



## An economics analysis of chilli in Raigarh district of Chhattisgarh state in India

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### Abstract

The present study conducted with the analysis of growth rate in area, production and productivity of major spices in Raigarh district and Chhattisgarh state. The 3 blocks in Raigarh district which Lailunga, Baramkela and Pusaur blocks were selected for study. Out of the selected blocks total 20 villages were selected purposively for fulfillment of the objectives of study. Total sample of 80 farmers were selected randomly. Further, the respondents were categorized under marginal, small, medium and large spices growers. The overall gross return is observed as Rs. 234314.09 per hectare in the study area which ranges from Rs. 208892 per hectare at marginal farms, to Rs. 279180 per hectare at large farms. The per quintal cost of production, on an overall, is worked out as Rs. 935.59. The per quintal cost of production of chilli is estimated as Rs. 982.40, Rs. 961.97, Rs. 915.14, and Rs.860.30 at shows that per quintal cost of production is decreasing marginal, small, medium and large farm respectively. The overall input-output ratio is observed as 1:2.51 and it varied from 1:2.39 at marginal farms to 1:2.73 at large farms.

**Keywords:** Gross returns, net returns, B: C ratio, input-output ratio

### Introduction

Chilli (*Capsicum* spp.) is one of the most important commercial spice and vegetable crops cultivated worldwide. It belongs to the family Solanaceae and is native to Central and South America. After its introduction to Asia by Portuguese traders during the 16th century, chilli became an integral component of Indian agriculture, cuisine, and trade. India is currently one of the largest producers, consumers, and exporters of chillies in the world.

Botanically, chilli is classified under the genus *Capsicum*, with major cultivated species including *Capsicum annum*, *Capsicum frutescens*, and *Capsicum chinense*. The crop is predominantly self-pollinated but shows a certain degree of cross-pollination due to insect activity. It is grown under both tropical and subtropical climates and adapts well to diverse agro-climatic conditions.

Chilli fruits are valued for their pungency, colour, flavour, and nutritional properties. The pungency is due to the presence of capsaicin, an alkaloid compound concentrated in the placenta of the fruit. Besides capsaicin, chillies are rich in vitamins A, C, and E, carotenoids, and antioxidants. These biochemical constituents make chilli not only an essential spice crop but also significant in pharmaceutical and food processing industries.

Economically, chilli plays a vital role in improving farmers' income due to its high market demand in domestic and export markets. It is used in fresh, dried, powdered, and processed forms. In India, major chilli-producing states include Andhra Pradesh, Telangana, Karnataka, Maharashtra, Madhya Pradesh, and Chhattisgarh.

### Methodology

Sampling technique of Raigarh district of Chhattisgarh was purposively chosen as the study area because, it has the larger area under chilli cultivation in the district. A multistage simple random sampling technique (SRS) was adopted to select the villages and the respondents, different farmer involved in chilli production and marketing in Raigarh district.

### Collection of data

#### Primary Data Collection

The primary data was collected from the selected major spices growers through personal interview method with the help of well-designed questionnaire and schedule on different aspects to fulfil the objectives of the study. The primary data was pertaining for the agricultural year 2020-21.

#### Period of enquiry

The detail enquiry was done for the agricultural year 2021-22.

#### Analytical Procedures

The stated objectives of this study are fulfilled through tabulation and analysis of the data pertaining to study. To work out the cost of cultivation simple arithmetic and statistical techniques of analyses *viz.* average, percentage and standard methods of cost of cultivation were adopted to fulfill the objectives of the study.

#### Costs and returns of major spices cultivation

Despite the costs & return was worked out by old concepts, a standard method of cost of cultivation of major spices was also used. This method is accepted by The Commission of Agricultural Costs and Prices (CACP). Under this method, the cost of cultivation was computed by using the 7 Cost concepts, which are known as cost A<sub>1</sub>, cost A<sub>2</sub> cost B<sub>1</sub>, cost B<sub>2</sub> and cost C<sub>1</sub>, cost C<sub>2</sub>, and cost C<sub>3</sub>.

#### Cost A<sub>1</sub>: Consist of following 16 items of costs

1. Value of hired human labour (permanent and casual)
2. Value of owned bullock labour
3. Value of hired bullock labour
4. Value of owned machinery
5. Hired machinery charged
6. Value of fertilizers
7. Value of manure (produced on farm and purchased)

8. Value of seed (both farm-produced and purchased)
9. Value of insecticides and fungicides.
10. Irrigation charges (both of the owned and hired tube wells, pumping sets etc.)
11. canal-water charges
12. Land revenue, cesses and other taxes
13. Depreciation on farm implements (both of the bullock drawn and worked with human labour)
14. Depreciation on farm building, farm machinery.
15. Interest on the working capital.
16. Miscellaneous expenses (wages of artisans, and repairs to small farm implements)

Cost A<sub>2</sub> = Cost A<sub>1</sub> + 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 per cent of cost C<sub>2</sub> taking as managerial allowances.

#### Income over different cost

Income over cost A<sub>1</sub> = Gross Return – Cost A<sub>1</sub>

Income over cost A<sub>2</sub> = Gross Return – Cost A<sub>2</sub>

Income over cost B<sub>1</sub> = Gross Return – Cost B<sub>1</sub>

Income over cost B<sub>2</sub> = Gross Return – Cost B<sub>2</sub>

Income over cost C<sub>1</sub> = Gross Return – Cost C<sub>1</sub>

Income over cost C<sub>2</sub> = Gross Return – Cost C<sub>2</sub>

Income over cost C<sub>3</sub> = Gross Return – Cost C<sub>3</sub>

#### Net income

It is the difference between total return and total expenses.

So,

Net income = Gross income - Total expenses

#### Input – output ratio

It is the ratio of input and output, which is an under

Input - Output Ratio = Value of output / Value of input used

#### Cost of production per quintal

It is a total cost of cultivation divided by production of major spices. It is mentioned as Cost of production (Rs/q) = Total cost of cultivation / Production (output)

#### Economics of major spices production

##### 1. Economics of chilli crop

The economics of chilli crop is presented in table 1. It clearly shows that the cost of cultivation per hectare of chilli was higher on large farms as compared to marginal farms. Over all, on an average the cost of cultivation per hectare of chilli was found to be Rs. 93286.40 per hectare. The cost of cultivation in case of large farm was higher (Rs.102203.53/ha.) as compared to marginal farms (Rs. 87158.97 /ha.), small (Rs.91771.96 /ha.) and medium farms (Rs. 97105.74 /ha.).

The cost of cultivation per hectare showed a rising trend with the increase in size of farm. It was due to the fact that the large farmers incurred more expenditure on modern farm inputs like quality seed, fertilizer, plant protection material, hired labour etc. as a result of borrowing from credit institutions and better economic status compared to marginal, small and medium farmers. The higher expenditure returns into higher yield and returns on large farms as compare to others.

**Table 1:** Costs of Chilli on different farm size

Particulars	Marginal	Small	Medium	Large	Overall
<b>A. Material cost</b>					
1. Seed	3652.72 (4.19)	4230.02 (4.61)	4890.09 (5.04)	5598.6 (5.48)	4429.99 (4.75)
2. Manures and fertilizer	6988.61 (8.02)	7686.12 (8.38)	8469.14 (8.72)	8743.97 (8.56)	7813.31 (8.38)
3. Plant protection	3244.8 (3.72)	3497.8 (3.81)	3793 (3.91)	4160.95 (4.07)	3598.43 (3.86)
4. Irrigation charges	2562.3 (2.94)	2760.83 (3.01)	2863.67 (2.95)	2935.58 (2.87)	2750.84 (2.95)
Total material cost	16448.43 (18.87)	18174.77 (19.80)	20015.90 (20.61)	21439.10 (20.98)	18592.56 (19.93)
<b>B. Human labour cost</b>					
1. Family labour	9877.64 (11.33)	7573.24 (8.25)	5822.01 (6.00)	2856.43 (2.79)	7080.61 (7.59)
2. Hired labour	45885.46 (52.65)	50212.79 (54.71)	54703.69 (56.33)	60167.76 (58.87)	51569.10 (55.28)
Total human labour cost	55763.10 (63.98)	57786.03 (62.97)	60525.70 (62.33)	63024.19 (61.67)	58649.71 (62.87)
<b>C. Power use cost</b>					
1. Bullock labour	1603 (1.84)	1032.04 (1.12)	0 (0.00)	0 (0.00)	823.45 (0.88)
2. Machine power	1333.33 (1.53)	2013.47 (2.19)	3246.13 (3.34)	3609.58 (3.53)	2331.32 (2.50)
Total power use cost	2936.33 (3.37)	3045.51 (3.32)	3246.13 (3.34)	3609.58 (3.53)	3154.77 (3.38)
Interest on working capital	1305.4 (1.50)	1428.66 (1.56)	1559.31 (1.61)	1704.32 (1.67)	1466.32 (1.57)
(I). Total variable cost	76453.26 (87.72)	80434.97 (87.65)	85347.04 (87.89)	89777.19 (87.84)	81863.37 (87.75)
<b>D. Fixed cost</b>					

1. Depreciation	222.01	794.09	1178.37	1784.4	873.05
	(0.25)	(0.87)	(1.21)	(1.75)	(0.94)
2. Land revenue	12	12	12	12	12.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
3. Rental value of land	9500	9500	9500	9500	9500.00
	(10.90)	(10.35)	(9.78)	(9.30)	(10.18)
4. Interest fixed capital	971.7	1030.9	1068.33	1129.94	1037.99
	(1.11)	(1.12)	(1.10)	(1.11)	(1.11)
(II).Total fixed Cost	10705.71	11336.99	11758.70	12426.34	11423.04
	(12.28)	(12.35)	(12.11)	(12.16)	(12.25)
Total cost (A+B+C+D)	87158.97	91771.96	97105.74	102203.53	93286.40
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses indicate percentages of the total cost

Among different input operation on an overall, the per hectare cost was observed highest for total human labour Rs. 58649.71 followed by manures and fertilizer Rs. 7813.31, seed Rs. 4429.99, plant protection Rs. 3598.43, irrigation Rs. 2750.84, Machine power Rs. 2331.32, Depreciation Rs. 873.05, Bullock labour Rs. 823.45, and land revenue Rs.12.

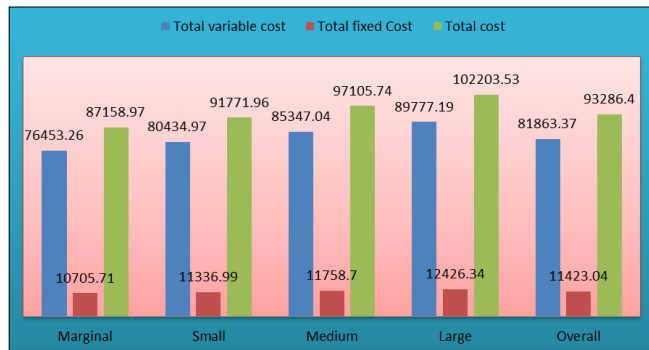


Fig 1: Different costs of Chilli on different farm size

## 2. Yield and cost of production per quintal

The yield, value of output per hectare and cost of production per quintal of chilli on the sample farms have been worked out in table 2.

An overall yield per hectare of chilli came to 99.71 quintals on the sample farms per hectare which ranges from 88.72 quintal per hectare at marginal farms to 118.8 quintal per hectare at large farms. The per quintal cost of production, on an overall, is worked out as Rs. 935.59. The per quintal cost of production of chilli is estimated as Rs. 982.40, Rs. 961.97, Rs. 915.14, and Rs.860.30 at shows that per quintal cost of production is decreasing marginal, small, medium and large farm respectively.

It decreased with the increased in the size of farms due to higher yield in return to the cost of cultivation on the large farms. The overall value of output per hectare come to Rs. 234314.09 the value of output per hectare come to Rs. 208892, Rs. 224190, Rs. 249358.50, and Rs. 279180 on marginal, small, medium and large farms respectively. The higher value of output on large farms was associated with the higher expenditure incurred on modern farm inputs.

Table 2: Per hectare yield, value of output and cost of production per quintal of Chilli

Particulars	Marginal	Small	Medium	Large	Overall
1. Average yield (qtl/ha)	88.72	95.4	106.11	118.8	99.71
2. Average price (Rs./qtl)	2350	2350	2350	2350	2350
3. Gross returns (Rs./ha)	208492.00	224190.00	249358.50	279180.00	234314.09
4. Cost of cultivation (Rs./ha)	87158.97	91771.96	97105.74	102203.53	93286.40
5. Net returns (Rs./ha)	121333.03	132418.04	152252.76	176976.47	141027.69
6. Cost of production (Rs./qtl.)	982.40	961.97	915.14	860.30	935.59
7. Input output ratio	1:2.39	1:2.44	1:2.57	1:2.73	1:2.51

## 3. Measures of farm profit

The overall gross return is observed as Rs. 234314.09 per hectare in the study area which ranges from Rs. 208892 per hectare at marginal farms, to Rs. 279180 per hectare at large farms. The gross return depends upon variety, productivity and price received by the farmers. The overall net return is observed as Rs. 141027.69 per hectare. It is estimated as Rs. 121333.03 per hectare, Rs. 132418.04 per hectare, Rs. 152252.76 per hectare and Rs. 176976.47 per hectare at marginal, small, medium and large farms respectively. The overall input-output ratio is observed as 1:2.51 and it varied from 1:2.39 at marginal farms to 1:2.73 at large farms.

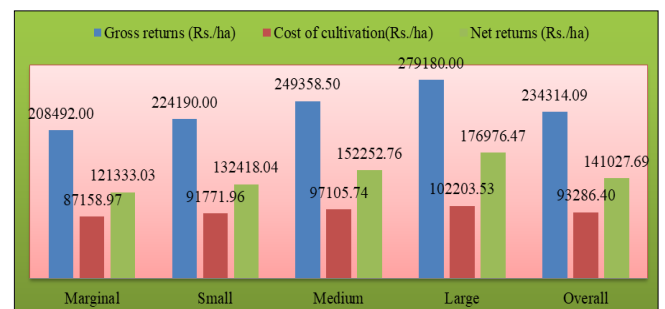


Fig 2: Per hectare cost and returns of Chilli crop

Table 3: Break-up of total cost, and income obtained over different cost of Chilli cultivation (Rs/ha)

Particulars	Marginal	Small	Medium	Large	Overall
Break-up of costs					
Cost A <sub>1</sub>	66809.63	73667.82	80715.40	88717.16	75667.81
Cost A <sub>2</sub>	66809.63	73667.82	80715.40	88717.16	75667.81
Cost B <sub>1</sub>	67781.33	74698.72	81783.73	89847.10	76705.80
Cost B <sub>2</sub>	77281.33	84198.72	91283.73	99347.10	86205.80

Cost C <sub>1</sub>	77658.97	82271.96	87605.74	92703.53	83786.40
Cost C <sub>2</sub>	87158.97	91771.96	97105.74	102203.53	93286.40
Cost C <sub>3</sub>	95874.87	100949.16	106816.31	112423.88	102615.04
Return obtained over different costs					
Return over cost A <sub>1</sub>	141682.37	150522.18	168643.10	190462.84	158646.29
Return over cost A <sub>2</sub>	141682.37	150522.18	168643.10	190462.84	158646.29
Return over cost B <sub>1</sub>	140710.67	149491.28	167574.77	189332.90	157608.30
Return over cost B <sub>2</sub>	131210.67	139991.28	158074.77	179832.90	148108.30
Return over cost C <sub>1</sub>	130833.03	141918.04	161752.76	186476.47	150527.69
Return over cost C <sub>2</sub>	121333.03	132418.04	152252.76	176976.47	141027.69
Return over cost C <sub>3</sub>	112617.13	123240.84	142542.19	166756.12	131699.05

### Suggestions for Chilli Research and Development

Chilli (*Capsicum* spp.) research should focus on developing high-yielding, disease- and pest-resistant varieties adapted to diverse agro-climatic conditions. Breeding programs must prioritize resistance to leaf curl virus, anthracnose, and thrips, along with improvement in quality traits such as capsaicin content and colour value. Promotion of hybrid technology and molecular breeding tools can accelerate varietal development. Integrated pest management (IPM) strategies should be strengthened to minimize excessive pesticide use and encourage eco-friendly approaches, including biocontrol agents. Site-specific nutrient management and balanced fertilization must be standardized to enhance productivity and fruit quality. Adoption of drip irrigation and fertigation techniques can improve water-use efficiency and reduce input costs.

Climate-resilient technologies, including drought- and heat-tolerant cultivars and protected cultivation, should be promoted to mitigate climate variability. Research on post-harvest handling, improved drying methods, and value addition such as oleoresin extraction is essential to reduce losses and increase farmers' income. Finally, strengthening farmer organizations, market linkages, and export promotion policies will ensure sustainable growth of the chilli sector.

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