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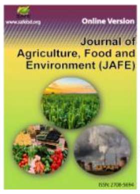

Research Article

An economic study and resource use efficiency of brinjal production in Bangladesh

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A B S T R A C T

This study assessed brinjal producers' socioeconomic characteristics, profitability, and resource use efficiency. The study was carried out in Boalmari and Faridpur sadar upazila in Faridpur district, Mithapukur, and Gangachara upazila in Rangpur district, Kaligonj upazila in Shatkhira district, and Jashore sadar upazila in Jashore district. Data were gathered via the use of an interview schedule from a sample of 60 respondents chosen at random between the dates of January 1st and March 31st, 2021. A Cobb-Douglas production function (CDPF) analysis was performed with descriptive statistics to explore the factors influencing brinjal production. In this study, majority of respondents (46.67%) were found middle-aged (31–45 years old). A major percentage of brinjal farmers (45%) were illiterate, while 23.33% had secondary education. About 41.67% of brinjal farmers had a medium family (5-6 persons), while over 30% had a big family of more than 6. Fertilizers, seed, and insecticides were the major variable costs during the brinjal production. The findings also revealed that the total production cost, gross returns, gross margin, and net return per hectare were Tk. 169877, Tk. 534594, Tk. 388767, and Tk. 364717, respectively. The brinjal cultivation was found profitable as the benefit-cost ratio (BCR) was found 3.14. The CDPF analysis revealed that the machinery utilized was negatively significant for brinjal production, whereas the coefficients of hired labor and urea were favorably significant. Except for the overuse of insecticides, resource usage efficiency showed that all the resources were underutilized for brinjal farming.

INTRODUCTION

The agriculture sector plays crucial role for global food security and productivity (Smutka *et al*., 2009; Otsuka, 2013; Smutka *et al*., 2015; Wegren and Elvestad, 2018). As a developing country, Bangladesh's economy depends on agriculture which contributes around 11.30% to its gross domestic product (GDP) in 2022-23. The proportion of the entire workforce employed in this sector is around 45.33% (BBS, 2023). Within the share of agriculture, crop and vegetables contributes 5.30% to the GDP of Bangladesh (BBS, 2023). Vegetables are essential for a healthy diet because they include significant amounts of vitamins, minerals, and dietary fiber while having low levels of fats and carbohydrates (Dong *et al*., 2022; Gruda, 2005; Głąbska *et al*., 2020; Rashmi and Negi, 2020; Sokołowski *et al*., 2024). Bangladesh is well known for its high production of vegetables. It has achieved third place in global vegetable production (FAO, 2017). Including over 142 varieties of home-grown and exotic vegetables, Bangladesh is well-renowned for growing various vegetables due to its fertile soil and climate (Alam and Khatun, 2021). Brinjal is one of the most important vegetables among these.

Brinjal, scientifically known as *Solanum melongena* L., is a widely consumed vegetable in Bangladeshi people's regular diet, with an average consumption of 7.28 grams per person per day in Bangladesh (Bushra *et al*., 2022; BBS, 2018). It is available throughout the year. Consuming brinjal in one's diet provides a substantial portion of the vitamins, minerals, and phenolic compounds that adults need daily (Naeem and Ugur, 2019). In 2022-23, Bangladesh produced 681,196 metric tons of brinjal on 54,655 hectares of arable land (BBS, 2023).

Brinjal is categorized into two groups according to its production season. They are brinjal varieties that are grown throughout the winter season (rabi) and summer season (kharif) (Rahman *et al.*, 2016). Brinjal has the second highest position among vegetables cultivated in both the kharif (4.38% of total output) and rabi (8.31% of total production) seasons in Bangladesh (BBS, 2023; Bushra *et al.*, 2022). The Khulna division had the biggest agricultural area for kharif brinjal (i.e., 5,134 hectares), while the yearly output was the greatest in the Rajshahi division, at 80,731 metric tons in 2022–23. In 2022-23, the Rajshahi division had the maximum cultivation area and output of rabi brinjal, with 6,147 hectares and 105327 metric tons, respectively. Despite its availability year-round, its greatest supply appears from November to mid-April (BBS, 2023). It is a versatile fruit that can be cultivated in almost any agroclimatic zone. There are more than 100 distinct types of brinjal, each with its own unique color, size, shape, and flavor (Shelton *et al.*, 2020). Dhaka, Faridpur, Rajbari, Gazipur, Rangpur, Satkhira, Jashore, Manikganj are some of the top Brinjal's producing districts in Bangladesh (BBS, 2023). In Bangladesh, different kinds of brinjal are grown, and the fruits are picked twice or three times a week when they are big enough to sell (Shelton *et al.*, 2020). Fruits that are of good quality are healthy, free of disease, shiny, the right color, and don't have any cuts or scars. Yields are usually between 14 and 22 tons per hectare, but they can be much higher or lower based on the variety and where it grows (Shelton *et al.*, 2020).

Production of brinjal was found profitable in Rajshahi, Cumilla, and Mymensingh districts in a study by Hasan *et al.* (2020). Seed, irrigation, human labor, insecticides, and pesticides were explored as the most cost-bearing items in that study. Many insect pests severely limit the production of brinjal. About 6 distinct types of disease and 17 bug species were found which caused great damage to brinjal production in Bangladesh (Kamrujaman *et al.*, 2023; Alam *et al.*, 2011). In a study by Manjunatha *et al.* (2021), brinjal production was also found as a profitable vegetable. They revealed that insecticide cost, human labor cost, and fertilizer cost are the major cost items during brinjal cultivation. Another study by Rahman *et al.* (2016) have also done their research study on the brinjal production in Jamalpur district in Bangladesh. They found brinjal production as a lucrative choice for farmers. However, most of these researches are done on a limited scale and did not identify the factors that influence on production and level of resources use efficiency.

So, there is a clear research gap in the economic study of brinjal production in several high-production zones of brinjal in Bangladesh. To fill-up the existing research gap, the present study is undertaken in four major brinjal production districts in Bangladesh namely Faridpur, Rangpur, Satkhira, and Jashore. This research aims to establish brinjal producers' socio-economic characteristics and assess their profitability and resource usage efficiency in the study regions.

METHODOLOGY

Study area

Shatkhira, Rangpur, Faridpur, and Jashore districts are well-known for their production status of brinjal in Bangladesh. Boalmari and Faridpur sadar upazilas in the Faridpur district, the Mithapukur and Gangachara upazilas in the Rangpur district, the Kaliganj upazila in the Satkhira district, and the Jashore sadar upazila in the Jashore district were chosen for this study (Figure 1) where most of the transition practice from agronomic to horticulture crops happened during couple of years.

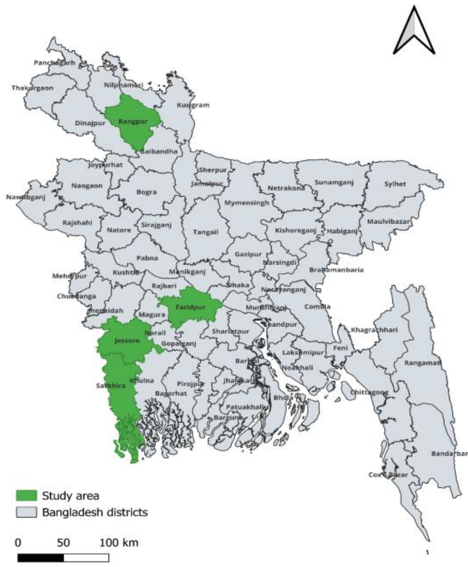

Figure 1. Map of the study area (Developed by using QGIS)

Data collection and sampling techniques

A total of 60 brinjal producers were conveniently chosen from certain areas in the Faridpur, Rangpur, Satkhira, and Jashore districts. The areas include Boalmari and Faridpur sadar upazila in Faridpur district, Mithapukur and Gangachara upazila in Rangpur district, Kaliganj upazila in Satkhira district, and Jeshore sadar upazila in Jashore district. Data collection occurred from January 1st to March 31st, 2021. The data were gathered via in-person interviews using a pre-tested structured interview schedule. The gathered data were organized, manipulated, and examined using Microsoft Excel and SPSS (Statistical Package for Social Sciences, version 20) analytical software.

Analytical techniques

Cost calculation for brinjal production

The brinjal farmers had to pay for inputs. Market prices were used to value inputs. However, farmers did not pay cash for family labor, home-grown seeds, manure, etc. The opportunity cost theory was used for that case. This research evaluated hired labor, power tiller or equipment costs, seed, fertilizer, manure, irrigation, hormones, and land usage costs, and so on when assessing production costs.

Profitability analysis

Total return (GR) was computed by multiplying an enterprise's total produce sold by the mean price (Dillion and Hardaker, 1993). Subsequently, gross cost was calculated by summing the variable and fixed costs of production in monetary terms.

The gross return (GR) and gross cost calculation formulas (Afrin *et al*., 2016) are as follows:

GR = Q.P ……………………………………………………… (1)

Where GR = Gross return from the product (Tk./hectare);

Q = Quantity of the product (kg/hectare);

P = Per unit price of the product (Tk./kg);

Gross cost = Total Variable Cost + Total Fixed Cost …… (2)

Farmers often prioritize a high rate of return over fluctuating production costs. The gross margin, which is the result of subtraction between gross return and total variable costs, helps farmers focus on maximizing profits (Biswas *et al*., 2022). They use gross margin analysis to enhance return over variable costs (Haque and Chakbarty, 2014; Islam, 2016). To calculate the net return, the net return is determined as the difference between gross return and total cost (Mia *et al*., 2019; Islam and Hasan, 2020).

Undiscounted BCR was estimated by following formula:

BCR= Total Return/total cost ……………………… (3)

If BCR > 1, the project will give a positive net return.

Functional analysis

The Cobb-Douglas production function (CDPF) was used to analyze the effects of key variables to the brinjal production. The CDPF model is given below:

$$Y = aX_1^{b1} aX_2^{b2} aX_3^{b3} aX_4^{b4} aX_5^{b5} aX_6^{b6}\ aX_7^{b7} aX_8^{b8} aX_9^{b9} aX_{10}^{b10} e^{ui} \quad \ldots\ldots (4)$$

After simplifying we get,

$$\ln Y = \ln b_o + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + b_8\ln X_8 + b_9\ln X_9 + b_{10}\ln X_{10} \quad \ldots\ldots (5)$$

Where, Y = Gross output from Brinjal production per hectare (kg), X_1 = Human labor cost per hectare (Tk), X_2= Machinery used cost per hectare (Tk), X_3= Seed cost per hectare (Tk), X_4= Insecticides cost per hectare (Tk), X_5 = Pesticides cost per hectare (Tk), X_6 = Irrigation cost per hectare (Tk), X_7 = Urea cost per hectare (Tk), X_8 = TSP cost per hectare (Tk), X_9 = MoP cost per hectare (Tk), X_{10}=Zinc cost used per hectare (Tk), b_0= Intercept and $b_1, b_2, \ldots\ldots b_{10}$= parameters

Resource use efficiency calculation

For resource use efficiency, the ratio of Marginal Value Product (MVP) to the Marginal Factor Cost (MFC) for each input was computed and tested for its equality to 1. i.e., MVP/MFC = 1 (Rasha *et al*., 2018). The most reliable, perhaps the most useful estimate of MVP is obtained by taking resources (Xi) as well as gross return (Y) at their geometric means.

$$MVP\ (X_i) = \beta_i * (\bar{Y}(GM) / \ddot{X}_i(GM)) \quad \ldots\ldots (6)$$

Where, $\bar{Y}$ (GM) = Geometric mean of gross return (Tk.)

$\ddot{X}i$ (GM) = Geometric mean of different independent variables (Tk.)

βi = Co-efficient of parameter

i = 1, 2,………………..n

To test the efficiency, the following formula was used:

MVP / MFC = r ……………………………………… (7)

Where, r = Efficiency ratio; MVP = value of change in output resulting from a unit change in variable input (Tk.); and MFC = price paid for the unit of variable input (Tk.)

When, r >1, implies under-utilization of resources; r <1, implies over-utilization of resources and r = 1 implies optimum utilization of resources.

RESULTS AND DISCUSSION

The socio-economic attributes of the farmers have a direct and indirect influence on production. Individuals vary in several aspects. Socio-economic characteristics are the important factors influencing a person's behavior. This research study chose six characteristics of farmers. The factors include age, educational attainment, household size, prior expertise in cultivating brinjal, farm size, and yearly family income.

The majority of farmers (46.67%) were middle-aged, while 36.66% were youthful and 16.67% were elderly. This suggests that youthful and middle-aged farmers may significantly influence the production process regarding brinjal farming. Table 1 also demonstrated that a larger portion of brinjal cultivators (45%) were illiterate, while 23.33% of them had completed secondary education. While 30% of brinjal producers who had a large family of more than six members, 41.67% of farmers had a medium family of 5 to 6 member. Additionally, the data indicated that half of the farmers (50%) had medium expertise in farming, as opposed to those with low (25%) and high (25%) experience.

The respondents' farm sizes were between the range of 0.05 and 3.95 hectares. Therefore, the participants were categorized into three groups according to their farming area: "marginal farm" (up to 0.2 hectares), "small farm" (0.21–1.0 hectares), "medium farm" (1.1–3.0 hectares), and "large farm" (above 3 hectares) (BBS, 2023). According to Table 1, the majority of farmers (51.67%) owned small farms, while 30% owned medium farms, and 8.33% owned marginal farms. Just 10% of the farmers own massive agricultural land. Most of the farmers fell into the category of medium-sized farmers, which aligns with the overall situation in the country.

The respondents' yearly income varied from 70 to 520 thousand Tk. Accordingly, the participants were categorized into three groups, as shown in Table 1. Table 1 shows that the majority of respondents (58%) reported having a medium yearly income.

Table 1. Socio-economic characteristics of the brinjal producers

Attributes	Number of respondents	Percentage (%)
Age group (Years)		
Young aged (up to 30)	22	36.66
Middle-aged (31-45)	28	46.67
Above 45 years	10	16.67
Literacy levels (Years of schooling)		
Illiterate/Can sign only (0-0.5)	27	45.00
Primary Level (1-5)	13	21.67
Secondary Level (6-10)	14	23.33
Above Secondary Level (>10)	6	10.00
Income levels ('000 Tk.)		
Low income (70-195)	15	25.00
Medium income (196-427)	35	58.33
High income (above 427)	10	16.67
Family Size (Persons)		
Small family (2-4)	17	28.33
Medium family (5-6)	25	41.67
Large family (>6)	18	30.00
Farm size		
Marginal farm (up to 0.2 hectare)	5	8.33
Small farm (0.21-1.0 hectare)	31	51.67
Medium farm (1.01-3.00 hectare)	18	30.00
Large farm (>3 hectare)	6	10.00
Farming experience (Years)		
Low (2-20)	15	25.00
Medium (21-40)	30	50.00
High (>40)	15	25.00

Source: Field Survey, 2021

Profitability of brinjal cultivation

The analysis categorized the cost into variable costs and fixed costs (Barmon, 2019). To determine various expenses related to the production of brinjal, the inputs were generally assessed based on the prevailing market price during the data collection period. Human labor is a crucial factor in the production of any crop. It is necessary for a variety of tasks and the overall administration of chosen farms, including operations such as farm preparation, building dykes, removing weeds, sorting and grading produce, and harvesting crops. Calculating hired labor expenses is straightforward. The cost of labor employed per hectare amounted to Tk. 17213, accounting for 10.13% of the total cost (Table 3).

Power tillers were mostly used for land preparation in the research area. The entire cost of land preparation, including power tiller expenses and draft power costs, was determined to be Tk. 7,366 (Table 3). The farmers procured seeds from the market. The average cost of seed and seedling per hectare was calculated to be Tk. 19,773. Fertilizer is a crucial component for the production of brinjal. Farmers use many types of fertilizers, including Urea, TSP, MP, DAP, zinc, gypsum, and ammonia. The cost of fertilizer was determined based on the current market pricing, which was paid by the farmers. In the research region, the average prices of urea, TSP, and MP were Tk. 17, Tk. 25, and Tk. 15 per kilogram, respectively.

Table 2. Per hectare fertilizer costs of brinjal cultivation

Particulars	Cost (Tk/hectare)	Percentage (%) of Total fertilizers' cost
Urea	9540	20.77
TSP	23950	52.13
DAP/MAP	2266	4.93
MP	6367	13.86
Zinc	3267	7.11
Gypsum	434	0.95
Ammonia	115	0.25
Total fertilizers' cost	45939	100.00

Source: Field Survey, 2021.

Table 3. Per hectare production costs of brinjal cultivation

Particulars	Cost (Tk/hectare)	Percentage (%) of Total Cost
Fertilizers	45939	27.05
Manure	2201	1.30
Insecticides	46396	27.31
Seed	13940	8.22
Seedling	5833	3.43
Irrigation	675	0.39
Hormone	2326	1.37
Draft power (for Tillage)	773	0.45
Machinery used (for tillage)	6593	3.88
Pesticides	3938	2.32
Hired labor	17213	10.13
A. Total variable cost	145827	85.84
Land use cost	24050	14.15
B. Fixed cost	24050	14.15
C.Total production cost (A+B)	169877	100

Source: Field Survey, 2021.

According to Table 2, the cost of fertilizer per hectare was Tk 45,939, which accounted for 27% of the overall production cost. Hasan *et al*. (2020) examined the profitability of brinjal production and found that the cost of seeds per hectare was Tk. 19,162, while the cost of fertilizer per hectare was Tk. 33,568. These findings align with the results of this study.

Cow dung, also known as manure, was often used as an organic fertilizer for the cultivation of brinjal. Farmers applied commercially bought manure. The manure cost was computed using current market prices, which were estimated to be Tk. 1 per kilogram throughout the study period. The cost of utilizing manure per hectare was determined to be Tk 2,201, accounting for 1.30% of the overall production cost. The farmers in the research region used pesticides such as Basudin, Dimocrone, Sumithion, Theovit, Furadon, Malathianon, and others. According to Table 3, the cost of pesticides per hectare was Tk 3,938, which accounts for 2.32% of the overall production cost.

Brinjal requires water. Within the research area, farmers relied on both shallow tube wells (STW) and deep tube wells (DTW). These tube wells were powered by either fuel or electricity. Payment for all irrigation water costs was made in monetary terms. Insecticides are a crucial ingredient for the growth of Brinjal. The mean expenditure on insecticides per hectare amounted to Tk. 46,396. It constituted a quarter (27.31%) of the whole production expenses. Manjunatha *et* *al.*, 2021 also found insecticides cost as a major cost item during brinjal production.

The per hectare variable cost for brinjal cultivation was Tk. 145,827, which was 85.84% of production cost. In the study area, it was estimated that per hectare total fixed cost was Tk. 24,050, which comprised 14.15% of total production cost. The total costs were calculated by adding up total variable costs and total fixed costs. In the study per hectare total cost of brinjal cultivation was calculated at Tk.1,69,877 (Table 3).

Table 4. Profitability of brinjal cultivation

Items	Unit	Value
Yield	(kg/hectare)	21383
Price	(Tk/kg)	25
Gross return (GR)	(Tk)	534594
Total variable costs (TVC)	(Tk)	145827
Total cost (TVC+TFC)	(Tk)	169877
Net return (GR-TC)	(Tk)	364717
Gross margin (GR-TVC)	(Tk)	388767
Benefit-cost ratio (BCR)=GR/TC		3.14

Source: Field Survey, 2021.

The average output of brinjal per hectare in the study zone was 21,383 kg/hectare, with an average market price of Tk. 25. The overall return per hectare for brinjal was estimated to be Tk. 534,594 (Table 4). Net return is a key consideration when evaluating the profitability of brinjal farming. The expected net return per hectare was Tk. 364,717. Farmers normally strive to maximize their return over the variable cost of production. The gross margin for brinjal farming was calculated at Tk. 388,767 per hectare (Table 4). In a study, Rahman *et al*., (2016) found that the per-hectare net return of brinjal production was Tk. 317,298 which is consistent with the findings of this study.

The research revealed that the benefit-cost ratio of brinjal cultivation was 3.14, suggesting that Tk. 3.14 would be gained for spending Tk. 1.00 in brinjal production. So, brinjal growing was shown to be lucrative for farmers (Table 4). In a study, Rahman *et al*., (2016) found the benefit-cost ratios of brinjal cultivation to be 3.29.

Factors influencing the gross return of brinjal cultivation

In this research, the Cobb-Douglas production function was used to assess the factors influencing gross return of brinjal farming. For this purpose, ten explanatory variables namely hired labor, machinery used, seed, insecticides, pesticides, irrigation, urea, TSP, MoP, and zinc were chosen.

The coefficient of hired labor was 0.365 and it was significant at a 5% level of significance. It means that if the amount of human labor used in brinjal production increases by 1% while keeping all other elements the same, the profitability would improve by 0.365%. The calculated coefficient for equipment utilized in brinjal farming was -0.460 and it was statistically significant at a 5% level of significance (Table 5). It indicates that a 1% rise in the cost of equipment used for brinjal growth would result a drop of 0.460% in gross return while keeping all other parameters the same.

Table 5. Estimated values of coefficients and related statistics of Cobb- Douglas production function

Explanatory Variable	Coefficient	Standard error	p-value
Constant	2.860	3.127	0.365
Hired labor	0.365	0.177	**0.0463****
Machinery used	-0.460	0.232	**0.053****
Seed	-0.245	0.99	0.806
Insecticides	0.032	0.133	0.812
Pesticides	-0.462	.472	0.329
Irrigation	1.11	0.888	0.218
Urea	0.663	0.239	**0.008*****
TSP	0.215	0.199	0.291
MoP	-0.090	0.167	0.577
Zinc	-0.110	0.425	0.779
R^2		0.70	
Adjusted R^2		0.64	
Return to scale		1.2	
F-value		11.09***	

Source: Author's calculation based on field survey, 2021

Note: *** Significant at 1% level; **Significant at 5% level and *Significant at 10% level

The regression coefficient for urea in brinjal agriculture was 0.663 and it was significant at a 1% level of significance. Table 5 shows that a 1% increase in urea would result in a profitability rise of 0.663 percent while keeping all other parameters unchanged. The regression coefficients for insecticides, irrigation, and TSP were positive but they were not statistically significant. Conversely, the regression coefficients for seed, pesticides, MoP, and zinc were negative, indicating that they had no meaningful influence on the overall return of brinjal production in the research region. The coefficient of multiple determination was 0.70, indicating that about 70% of the total variation in gross return can be accounted for by the explanatory factors included in the model. Therefore, we may conclude that the regression model has a higher level of goodness of fit based on the R^2 value, as shown in Table 5. The F-value for the cultivation of brinjal was calculated to be 11.09, indicating a high degree of significance at the 1% level. It indicates that the explanatory factors used in the model were significant in explaining the variability in gross return of brinjal farming (Table 5). The total sum of the production coefficients for brinjal farming is 1.2. This indicates that the production function for brinjal farming demonstrates a phenomenon known as growing returns to scale. According to the model, increasing all the variables by 1% would result in a 1.2% increase in gross return (Table 5).

Resource use efficiency for brinjal production

To determine the level of resource utilization, it was determined that a ratio of one indicated the optimal use of the factor, while a ratio greater than one suggested that increasing resource usage may lead to higher yields. A number below one indicated the unprofitable use of resources, necessitating a reduction to mitigate losses resulting from over-exploitation by farmers.

Table 6. Estimated resource use efficiency of brinjal cultivation

Variable	Geometric Mean (GM)	Ȳ(GM)/ x̄i(GM)	Coefficient	MVP (Xi)	r=MVP/ MFC	Decision rule
Yield(Y)	196532	--	--	--	--	--
Human labor	11531.46	17.04	0.365	6.21	6.21	Under utilization
Urea	7597.467	25.87	0.663	17.15	17.15	Under utilization
TSP	14938.91	13.15	0.215	2.82	2.82	Under utilization
MoP	3208.688	61.25	-0.09	-5.51	-5.51	Under utilization
Machinery used	5301.372	37.07	-0.460	-17.05	-17.05	Under utilization
Irrigation	503.971	389.96	1.11	428.85	428.85	Under utilization
Insecticides	30776.13	6.39	0.032	0.8498	0.8498	Over utilization
Pesticides	3395.066	57.88	-0.462	-26.74	-26.74	Under utilization
Seed	13895.01	14.14	-0.245	-6.00	-6.00	Under utilization

Source: Author's estimation, 2021.

The ratio of MVP (Marginal Value Product) and MFC (Marginal Factor Cost) of human labor for brinjal cultivation was 6.21, which was both positive and more than one (Table 6). This suggests that in the research region, human labor for brinjal cultivation was not being fully used. Therefore, farmers have to increase the use of manual labor to achieve a higher degree of efficiency. The ratio of equipment used cost, MoP, pesticides, and seed for brinjal production, in terms of MVP and MFC, was both negative and more than one. This indicates that these expenses were not fully used in the research region, as shown in Table 6. To significantly improve efficiency, farmers should augment the use of technology, means of production, pesticides, and seeds. The research found that the ratio of MVP (Marginal Value Product) to MFC (Marginal Factor Cost) for human labor, urea, TSP (Triple Super Phosphate), and irrigation in brinjal production was more than one. This indicates that the use of human labor, urea, TSP, and irrigation in the study region was not fully optimized. Therefore, producers have to enhance the use of these resources to achieve optimal efficiency in brinjal farming.

The data presented in Table 6 clearly showed that the value of r for insecticides in brinjal cultivation was 0.849. This value, being positive and smaller than one, indicates that the use of insecticides for brinjal cultivation in the research region was excessive. To achieve optimal effectiveness in brinjal farming, farmers should reduce the use of insecticides.

CONCLUSION

Brinjal is a well-accepted vegetable at the consumer level in Bangladesh. There is a huge scope for commercial production of brinjal throughout the country as the price is almost satisfactory in the marketplaces. Production of brinjal always incurs some major costs namely seed costs, human labor, fertilizers, insecticides, pesticides, and so on. It is a profitable vegetable with a higher gross return and net return. Farmers have a higher chance of earning profit by employing input items in the production of brinjal. Though farmers used different inputs during the production period, most of the resources remained underutilized except for insecticides. Brinjal is highly vulnerable to insects and pests for that reason farmers may use high dosages of insecticides. For better farming practices, farmers should use ideal dosage of all available inputs and also avoid using extra dosages of insecticides.

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