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## Economics of Potato Production in Gorakhpur District of Eastern Uttar Pradesh

Hraday Kumar<sup>1st</sup>, Vijay Kumar Pal<sup>2nd</sup>, Satish Chandra Verma<sup>3rd</sup>, Vinay Kumar Rawat<sup>4th</sup>, Sugriv Kumar Maurya<sup>5th</sup>

<sup>1,2,&3</sup> Assistant Professor, Department of Agricultural Economics & Statistics, Baba Raghav Das

Post Graduate College, Deoria, Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, Uttar Pradesh, India

<sup>4</sup> Associate Professor & Head, Department of Agricultural Economics & Statistics, Baba Raghav Das Post Graduate College, Deoria, Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, Uttar Pradesh, India

<sup>5</sup> Assistant Professor, Department of Agricultural Economics, Janta mahavidhyalya, Ajitmal Auraiya, Uttar Pradesh, India.

### ABSTRACT

Potato is one of the most important cash crops of the country in a place of pride in the vegetable kingdom. Potato grown in more than 100 countries in the world. The study was confined to the Gorakhpur district of eastern Uttar Pradesh. The district was selected purposively. 60 farmers were selected by simple random sampling method. There are 28 marginal 18 small, 8 medium and 6 large farmers from five selected villages of the one block of the district. The farm level data and required information of potato growing farmers pertaining to crop year 2019-2020. The overall cost of potato cultivation was worked out to be Rs 96272.30 per hectare. Which was highest for large (Rs.109402.21) size of holding followed by medium (Rs. 101713.80), small (Rs. 90349.28) marginal (Rs. 83623.96) size of holdings. The overall, cost A<sub>1</sub> accounted 60.87 percent of total costs (cost C<sub>3</sub>). Cost A<sub>1</sub> and cost A<sub>2</sub> were found to be same as there was no land was taken on lease. Cost B<sub>1</sub>, cost B<sub>2</sub>, cost C<sub>1</sub> and C<sub>2</sub> was found to be 61.70, 82.15, 70.45 and 90.91 percent of cost C<sub>3</sub>, respectively. The cost C<sub>3</sub> which take into account the managerial function performed by farmers was Rs.105899.53. The overall value of gross income, net income, farm business income and family labour income per hectare came to Rs. 257440.38, Rs. 161168.08, Rs. 192972.85, and Rs. 170435.55 respectively. The B: C which indicates the profitability of investment was observed to be 2.67 at the overall level. Non availability of quality seed was considered as major problems faced by potato growers. Lack of awareness regarding market price of potato was considered as the most important problems faced by the potato growers.

**Keywords:** cost of production, potato, cost concepts, farm income measures, Benefit-cost ratio

### I. INTRODUCTION

Potato is an economically important staple crop in both developed and developing countries. Potato is grown about 150 countries throughout the world. China ranks 1<sup>st</sup> followed by India and Russia. India's ranks 3<sup>rd</sup> in area and it are the 2<sup>nd</sup> largest country in the world in potato production. Globally, 380 million tonnes of potato is produced in more than 100 countries and 50% of this is consumed fresh. The tuber is important for food security for millions of people across South America, Africa, Europe and Asia. India produced about 53 million tonnes of potatoes during 2018-19. The country exports around 3.5 lakh tonnes of potatoes a year, earning Rs 350-400 crore. Potato is a temperate crop grown under subtropical conditions in India. Potato popularly known as 'The king of vegetables', has emerged as fourth most important food crop in India after rice, wheat and maize. Indian vegetable basket is incomplete without Potato. Agriculture is the most important occupation for more than 58% population either directly or in directly. It is the backbone of our economic system. In India agriculture contributes 16% of total GDP and 10% of total exports. (Economic survey 2018- 2019). The potato

is one of the most widely cultivated horticultural crops in India. It is the number one vegetable crop in the country. Potato is mostly grown as cash crop and provides good returns to farmers when grown scientifically. When grown with other cereals as intercrop, it provides additional benefits. The contribution of potato to the national agricultural economy is manifold. For a developing country like India, where labour is surplus and limited capital, high yielding and labour intensive crops like potato, have added advantage in increasing food production and employment generation. Being a short duration crop, it fits well in relay cropping systems. Returns from investment on research and development are an important yardstick to judge the importance of a particular crop in the national economy. In India potato is cultivated in almost all states under diverse agro climate conditions. About 85 percent of potato is cultivated in Indo-gangetic plains of north India. In states of Uttar Pradesh, Westbanganal, Bihar, Gujrat accounted more than 70% share in total production. In Uttar Pradesh there has been steady and continuous increase in the area and production of potato during recent years. The acreage has gone up from 1992200 ha. During 2013 to 2179000 ha during 2016 -2017. The major Potato producing states are Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh, Punjab, Assam, Haryana, Jharkhand and Chhattisgarh. Studied the economics of potato production based upon primary survey of 50 growers selected randomly from lahaul valley during 2001-2002 this crop was found to be the most capital and labour intensive due to substantial cost incurred on seed, fertilizer and human labour. Out of the total cost of Rs. 74,461 the human labour alone accounted for around 30 per cent followed by seed (18 %). As such, the cost benefit ratio over all paid out cost was 1:2.51 while on total cost it was 1:1.03. **(Harbans and Sharma 2006)**. Conducted a study of potato production of 44 growers grouped into small (20), medium (14) and large (10) from Agra district showed the overall cost of cultivation to be Rs. 140303.7 per farm and Rs. 78657.98 per hectare. Among all the inputs, per hectare value of potato seed was 25%, the human labour was 14%, the total variable cost was 78%, the total fixed cost was 22% per ha and the overall total cost C<sub>3</sub> of potato was Rs. 154334.07 per farm and Rs. 86523.78 per hectare. The gross income received by farms with the overall average of Rs. 188370. The analysis of efficiency of potato production under different categories of farms showed the overall cost of production of potato was Rs. 292.3 per quintal. The overall output/input ratio was 1:2.39, being 1:3.42, 1:2.61 and 1:2.21 on the small, medium and large farms, respectively. Thus, it could be concluded that with an investment of one rupee in potato cultivation the small, medium and large farmers earned Rs. 3.42, Rs. 2.61 and Rs. 2.21, respectively **(Singh et al. 2019)**.

## II. MATERIAL AND METHODS

Uttar Pradesh is divided in to four economic region viz. Eastern, Western, Central and Bundelkhand. The study was confined in eastern Uttar Pradesh which comprises five divisions Viz. Varanasi, Gorakhpur, Azamgarh, Mirzapur and Basti. Gorakhpur district was selected purposively. A list of all 19 blocks was prepared on the basis of potato growing area. One block namely Campiereganj block was purposively selected for the study where area under potato cultivation was higher in comparison to other blocks. From the selected block, a list of all villages was prepared and five villages were randomly selected on the basis of maximum coverage of area under potato crop. From the selected villages the list of farmers potato growing farmers was prepared and further classified in four size groups based on their size of holdings viz. marginal farmer (having <1 ha.) small farmer (having 1-2 ha.) medium farmer (having 2-4 ha.) and large farmer (having > 4 ha.). From each size group farmers were selected randomly method. Thus ultimate sample size was 60 potato growers which comprised of marginal, small, medium and large farmer. There are 28 marginal 18 small, 8 medium and 6 large farmers from five selected villages of the one block of the district. After the preparation of the schedules, data were collected from potato growers by personal interview. The information regarding the potato growers was collected from level of inputs used and output of main products of potato. The input and output prices used were that at which the potato growers had actually sold their output or procured the input. The opinion about the potato farming and the problems faced by the potato growers were elicited. The farm level data and required information of potato growing farmers pertaining to crop year 2019-2020, was during March-April by personal survey method. The data thus collected were subjected to tabular analysis, other statistical analysis.

### 2.1 Cost concepts as per the CACP classification

The cost concepts approach to farm casting is widely used in India. To work out the cost of cultivation standard method of cost cultivation employed by commission for agricultural costs and prices (CACP), directorate of economics and statistics, government of India was adopted. These include Cost A<sub>1</sub>, Cost A<sub>2</sub>, Cost B<sub>1</sub> Cost B<sub>2</sub> Cost C<sub>1</sub>, Cost C<sub>2</sub>, and Cost C<sub>3</sub>. Various costs have been worked out by applying following method:

**Cost A<sub>1</sub>:** all actual expenses in cash and kind incurred in production. Cost A<sub>1</sub>: consists of following 14 costs items:

1. Value of hired human labour (permanent & casual).
2. Value of owned bullock labour.
3. Value of hired bullock labour.
4. Value of owned machine labour.
5. Hired machinery charges
6. Value of fertilizers.
7. Value of manure (produced farm and purchased).
8. Value of seed (both farm- produced and purchased).
9. Value of insecticides, pesticides and fungicides.
10. , irrigation charges (both owned and hired tube wells pumping sets etc.).
11. Canal water charges.
12. Land revenue, cesses and other taxes.
13. Depreciation on farm implements and machinery (both bullock drawn & worked with human labour, farm building and farm machinery).
14. , interest on the working capital..

**Cost A<sub>2</sub>:** Cost A<sub>1</sub> + Actual rent paid for leased in land

**Cost B<sub>1</sub>:** Cost A<sub>1</sub> + Interest on value of owned fixed capital assets (excluding land)

**Cost B<sub>2</sub>:** Cost B<sub>1</sub> + rental value of owned land

**Cost C<sub>1</sub>:** Cost B<sub>1</sub> + imputed value of family labour

**Cost C<sub>2</sub>:** Cost B<sub>2</sub> + imputed value of family labour

**Cost C<sub>3</sub>:** Cost C<sub>2</sub> + 10 percent of cost C<sub>2</sub> to account for managerial function perform by farmer.

## 2.2 Farm income measures

Under farm income, gross income, net income, farm business income, family labour income and farm investment income were worked out.

**Gross income:** gross income pertains to the total value of the potato production during the year valued at the average prices of the year.

**Net income:** Net income was worked out on by deducting cost C<sub>2</sub> gross income.

**Farm business income:** This is the return to the producer and his family labour and investment on owned land and owned capital. It was worked by deducting cost A<sub>1</sub> from gross income.

**Family labour income:** it is a measure of return from potato production to family labour. This will be obtained by deducting cost B<sub>2</sub> from gross income.

## 2.3 Benefit-cost ratio (BCR)

.Benefit – cost ratio is obtained by ratio of total gross return to the total cost

# III. RESULT AND DISCUSSIONS

## 3.1 Per hectare cost of input factors in potato production

The per hectare cost on various input factor in potato cultivation was worked out and its details are presented in table 1. This table indicates that overall cost of potato cultivation was worked out to be Rs 96272.30 per hectare. Which was highest for large (Rs.109402.21) size of holding followed by medium (Rs. 101713.80), small (Rs. 90349.28) marginal (Rs. 83623.96) size of holdings. The per hectare operational cost at overall level Rs.71468.29 (74.24 percent of the total cost) and per hectare overhead cost came out to be Rs. 24804.01 (25.76 percent of the total cost).

**Table 1: Per hectare cost input of factors in potato cultivation (Rs./ha)**

Sr. No.	Cost Items	Marginal (0-1ha)	Small (1-2ha)	Medium (2-4ha)	Large (4ha& above)	Overall Average
<b>Operational cost</b>						
1.	Human labour	17031.16 (20.37)	19302.14 (21.36)	19866.45 (19.53)	20390.61 (18.64)	19149.09 (19.89)
	a) Hired labour	4482.44 (5.36)	7455.15 (8.25)	12698.65 (12.48)	14884.22 (13.60)	9880.12 (10.26)
	b) Family labour	12548.72 (15.01)	11846.99 (13.11)	7167.80 (7.04)	5506.39 (5.03)	9267.47 (9.63)
2.	Tubers (seeds)	16265.45 (19.45)	20242.15 (22.40)	26688.56 (26.24)	27308.05 (24.96)	22626.05 (23.50)
3.	Manure	2220.22 (2.65)	2588.45 (2.86)	3250.33 (3.19)	3445.23 (3.15)	2876.05 (2.98)
4.	Fertilizers	8190.64 (9.97)	8045.34 (8.90)	8332.41 (8.19)	8423.32 (7.69)	8247.93 (8.57)
5.	Plant protection	2916.90 (3.50)	3352.78 (3.71)	3946.04 (3.88)	4423.04 (4.04)	3659.69 (3.80)
6.	Irrigation charges	7467.87 (8.93)	7279.99 (8.05)	6585.78 (6.47)	6014.05 (5.49)	6836.93 (7.10)
7.	Machine labour	4656.36 (5.57)	5576.27 (6.17)	7168.24 (7.04)	7923.28 (7.24)	6331.03 (6.58)
8.	Interest on working capital	1468.71 (1.75)	1659.68 (1.84)	1895.93 (1.86)	1948.19 (1.78)	1743.12 (1.81)
z	<b>Total operational cost</b>	<b>60217.31 (72.01)</b>	<b>68046.80 (75.31)</b>	<b>77733.30 (76.42)</b>	<b>79875.77 (73.01)</b>	<b>71468.29 (74.24)</b>
<b>Fixed costs/overhead cost</b>						
9.	Land revenue	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0.00 (0.00)
10.	Depreciation	1578.77 (1.89)	1983.65 (2.19)	2602.32 (2.55)	2902.10 (2.65)	2266.71 (2.76)
11.	Rental value of owned land	21000.00 (25.11)	19530.00 (21.61)	20530.00 (20.18)	25580.00 (23.38)	21660.00 (22.49)
12.	Interest on fixed capital	827.88 (0.99)	788.83 (0.87)	848.18 (0.83)	1044.34 (0.95)	877.30 (0.91)
	<b>Total overhead cost</b>	<b>23406.65 (27.99)</b>	<b>22302.48 (24.69)</b>	<b>23980.50 (23.58)</b>	<b>29526.44 (26.99)</b>	<b>24804.01 (25.76)</b>
	<b>Total cost</b>	<b>83623.96 (100)</b>	<b>90349.28 (100)</b>	<b>101713.80 (100)</b>	<b>109402.21 (100)</b>	<b>96272.30 (100)</b>

*Note: figures in the parentheses indicate percentages to total*

Input wise analysis showed that tubers (seeds) cost was highest expenditure among various components of operational cost with 23.50 percent (Rs.22626.05) share of total cost. The overall major cost component of cultivation of potato crop was total cost of tubers (seeds) Rs. 22626 (24.43 percent) followed by rental value of owned land Rs.21660.00 (22.49 percent), human labour Rs. 19149.09 (19.89 percent), fertilizers Rs. 8247.93 (8.57 percent), irrigation charges Rs. 6836.93 (7.10 percent), machine charges Rs.6331.03 (6.58 percent), and plant protection Rs. 3659.69 (3.80 Percent).

### 3.2 Show the share of different cost in potato production

These results show that the cost of potato production of overall fixed cost 25.76 percent, human labour 19.89 percent, material input 38.85 percent and other expenses 15.49 percent respectively.

**Table 2: Show the share of different cost in potato production**

Sl. No.	Show the cost	Marginal (%)	Small (%)	Medium (%)	Large (%)	Overall (%)
1.	Fixed cost	27.99	24.69	23.58	26.99	25.76
2.	Human labour	20.37	21.36	19.54	18.64	19.89
3.	Material input	35.38	37.88	41.50	39.85	38.85
4.	Other expenses	16.26	16.07	15.38	14.52	15.49
	Total	100.00	100.00	100.00	100.00	100.00

*Note: figures in the parentheses indicate percentages to total*

### 3.3 Costs as per the CACP classification

The various cost concepts (Cost A<sub>1</sub>, Cost A<sub>2</sub>, Cost B<sub>1</sub>, Cost B<sub>2</sub>, Cost C<sub>1</sub>, Cost C<sub>2</sub> and Cost C<sub>3</sub>) used by CACP have been worked out and presented in table 3. As perusal of table Indicates that overall, cost A<sub>1</sub> accounted 60.87 percent of total costs (cost C<sub>3</sub>). Cost A<sub>1</sub> and cost A<sub>2</sub> were found to be same as there was no land was taken on lease. Cost B<sub>1</sub>, cost B<sub>2</sub>, cost C<sub>1</sub> and C<sub>2</sub> was found to be 61.70, 82.15, 70.45 and 90.91 percent of cost C<sub>3</sub>, respectively. The cost C<sub>3</sub> which take into account the managerial function performed by farmers was Rs.105899.53. Farm size-wise analysis of the cost concept of the sample potato growers that indicated increasing trend of cost C<sub>3</sub> with increasing farm sizes. It was Rs. 83623.96, Rs.90349.28, Rs.101713.80 and Rs.109402.21 for marginal, small, medium and large size potato growers, respectively.

**Table 3: Cost of cultivation as per the CACP approach(Rs./ha.)**

Sl. No.	Costs/ Category	Marginal (0-1ha)	Small (1-2ha)	Medium (2-4ha)	Large (4ha&above)	Overall Average
1..	Cost A <sub>1</sub> (all actual expenses)	49247.36 (53.54)	58183.46 (58.54)	73167.82 (65.39)	77271.48 (64.20)	64467.53 (60.87)
2.	Cost A <sub>2</sub> = Cost A <sub>1</sub> + rent paid for leased in land	49247.36 (53.54)	58183.46 (58.54)	73167.82 (65.39)	77271.48 (64.20)	64467.53 (60.87)
3.	Cost B <sub>1</sub> = Cost A <sub>1</sub> +interest on value of owned fixed capital	50075.24 (54.43)	58972.29 (59.33)	74016.00 (66.15)	78315.82 (65.07)	65344.83 (61.70)
4.	Cost B <sub>2</sub> = Cost B <sub>1</sub> + rental value of owned land	71075.24 (77.27)	78502.29 (78.99)	94546.00 (84.50)	103895.82 (86.33)	87004.83 (82.15)
5.	Cost C <sub>1</sub> =: Cost B <sub>1</sub> + imputed value of family labour	62623.96 (68.08)	70819.28 (71.26)	81183.80 (72.56)	83822.21 (69.65)	74612.30 (70.45)
6.	Cost C <sub>2</sub> = Cost B <sub>2</sub> + imputed value of family labour	83623.96 (90.91)	90349.28 (90.91)	101713.80 (90.91)	109402.21 (90.91)	96272.30 (90.91)
7.	Cost C <sub>3</sub> = Cost C <sub>2</sub> + 10 percent of cost C <sub>2</sub> to account for managerial function perform by farmer.	91986.35 (100)	99384.20 (100)	111885.18 (100)	120342.43 (100)	105899.53 (100)

*Note: figures in the parentheses indicate percentages to the total cost (C<sub>3</sub>)*

### 3.4 Returns from potato production

The production and value of output per hectare of selected farmers have been shown in table 4. Overall production per hectare of potato growers came to 199.56 quintals. It was observed higher production was accrued to be large farmers (207.34 quintals) followed by medium (202.92quintals), small (196.67quintals) and marginal (191.31 quintals) farmers. The table show that production of potato increased with the size of holdings. The overall value of gross income, net income, farm business income and family labour income per hectare came to Rs. 257440.38, Rs. 161168.08, Rs. 192972.85, and Rs. 170435.55 respectively. The gross income was highest for the large farmers (Rs. 298569.60) followed by medium (Rs.273942.00) small (Rs. 239957.07) and marginal (Rs.220017.98) farmers. The net income on potato production was highest for the large farmers (Rs. 189167.39) followed by medium (Rs. 172228.20) small (Rs. 149607.79) and marginal (Rs. 136394.02) farmers. On an average, per hectare production of potato came to be 199.56 quintals. The B: C which indicates the profitability of investment was observed to be 2.67 at the overall level. Among the size of holding, the B: C ratio was highest in large size group (2.72) compared to medium (2.69), small (2.65) and marginal (2.63) farmers.

**Table 4: Returns from potato production for different categories of farmers**

Sl. No.	Particulars	Marginal (0-1ha)	Small (1-2ha)	Medium (2-4ha)	Large (4ha& above)	Overall Average
1.	Cost of cultivation (Rs./ha)	83623.96	90349.28	101713.80	109402.21	96272.30
2.	Production (Q./ha)	191.31	196.67	202.92	207.34	199.56
3.	Price (Rs. /Q.)	1150.06	1220.10	1350.00	1440.00	1290.04
4.	Gross income (Rs./ha)	220017.98	239957.07	273942.00	298569.60	257440.38
5.	Net income Rs. /ha	136394.02	149607.79	172228.20	189167.39	161168.08
6.	Farm business income Rs. /ha	170770.62	181773.61	200774.18	221298.12	192972.85
7.	Family labour income Rs./ha	148942.74	161454.78	179396.00	194673.78	170435.55
8.	Cost of production (Rs./Q)	437.11	457.39	501.25	527.64	482.42
9.	B:C ratio(BCR)	2.63	2.65	2.69	2.73	2.67

Note: figures in the parentheses indicate percentages to the total cost ( $C_3$ )

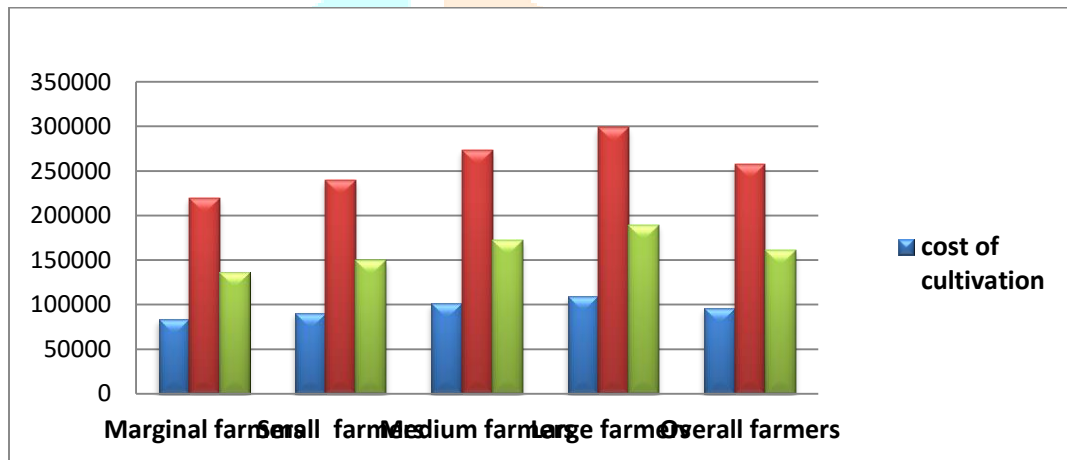


Fig.1 cost of cultivation, gross income and net income from potato production from various land holding size

#### IV. CONCLUSIONS

The cost of cultivation shown increasing trend from marginal to large farmer. It due to fact that large size of holding farmer could incur more expenditure on modern farm input like quality of seed, hired labour, manure, fertilizers, plant protection and machine labour charges etc Farm size-wise analysis of the cost concept of the sample potato growers that indicated increasing trend of cost  $C_3$  with increasing farm sizes. The B: C ratio indicates that the cultivation of potato was more profitable in large size of group holdings, than of that medium, small, and marginal size of group holdings. Non availability of quality seed was considered as major problems faced by potato growers. Lack of awareness regarding market price of potato was considered as the most important problems faced by the potato growers.

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