

Economics of Potato Production: A Case Study on the Farmers of Munshiganj Area

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Abstract: *This research mainly focuses on the trend of potato price from supply side and potato production over the years. The research also explores the phenomenon of paradox of plenty which shows that bumper production of potatoes over the years leads to decrease in the income of the farmers. To carry out the research, Vaterchar and Tengarchar regions of Munshiganj have been selected. Stratified sampling technique has been adopted to conduct the study. Data has been collected from 75 respondents of whom 25 are small farmers, 25 are medium farmers and 25 are large farmers. The analysis shows that the amount of producing potatoes is increasing over the years in a decreasing return. The price of potato (per kg) from supply side is decreasing drastically over the years which are very much unsatisfactory and reducing the income of the farmers.*

Keywords: *Potato, Production, Small farmers, Medium farmers, Large Farmers, Price, Munshiganj, Trend*

1. BACKGROUND OF THE STUDY

Bangladesh is mainly an agricultural based country dominated by crop production. Agriculture is the main stay of the economy of Bangladesh. Bangladesh enjoys generally a sub-tropical monsoon climate. Bangladesh has been famous for growing large variety of tropical crops particularly rice, wheat, potato, jute, pulses, oilseeds, sugarcane etc. Potato is one of the most important food crops grown in more than 100 countries in the world. Potato is the fourth most important food crop in the world after wheat, rice, and maize. Because of climate change, the reduction of arable land, increasing population, and frequent occurrence of natural disasters, food security has become a crucial issue. Though rice and wheat are main food crops, their production is not sufficient to meet the increasing requirement for the growing population in the country.

Considering the area coverage in the country, potato is the third major crop after paddy and wheat. Bangladesh is now 14th among the world's potato producers and 4th largest in Asia. Potato is mostly consumed as vegetable in the households in Bangladesh. Potato is one of the main commercial crops grown all over the country. In Bangladesh, potato is mainly consumed as vegetable. Various other food items are also made from potato. Adequate supply of potato stabilizes the vegetable market all-round the year (Moazzem & Fujita, 2004).

The government has been trying to diversify food habits and encourage potato consumption to reduce pressure on rice. So, potato is becoming an important food for food security in Bangladesh. Munshiganj is one of the most suitable areas for potato production. Compared to any other regions of a country a bigger volume of potato are produced in Munshiganj region and thereby we can see that different types of farmers are engaged in producing potato to lift up their socio-economic conditions. So the author wants to see the production trend & price volatility of potatoes from the supply side over the years.

1.1 OBJECTIVE OF THE STUDY

The objective of the study is to see the trend of farmers' profit, potato price (BDT/ per kg) from the supply side and the trend of potato production (in mound) over the years.

2. LITERATURE REVIEW

Potato is a staple food in the developed countries and which accounts for 37% of the total potato production in the world (FAO & CIP, 1995). Considering the trend of population growth and consequently the increased demand for food in the country and dwindling cultivable land area, the potato is likely to play a very important role in the future. Potato is a popular and important vegetable in Bangladesh.

Sabur (1988) conducted a study on marketed surplus of potatoes in two districts of Bangladesh, he found that production and marketed surplus of potatoes moved in some positive direction. He observed that the average production cost per hectare was BDT 29635.57 and net return was BDT 30947.82. Das (1992) conducted a study on the profitability of potato cultivation and found that the average yield of potato was 4720 kg per hectare and the average gross return amounted to BDT 33040 per hectare. He calculated the per hectare net return above full-costs at BDT 11085.89.

Hakim (1993) conducted a comparative economic study on Cardinal and multi varieties of potatoes in Bogora district. He found that per hectare total costs were BDT 32097.25 and BDT 30818.50 for Cardinal and multi varieties respectively. The costs were estimated at BDT 15896.15 and BDT 12701.60. Net returns per hectare on full costs basis were BDT 45196.65 and BDT 451.65.

Rashid (1994) conducted a study on the profitability of different cropping patterns with and without potatoes in two villages in Dinajpur district. The average yields per hectare were 15550 and 4720.54 kg for HYVs and LVs of potatoes, respectively and their respective values were BDT 46084.03 and BDT 24574.82. He also observed that the HYVs of potatoes were more profitable than other crops.

Arif (1998) conducted a study on potato product on selected areas of Comilla district. He showed that the per hectare gross returns were BDT 101858.56, 102358.56 and 101358.56; gross costs were BDT 64251.10, BDT 65179.58 and BDT 64741.42; net returns were BDT 37607.46, 37178.98 and 366617.14 for small, medium and large categories of farmers respectively.

Another study showed that potato production is highly profitable and it could be provide cash money to farmers. In terms of profitability, potato production was more attractive than any other winter vegetables. Per unit yield and gross return of potato were found higher than other competitive crops. (Akhter *et al.*, 2001)

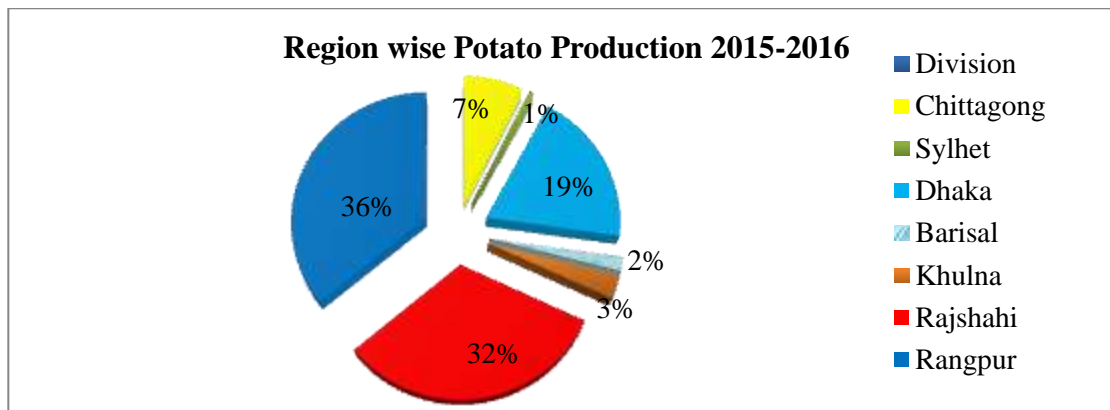
The table below shows the trend of potato production in Bangladesh previous four years. We can see the below table shows the trend of potato production has increases year to year. Where in 2012 to 2013 total production in 86, 03,120 metric ton which is increase in next year 2013 to 2014 in 89, 50,094 metric ton. This table also reveals that the trend of total production increasing 2014 - 2015 to 2015-2016 in 92, 50, 00 metric ton to 94, 70, 00 metric ton. So below the table depicts by the trend of potato production is upward

Table 1: Trend of Potato Production in Bangladesh, 2012-2013 to 2015-2016

Year	Production (in M.ton)
2012-2013	86,03,120
2013-2014	89,50,094
2014-2015	92,50,000
2015-2016	94,70,000

Source: BBS, 2015

Figure 1: Potato Production by Regions (2015-2016)



Source: BBS, 2015

The returns to scale of potato cultivation in Munshiganj district was found around 0.59 which indicate the diminishing returns to scale. It means potato farmers allocated their resources in the rational stage of production (Rational Zone of Production) where lower amount of return would be added to the gross return by using each additional units of input to the potato cultivation. The return to scale of potato cultivation in Munshiganj, Bogora and Comilla district of Bangladesh was found 0.965 (Sujan *et al.*, 2019).

2.1 RESEARCH GAP

There are many research works on rice-price hike issue. This study tries to explore the phenomenon of paradox of plenty in potato production which has rarely been taken to the best of my knowledge in Munshiganj area.

3. RESEARCH METHODOLOGY

3.1 AREA COVERAGE

As we can see that surplus potato production leads a lower price of potato which puts pressure on the farmer’s socio-economic condition because they do not get the desired price through the production process. To analyze the situation the farmers belonging of Gazaria Upazilla, Munshiganj are considered as the population of the research because many farmers of this area are the sole producer of potatoes and drive their socio-economic conditions by producing potatoes. In the context, Vaterchar and Tengarchar regions of Munshiganj area have been taken in to account for the study purpose.

3.2 DETERMINING SAMPLE SIZE AND SAMPLING TECHNIQUE

The study is based on primary survey conducted on a sample of size 75. Stratified sampling process has been adopted to select the sample. Distribution of sample by category is presented in the following table.

Table 2: Distribution of Sample Size and its Justification

Category	Number of Respondents
Small Farmers	25
Medium Farmers	25
Large Farmers	25
Total	75

Source: Author’s Compilation, 2019

Justification of sampling technique is given below by the basic formula of sampling.

$$\begin{aligned}
 SS &= Z^2 * (P) * (1-P) / c^2 \\
 &= (1.96)^2 (.5) (.5) / (.05)^2 \\
 &= 384
 \end{aligned}$$

Where,

SS = Sample Size

Z = Z Value (e.g.1.96 for 95% confidence level)

P= Percentage picking a choice, Expressed as decimal (.5 used for sample size needed)

c = Confidence interval, Expressed as decimal

So the with the justification, the size of samples has become 384 farmers. But due to lack of time and budget constraint, the author has been able to take the sample size of 75 farmers.

3.3 IMPACT VARIABLES

The variables that are studied in this paper are categorized in the form of economic variables. The table describes the name of the variable and unit of measurement of variables.

Table 3: Description of the Variables

Name of the Variables	Unit of Measurement
Total Revenue	BDT (in thousands/lacs)
Total Cost	BDT (in thousands/lacs)
Profit	BDT (in Thousands)
Supply Price of Potato	BDT (per kg)

Production Amount	In Mound
Savings	BDT (in Thousands)

Source: Author's Compilation, 2019.

4. RESULTS AND DISCUSSION

4.1 TYPES OF POTATO PRODUCED

Having surveyed it has been found that the farmers of Munshiganj area produce variety of potatoes namely Diamond, Peraton, Red Potato, Benela, Genela and Alga. The figure below depicts that 100 % of the farmers produce effectively Diamond potato more than any other potato and second item is Red Potato which has taken place after Diamond Potato by 27%. Besides, the farmers are also engaged in producing some other varieties of potatoes which can lift up their profit additionally. The study reveals the reason for excessive production of diamond is that the local people have a high demand for it and the farmers produce this potato in a large volume because of its taste and satisfactory yields.

Table 4: Types of Potato Produced by Percentage

Types of Potatoes	Percentage (%) of Farmers Produce Potatoes	Frequency of the Farmers
Diamond	100	75
Peraton	17	12
Red Potato	27	20
Benela	7	5
Genela	3	2
Alga	9	6

Source: Field Survey, 2019

4.2 TECHNOLOGIES USED IN PRODUCTION

Having surveyed it has been found that the farmers use both traditional and modern technologies in their production process. The study reveals that farmers operate their cultivation with the combination of both technologies. The contribution of these technologies is shown by the table below. The table depicts that 100% of the respondents use traditional method of irrigation by pump. 38% of them use traditional seeds to enhance their productivity. The farmers of this region do not use traditional insecticides, organic fertilizer and bullock labor at all. Moreover, the farmers of this region also adopt modern technologies to enhance their production. The contribution of these technologies has been shown by the table below. It can be seen that 100% of the respondents use modern insecticides, inorganic fertilizers and also every one use tractor as a modern method of production. So it can be stated that farmers of Munshiganj area are very much rely on modern technologies rather than using traditional technologies in the production process of potatoes.

Table 5: Production by Modern Technologies and Traditional Technologies (In Percentage)

Percentage (%) of Farmers Use Modern Technologies	Percentage of Farmers Use Traditional Technologies
Irrigation by Electricity (0 %)	Irrigation by Pump (100 %)
Hybrid Seed (62 %)	Traditional Seed (38 %)
Organic Fertilizer (0%)	Inorganic Fertilizer (100 %)
Modern Insecticides (100 %)	Traditional Insecticides (0 %)
Tractor (100 %)	Bullock Labor (0 %)

Source: Field Survey, 2019

4.3 TREND OF FACTOR PRICES OVER THE YEARS

The table depicts the price volatility of the factors of production over last three years where it can be noted that the price or cost of each variable is increasing year by year except the price of insecticides. The reasons behind decreasing the price of insecticides over last three years are due to timely rainfall and the infested diseases were very much less than that of the year of 2017. The labor cost has been increased from BDT 400 to BDT 500 from year 2017- 2019. The same thing happens in case of price of seeds, price of fertilizers and cost of irrigation. The information has given more clearly from the table below.

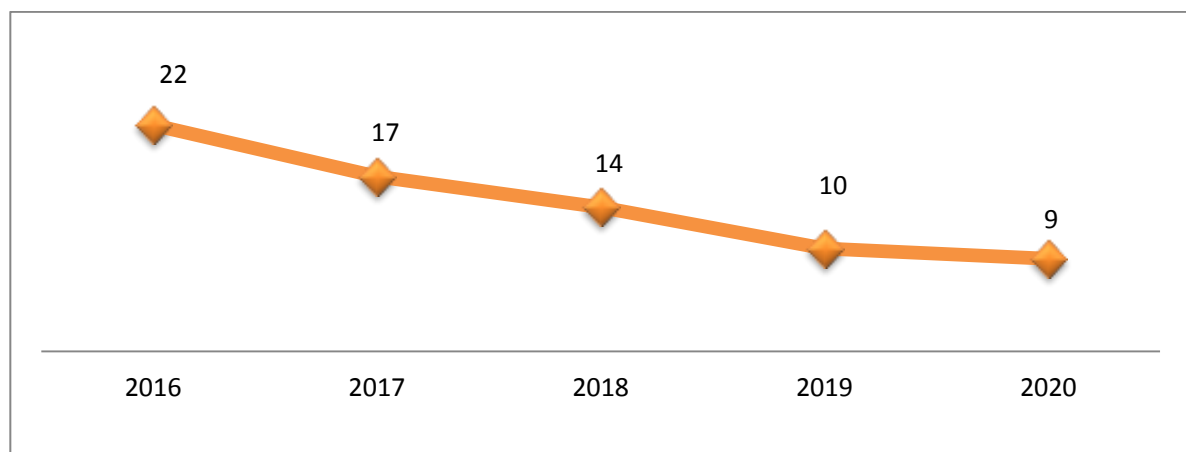
Table 6: Factor prices over the years

Costs	Items	2017 (BDT)	2018 (BDT)	2019 (BDT)
Variable Cost	1. Labor Wage	400	450	500
	2. Price of Seed (per acre)	13820	14200	14400
	3. Price of Fertilizer (per acre)	20010	20800	21380
	4. Cost of Irrigation (per acre)	950	952	970
	5. Price of Insecticides (per acre)	10509	6067	3892

Source: Field Survey, 2019

4.4 FORECASTING THE PRICE (PER KG) OF POTATO FOR THE YEAR 2020 FROM SUPPLY SIDE

This survey has found out the reason for decreasing the profits due to drastically decreasing the price of potatoes (per kg) over the last four years. The figure below depicts that at the year of 2016 the price of potato from the supply side was BDT 22 (per kg). But after 2016 there is a sharp decrease in the price of potatoes which can be easily seen by the graph below. The price came down to BDT 10 (per kg) from the year of 2017 to 2019. And if this unsatisfactory price keeps falling, the price of potato will be BDT 9 (per kg) in upcoming year 2020.



Source: Field Survey, 2019

Figure 2: Price (per kg) Forecasting for the Year 2020 from Supply Side

4.5 NET RETURN FROM CULTIVATION

From the analysis, the study identifies that the profit of the farmers are decreasing year by year. The case is shown in the table below where it can be seen that due to increase the total cost of production it creates a negative impact on their profit and it is decreasing over the years because of several reasons like improper price stability, high cost of inputs and cold storage etc. Many of the farmers claimed that the Total Cost (TC) of production is much higher than Total Revenue (TR) and thereby facing huge losses in the production process and some of them have agreed that they will not continue the production in upcoming years.

Table 7: Net Return from the production over the years

Category	Small Farmers			Medium Farmers			Large Farmers		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Total Revenue (BTD)	115400	92413	90200	161214	151071	156428	387857	364285	331428

Total Cost (BDT)	71666	68900	68040	140357	138428	142285	299642	315500	306785
Profit (BDT)	43734	23513	22160	20857	12643	8786	88215	48785	24643

Source: Field Survey, 2019

4.6 AVERAGE PRODUCTION TREND OF POTATO OVER THE YEARS (IN MOUND)

Before surveying the review of literature, it has been revealed that the return to scale of production trend of potato in Munshiganj areas is in decreasing returns to scale. This study also explores the scenario of decreasing returns to scale where we can see that the net production is increasing over the years but in a decreasing return to scale which falls in the 2nd stage of production (Economic Zone of Production). And the table below easily depicts the case in the year of 2017 to 2019 for every category of farmers.

Table 8: Trend of Potato Production over the Years

Category	Small Farmers			Medium Farmers			Large Farmers		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Production (in Mound)	165	186	205	445	483	500	1660	1692	1720

Source: Field Survey, 2019

4.7 COMPARISON OF AVERAGE MONTHLY INCOME, EXPENDITURE AND SAVINGS OVER THE YEARS

The table below shows the average monthly income, expenditure and savings pattern of the farmers. The study explores that due to have poor income of the respondents they are not able to save that much what they really expect. The increasing monthly expenditure is putting a great hardship on the socio economic conditions of the farmers. Due to low savings the farmers have to borrow money from the NGO's, relatives or mahajons, banks and other financial institution etc. As the cost of food, clothes, children's educational instruments and medical treatment are increasing, the real income of the farmers are decreasing day by day. And that is what exactly can be seen from the table below where the monthly savings of every category of farmers is decreasing by leaps and bounds.

Table 9: Comparison of Average Monthly Income, Expenditure and Savings over the Years

Items	Small Farmers			Medium Farmers			Large farmers		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Monthly Income (in BDT)	13600	12466	12933	23266	22200	20066	28400	27133	27333
Monthly Expenditure (In BDT)	12133	11600	11933	21133	20466	18500	22800	23800	23533
Savings (in BDT)	1467	866	400	2133	1734	1566	4934	3333	3800

Source: Field Survey, 2019

4.8 PHENOMENON OF PARADOX OF PLENTY

Paradox of plenty in agriculture implies that a bumper crop reaped by the farmers brings a smaller total income to them. The fall in the income or revenue of the farmer as a result of the bumper crop is due to the fact that with greater supply the prices of the crop decline drastically and in the context of inelastic demand for them, bring about fall in the income of the farmers. Thus, bumper crop, instead of raising their incomes, reduces them. The table below depicts the scenario that an increase in their supply

tends to lower the revenues of the farmers over the years. Thus large harvest has brought about low revenue to the farmers of Munshiganj area.

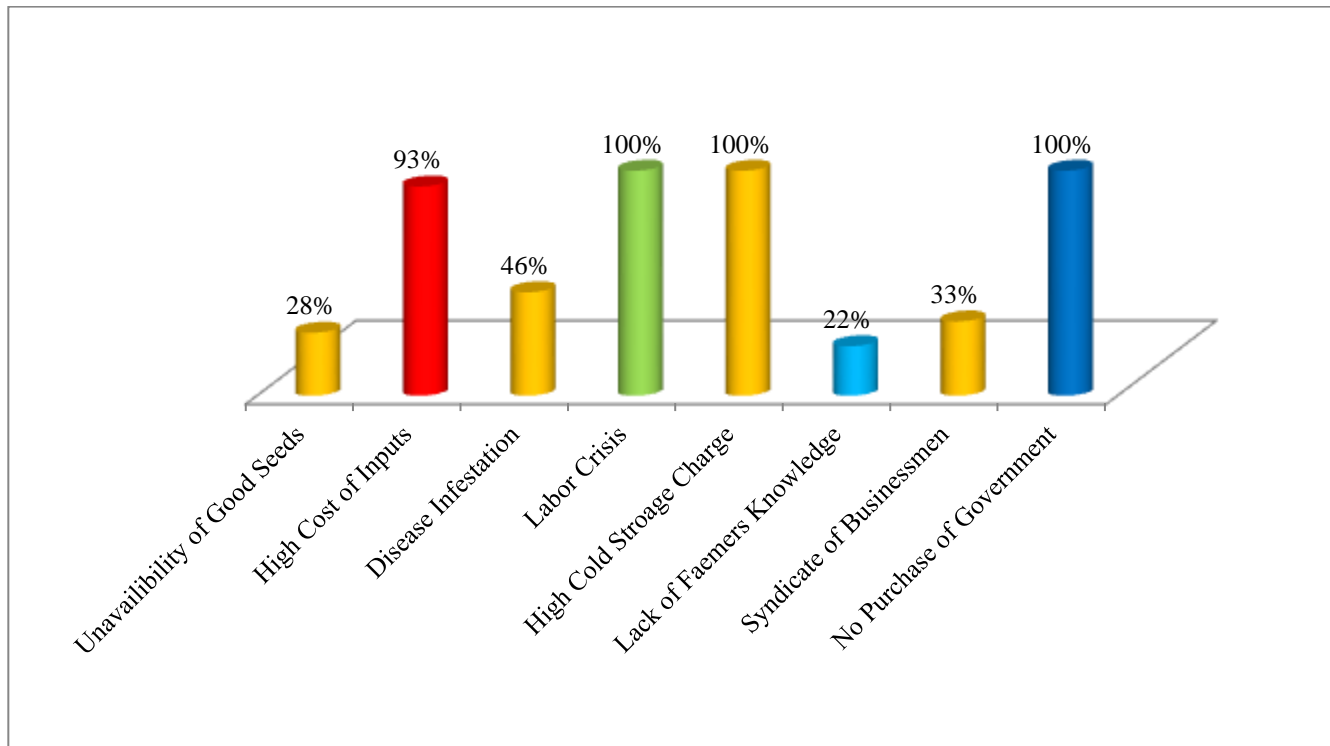
Table 10: Paradox of Plenty in Potation Production

Year	Amount of Production (in Mound)			Revenues of the Farmers (in BDT)		
	Small Farmers	Medium Farmers	Large Farmers	Small Farmers	Medium Farmers	Large Farmers
2017	165	445	1660	115400	161214	387857
2018	186	483	1692	92413	151071	364285
2019	205	500	1700	90200	156428	331428

Source: Field Survey, 2019

4.9 PROBLEMS OF POTATO PRODUCTION

The study explores that farmers of Munshiganj area face many problems of producing potatoes. The figure below depicts that 93% of the total respondents face the problem of high cost of inputs which puts a lot of pressure on small and medium farmers regarding the production process, 46% of the total respondents face disease infestation and 28% of the respondents face the problem of unavailability of good seeds to produce potatoes. The study also reveals that 100% of the total respondents face the problem of labor crisis and high cost of cold storage. Only 22% of the total respondents have the lack of farmer’s knowledge over good quality seeds and access to the better sowing and harvesting of potatoes. 33% of the respondents claimed about the issue of market syndicate to distort the fair price of potatoes to the farmers and every respondent also mentioned that govt. has no interest in purchasing potato directly to the farmers to ensure fair price stability of the potatoes over the years.



Source: Field Survey, 2019

Figure 3: Problems of Potato Production

4.10 LIKERT SCALE BASED ON THE PERCEPTION OF POTATO PRODUCTION AMONG FARMERS

Likert scale has been taken into account to investigate the perception of farmers regarding the production of potatoes. 12% of the total respondents agree strongly and 36% of them only agree, where as 30% of the total respondents do not have any

comment whether the potato production increases their life standard or not. And 10% of the respondents totally disagree with the statement.

The second attribute deals with the profitability issues of potato production. In this case most of the respondents are in the side of neutral and disagree position. From the table it can be depicted that 32% of the total respondents only agree with the view that producing potatoes is more profitable than other crops where as 44% of the respondents remained neutral commenting on this issue of profitability. And 12 % of the respondents totally disagree with the statement.

The third attribute is very much important in the context of producing potatoes because having surveyed it has been found that no one disagrees that potato production is becoming profitable day by day. The perception of the respondents depicts that 65% of the total respondents strongly agree and 28% of the total respondents only agree that production of potato has become less profitable than that of over last couple of years.

The study reveals, as the cost of inputs for production is increasing so 92% of the total respondents strongly agree and only agree that production of potato has become costly day by day which is putting pressure on their real income and profit.

Table 11: Likert Scale Based on the Perception of the Farmers Regarding Potato Production (In Percentage)

Potato Production has-

Attributes	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
increased the life standard of farmers	(5) 12%	(16) 36%	(12) 30%	(8) 19%	(02) 7%
increased more profit than cultivating other crops.	(1) 4%	(14) 32%	(19) 44%	(8) 12%	(2) 8%
become less profitable day by day	(29) 65%	(13) 28%	(02) 7%	(00) 0%	(00) 0%
become costly day by day	(27) 60%	(15) 32%	(02) 8%	(00) 0%	(00) 0%

Source: Field Survey, 2019

5. CONCLUSIONS

Bangladesh is the fourth largest potato producing country in Asia and is among the top seven of the potato producing countries of the world and Munshiganj has become one of the fertile regions for potato production. In addition, potato ranks second after rice in production in Bangladesh. The study reveals the vulnerable condition of the farmers where high yields of potato bring suffering to farmers by reducing their income over the years. Market failure is occurring due to mismatch between the demand and supply of potatoes. Dissemination of market information should be increased so that farmers can get fair price of the potatoes. Cost of production is higher but price of potato is lower at the time of harvest. So, farmers are becoming loser day by day. And this unacceptable phenomenon does not only exist in the case of potato production but also we can see in paddy production too. At last it can be said that farmers are becoming disinterested to cultivate potato because of high possibility of negative return. So, to make the situation favorable to the farmers, government needs to ensure proper policy of price instruments so that the farmers become interested to produce potatoes and strength their socio-economic condition as well.

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