. Among 20 large farmers, 7 heads were no education, 8 heads were educated up to high school level, 4 heads were up to matriculation and graduation level and only 1 head was educated up to graduation and above. For all size groups, highest numbers of household heads (55) were found to have education up to high school level followed by 45 with matriculation and graduation level, 14 with graduation and level and 28 with no education.

RESULTS AND DISCUSSION

The cost and returns of the different size groups of farmers were estimated and are presented in Table 1. It shows that per hectare input costs in various items varied between Rs. 13325.42 and Rs. 13836.93 with an overall average of Rs. 13647.18. It was found that expenditures of human labour per hectare was by a large same in all the farm sizes. The bullock labour /machine labour expenditure per hectare varied from Rs.382.5243 to Rs. 264.252 with an overall average Rs. 333.078 Rs/ha. It is also observed that the expenditures of inputs per hectare were found to be smaller in large farmer than other farmer groups. This was mainly because of fact that the farmers in the large size groups could properly and economically expenditure on farm inputs (Pegu, 2017).

Table 1: Per hectare Cost of the sample farms in Rice cultivation by the farm size groups

Particulars	Unit	Values (Rs)				
		Marginal Farmers	Small Farmers	Medium Farmers	Large Farmers	Overall
Human labour	Man Days	10055.36	10363.13	10420.681	10170.593	10252.44
Bullock labour/ Machine Labour	Pair Days/ Hr	356.572	382.5243	328.9628	264.252	333.078
Seed	Kg/Rs	1135.663	1094.186	1059.2955	1070.8661	1090
Fertilizer	Kg/Rs	310.174	340.293423	346.912998	313.72022	327.77516
Pesticide	Kg/Rs	66.16751	43.77945	53.18834	48.39539	52.8827
Irrigation	Rs/Rs	23.0816904	52.998592	63.626477	50.70049	47.6018124
Total VC		11947.0176	12276.91	12336.29	11918.53	12103.78
1. Land Revenue and taxes	Rs/ha	89.2	89.2	89.2	89.2	89.2
2. Rental Value	Rs/ha	0	0	0	0	0
3. Depreciation	Rs/ha	600	560	700	870	682.5
Total fixed cost		689.2	649.2	789.2	959.2	771.7
Total cost		13325.42	13575.31	13914.69	13836.93	13647.18

From the table 2 it is found that the large size farmers had highest rate of gross margin (Rs.18455.29) followed by medium (Rs. 15340.99), marginal (Rs. 14912.15) and small farmer (Rs. 13328.67) per hectare. The large farmers found to be highest

profitable because of fact that they could properly and economically expenditures on inputs as well as per hectare of yield has found to be high (Pegu, 2017). During the survey it was found that in the area under study there was no irrigation facility in the sampled households and use of chemical fertilizer was negligible. Only few farmers used plant protection chemicals as well as pesticides.

Table 2: Per hectare Cost and Returns of the sample farms in Rice cultivation by the farm size groups

Sl.No	Unit	Marginal farmers		Small Farmers		Medium Farmers		Large Farmers		Overall farmers	
		quantity	Value	quantity	Value	Quantity	Value	quantity	Value	quantity	Value
1. Output	Qtl.	22.38264	1200	21.33798	1200	23.0644	1200	25.31152	1200	23.024	1200
Total Revenue	(Rs.)	26859.17		25605.576		27677.28		30373.82		27628.97	
TVC	(Rs.)	11947.017		12276.91		12336.29		11918.53		12103.78	
TC	(Rs.)	13325.42		13575.31		13914.69		13836.93		13647.18	
GM	(Rs.)	14912.15		13328.67		15340.99		18455.29		15525.19	
Net Revenue	(Rs.)	13533.75		12030.26		13762.59		16536.89		13981.79	

The study of cost and return in rice cultivation is an important matter in the present context of India as well as Assam. Because of growing population and food security as well as farmers' income, the importance of stability of rice cultivation has always been a vital question for Governments. Farmer's income often impacts on govt. policy formulation and implementation in the food supply through the public distribution system (Takare, 2005). The farmers are also always falling in uncertain situation due to fluctuations in rice production. Farmers are increasingly unwilling to invest in food crops and there might be shortage of food production in the state. Assam being a developing state and due to lack of modern techniques the farmers has falling inefficiency of inputs use in their field of cultivation. Due to lack of production techniques, the farmers always face an uneven or unfavorable situation in terms of income, output and employment (Shewaye, et al., 2019). Therefore, there is urgent need of improving the present agricultural situation in Assam. Government agricultural policies and programmes should concentrate on increasing the production of rice by introducing HYVs and adopting new technology. This needs support of institutional credit and extension contacts for farmers. For increasing productivity of rice there must be properly trained and motivated to farmers about the uses of various inputs or resources in rice cultivation through improvement in extension services (Singh and Gupta, 1992). Moreover, for this purpose steps should be taken to develop irrigation and water management systems in the state. There is also an immense need to check the fragmentation of farm holdings in Assam. For the overall development of rice cultivation in Assam, efforts should come from Central and State governments, agricultural research institutions and other non-government organizations and must be free from conflict and conspiracy.

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REFERENCES

Ali, M. and Flinn, J.C. 1980. Profit efficiency among basmati rice producers in Pakistan's Punjab. *American Journal of Agricultural Economics*, 71:303-310.

- Basic Agricultural Statistics. 1991-92 to 2019-20. Directorate of Agriculture, Statistical Wing, Govt. of Assam, Khanapara.
- Bezbaruah, M.P. 1994. Technological Transformation of Agriculture: A study from Assam, Mittal Publication, New Delhi.
- Census of India. 2011. Directorate of Census Operation, Assam.
- Choumbou, R.F.D. 2015. Gross Margin analysis and Constraints faced by Small Scale Rice Producers in the West Region of Cameroon. *Journal of Biology, Agriculture and Healthcare*, 5(21):108-112.
- Dabai J. S. 2015. Resource Use Efficiency of Cowpea Production in Ngaski Local Government Area, Kebbi State, Nigeria, *New York Science Journal*, 8(3). 51-18
- Dhar, P.K. 2012. The economy of Assam including economy of North -East India, Kalyan Publishers, Guwahati. Assam.
- Haque, T. 2006. Resource use efficiency in Indian Agriculture. *Indian Journal of Agricultural Economics*, 61 (1): 65-76.
- Phukan, U. 1990. Agriculture Development in Assam (1950-1985) Mittal Publication, New Delhi.
- Pegu, N. C. 2017. Growth, Instability and Resource Use Efficiency in Production of Rice in Assam: Ph.D Thesis: 118-119.
- Shewaye, A. 2019. Cost and Return analysis of Rainfed Lowland Rice Production under Small holder Farmers in Fogera District, North Western Ethiopia, *International Journal of Research, Studies of Agricultural Sciences*, 5 (3):30-35.
- Singh V.K. and Gupta D.D. 1992. Input Use Efficiency in Wheat crop in Haryana, *Indian Journal of Agricultural Economics*, 47(3):500.
- Statistical Handbook of Assam. 1991-91 to 2019-20. Directorate of Economics and Statistics, Government of Assam.
- Takare, D.P. 2005. Resource –Use Efficiency in Indian Agriculture, Serial Publications, New Delhi.
- Usman, J. 2018. Cost and Return Analysis of Rice Production in Song Local Government Area of Adamawa State, Nigeria. *International Journal of Advances in Agricultural Science and Technology*, 5(2):55-62.



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