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Trends and economics of cultivation of potato in Chhattisgarh

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Abstract

The present study deals with the Input wise cost of cultivation and compound growth rate in area, production and productivity of potato (2004-05 to 2015-16) in Chhattisgarh. Multi-stage sampling design was used for the ultimate selection of potato growing farmers. Bilaspur district was selected purposively based on maximum area of potato under Chhattisgarh plain region. 100 farmers were sampled from ten villages of Bilha and Masturi block (5 Villages each) of Bilaspur district. Status of potato crop has improved drastically among the farmers of Chhattisgarh over the last few years. Growth rate in area, production and productivity of potato in Chhattisgarh state was found 9.01, 10.93 and 1.76 per cent per annum respectively. Cost of cultivation showed increasing trend from marginal to large farmers. Average cost of cultivation of potato was found Rs 75839.72. The major share of cost among different cost items were found in seed which accounts 37.65 per cent to the total cost of cultivation. Overall input output ratio was found 1:1.89 in potato crop.

Keywords: cost of cultivation, potato, compound growth rate, cost concepts, input output ratio

Introduction

Potato (*Solanum tuberosum* L.) popularly known as 'The king of vegetables', is the staple food for most of the population of India after cereals. India is the second largest producer of potato after China in the world. It contributes 26.53 per cent to the total vegetable production and occupying 21.24 per cent to the total area of vegetables in India. Uttar Pradesh is the leading producer of potato's followed by West Bengal and Bihar.

It is an annual plant of Solanaceae family; grown for its starchy edible tubers. Potatoes are frequently served whole or mashed as a cooked vegetable and are also ground into potato flour, used in baking and as a thickener for sauces. The tubers are highly digestible and supply vitamin C, protein, thiamin, and niacin. Being a major vegetable, it has the huge importance to the processing industry as well. Many processed products of potato such as potato chips, French fries, potato flakes etc. are available in market.

Being a short duration crop, it produces more quantity of dry matter, edible energy and edible protein in lesser duration of time compared to cereals. So it is one the most important vegetable for food security and nutrition. Looking to the need of financial understanding of potato growing farmers and nutritional value of potato to the country, the present study is conducted with the following objectives.

1. To estimate the compound growth rate of area, production and productivity of potato in Bilaspur district, Chhattisgarh plains and Chhattisgarh state.
2. To work out the cost and returns of potato in the study area.

Methodology

A multi-stage sampling design was adopted for the ultimate selection of potato growing farmers and market functionaries. As Chhattisgarh plain zone with 304453 ha area under vegetables contributing 69.69 percentages to total area of vegetables in Chhattisgarh. Chhattisgarh plains have 16 districts, amongst which Bilaspur has highest area under potato contributing 23.43 percentages to the total area under vegetables in Chhattisgarh plains. So, Bilaspur district was selected purposively for the study. Bilaspur districts has seven blocks, amongst which Bilha and Masturi blocks contributing 16.15 and 15.49 area of potato in the district; ranks first and second in the area of potato respectively. So, five villages were selected from each block and ten farmers were interviewed from each village. In all, hundred farmers were interviewed from ten villages.

Growth rate

Annual Compound growth rates in area, production and productivity of potato from 2004-05

to 2015-16 were estimated in the study area by fitting an exponential function of the following form.

$$Y=AB^t$$

Log y= log A+ t log B

Y= area/ production/ productivity

A= constant.

B= regression coefficient.

t= time in year.

Compound growth rate = (Anti-log of B-1) 100

Cost of cultivation

To work out the cost of cultivation standard Cost concept were used which includes cost A₁, cost A₂, cost B₁, cost B₂, cost C₁, cost C₂ and cost C₃.

Cost A₁: Consist of following 16 items of costs

1. Value of hired human labour (permanent & casual)
2. Value of hired and owned bullock labour
3. Value of hired and owned machinery
4. Value of seed (both farm-produced and purchased)
5. Value of manure (produced on farm and purchased) and fertilizers
6. Value of insecticides and fungicides.
7. Irrigation charges
8. Land revenue and other taxes
9. Depreciation
10. Interest on the working capital.
11. Miscellaneous expenses (wages of artisans, and repairs to small farm implements)

Cost A₂ = Cost A₁ + rent paid for Leased-in Land.

Cost B₁ = Cost A₁ + interest on value of Owned Capital assets (excluding land)

Cost B₂ = Cost B₁ + rental value of owned land + rent for leased in land

Cost C₁ = Cost B₁ + imputed value of Family Labour.

Cost C₂ = Cost B₂ + imputed value of Family labour.

Cost C₃ = Cost C₂ + 10 percent of cost C₂ as managerial cost

• Interest on working capital

It was calculated @ 4% per annum for half of the crop period.

• Interest on fixed capital

It was calculated @ 10% per annum for the crop period.

• Rental value of owned land

It was calculated based on the prevailing rates in the sampled villages.

• Depreciation

It represents the value by which a farm resource decreased in value as a result of cause other than a change in general price of the item. Straight line method was used for calculating the depreciation:

$$\text{Depreciation} = \frac{\text{Purchase value of the asset} - \text{Junk value}}{\text{No. of useful years of life (expected life)}}$$

Input: output ratio:

It is ratio between input and output and computed by dividing value of total output by value of total input.

Input output ratio = O/I

Where,

I = Total input and

O = Total output

Results and Discussion

Growth rate in area, production and productivity of potato

Growth rate in area, production and productivity of potato in Bilaspur district, different agro climatic zones and Chhattisgarh state is presented in table. It can be clearly seen from the table that compound growth rate in area and production of potato was found significantly positive in all the three agro climatic zones as well as Chhattisgarh state. Compound growth rate in area of potato in Bilaspur district was also found positive and significant. Being 39.92 and 34.19 percentage growth rate in area and production of potato respectively; Bastar plateau shown a drastic increase in compound growth rate of potato. Growth rate in area, production and productivity of potato in Chhattisgarh state was found positive being 9.01, 10.93 and 1.76 per cent per annum.

Table 1: Compound growth rate in area, production and productivity of potato

S. No	Region	Compound growth rate		
		Area	Production	Productivity
1	Bilaspur District	19.48**	12.20	-6.09
2	Chhattisgarh Plains	13.76**	13.85**	0.08
3	Bastar Plateu	39.92**	34.19*	-4.09
4	Northern hills	4.04*	7.93*	3.74
5	Chhattisgarh state	9.01**	10.93**	1.76

Note: ** Significant at 1% level of significance

* Significant at 5% level of significance

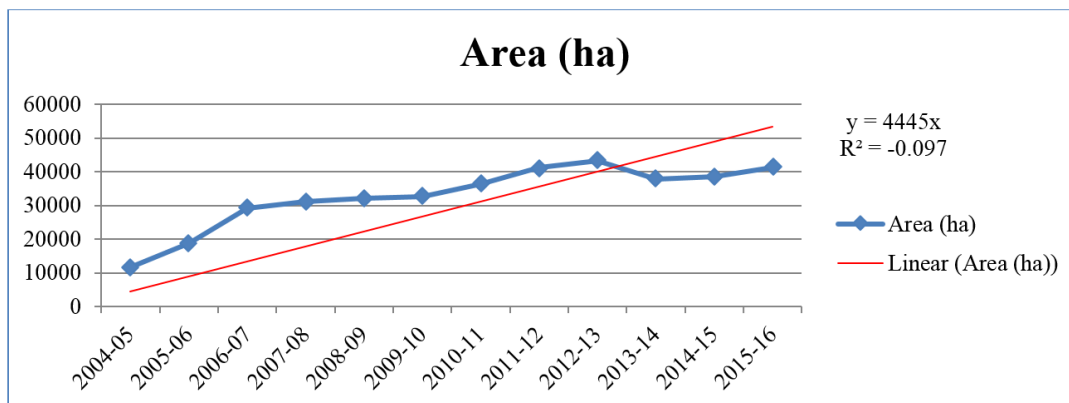


Fig 1: Trend in area of potato in Chhattisgarh

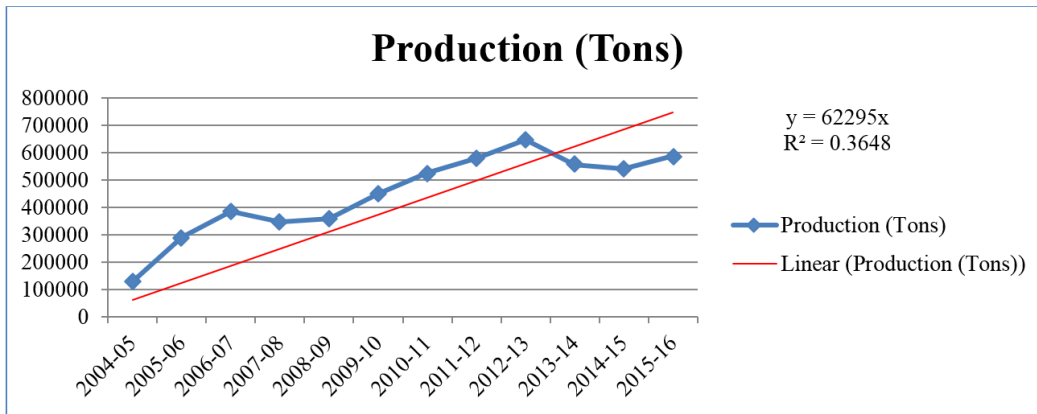


Fig 2: Trend in production of potato in Chhattisgarh

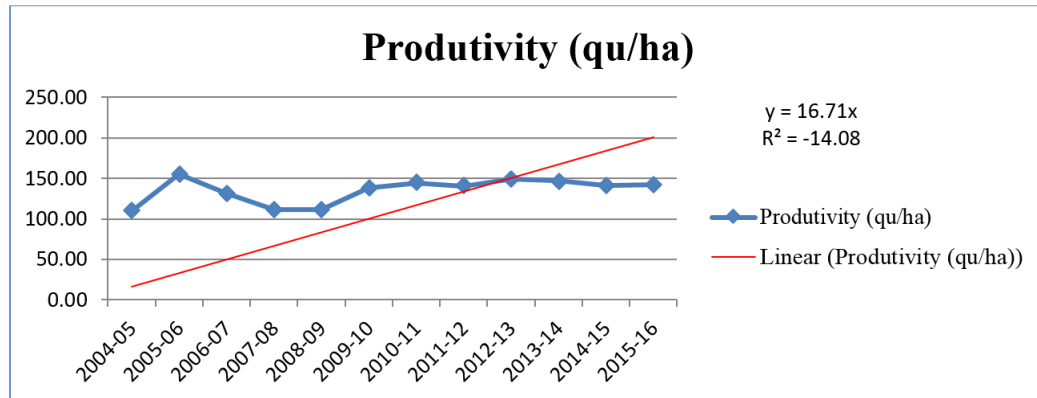


Fig 3: Trend in productivity of potato in Chhattisgarh

Input wise cost of cultivation of potato

Table 2 clearly shows input wise cost of cultivation of potato per hectare which is highest in case of large farms and lowest in case of small farms. Cost of cultivation showed increasing trend from marginal to large farmers. It is due to the fact that large farmers could incur more expenditure on modern farm inputs like quality seed, fertilizers, plant protection chemicals, hired labours etc. Average cost of cultivation of potato was

found Rs 75839.72. The major share of cost among different cost items were found in seed which accounts 37.65 per cent to the total cost of cultivation. Rental value of owned land contributed 23.73 and total labour cost (human, machine and bullock) contributed 23.22 percent to the total cost of cultivation. Contribution of variable cost and fixed cost in the total cost of cultivation was found 73.98 and 26.02 per cent respectively.

Table 2: Input wise cost of cultivation of potato (Rs/ha.)

S. No.	Particulars	Marginal Farms	Small Farms	Medium farms	Large farms	Overall
A	Input Cost					
1	Human labour					
	a) Family	8303.98(12.42)	7414.74(9.88)	4834.83(6.01)	2045.88(2.38)	5992.00(7.90)
	b) Hired	2711.03(4.05)	5055.45(6.74)	8599.77(10.69)	11896.44(13.84)	6457.58(8.51)
	Total human labour	11015.01(16.47)	12470.19(16.62)	13434.60(16.69)	13942.32(16.22)	12449.59(16.42)
2	Bullock and Machinery					
	a) Family	475.97(0.71)	996.79(1.33)	1445.54(1.80)	2275.28(2.65)	1183.58(1.56)
	b) Hired	3734.90(5.59)	4022.82(5.36)	3970.60(4.93)	4288.59(4.99)	3974.63(5.24)
3	Total machine and bullock labour	4210.86(6.30)	5019.61(6.69)	5416.13(6.73)	6563.88(7.64)	5158.21(6.80)
4	Total labour cost	15225.87(22.77)	17489.80(23.31)	18850.74(23.42)	20506.20(23.86)	17607.79(23.22)
5	Seed	24621.55(36.82)	28525.10(38.02)	30623.63(38.05)	32185.78(37.45)	28555.64(37.65)
6	Manure and Fertilizer	5488.72(8.21)	6612.07(8.81)	7488.75(9.31)	8289.28(9.64)	6798.60(8.96)
7	Plant protection	1413.76(2.11)	1864.55(2.49)	2210.79(2.75)	2564.56(2.98)	1942.92(2.56)
8	Irrigation Charges	681.41(1.02)	721.41(0.96)	723.08(0.90)	745.67(0.87)	714.58(0.94)
9	Interest on working capital	386.51(0.58)	468.01(0.62)	536.17(0.67)	599.70(0.70)	484.44(0.64)
	Sub total	47817.84(71.51)	55680.95(74.21)	60433.15(75.09)	64891.18(75.50)	56103.97(73.98)
B	Fixed Cost					
10	Land revenue & taxes	12.00(0.02)	12.00(0.02)	12.00(0.01)	12.00(0.01)	12.00(0.02)
11	Interest on fixed capital	906.98(1.36)	921.33(1.23)	954.49(1.19)	1002.84(1.17)	939.80(1.24)
12	Depreciation	127.52(0.19)	414.66(0.55)	1077.71(1.34)	2044.83(2.38)	783.95(1.03)
13	Rental value of land	18000.00(26.92)	18000.00(23.99)	18000.00(22.37)	18000.00(20.94)	18000.00(23.73)
	Sub total	19046.49(28.49)	19347.99(25.79)	20044.19(24.91)	21059.68(24.50)	19735.75(26.02)
C	Total cost (A+B)	66864.33(100.00)	75028.94(100.00)	80477.35(100.00)	85950.85(100.00)	75839.72(100.00)

Note: Figures in the parenthesis represent percentage to the total cost

Cost concepts in potato among various categories of farms

Table 3 portrays the cost concept of potato among different farm categories. Cost A₁ and Cost A₂ are same among all the farm categories because no respondent was found cultivating leased in land. On an average cost A₁, cost A₂, cost B₁, cost B₂, cost C₁, cost C₂ and cost C₃ was found Rs 50907.92,

50907.92, 51847.72, 69847.72, 57839.72, 75839.72 and 83423.69 respectively. It was noted that Rs 18000 was the prevailing rental value of land in the study area. Cost A₁ is showing increasing trend from marginal to large farms because of more use of hired labour, plant protection chemicals, improved varieties, manure and fertilizers etc.

Table 3: Cost concepts in potato among various categories of farms (Rs/ha.)

S.N.	Category	Marginal	Small	Medium	Large	Overall
1	Cost A ₁	39653.38	48692.87	56688.03	64902.13	50907.92
2	Cost A ₂	39653.38	48692.87	56688.03	64902.13	50907.92
3	Cost B ₁	40560.35	49614.2	57642.51	65904.97	51847.72
4	Cost B ₂	58560.35	67614.2	75642.51	83904.97	69847.72
5	Cost C ₁	48864.33	57028.94	62477.35	68180.25	57839.72
6	Cost C ₂	66864.33	75028.94	80477.35	85950.85	75839.72
7	Cost C ₃	73550.76	82531.84	88525.08	94545.94	83423.69

Net returns per rupee of the investment

Net returns per rupee of the investment for each category have been presented in table 4. Net returns per rupee of the investment for each category have been presented in table 4. Input output ratio was 1:1.59 in case of medium farmers

which was highest among all the categories of farms. Input output ratio in marginal small and large farms was found 1:1.58, 1:1.56 and 1:1.54 respectively. Overall input output ratio was found 1:1.57 in potato crop.

Table 4: Net Returns per Rupee of Investment by size of farms in potato crop.

S. No	Category	Input (Rs)	Output (Rs)	Input : Output Ratio
1	Marginal farms	66864.33	105778.79	1.58
2	Small farms	75028.94	116758.17	1.56
3	Medium farms	80477.35	127765.13	1.59
4	Large farms	85950.85	132471.72	1.54
5	Overall	75839.72	119044.26	1.57

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