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An economic analysis of production of chilli (*Capsicum annum L.*) in Raigarh district of Chhattisgarh

Reena Hota and Jaimangal Tirkey

Abstract

The richness of the culture and the fragrance of the spices were the major sources of glory of the ancient India. Species is an important crop grown in Raigarh district of Chhattisgarh. The aim of present study is to assess the cost, returns and growth rate of chilli production in different size of farm. A sample of 75 chilli growers were selected from 1 block of Raigarh district. Comprises of three size groups, cost of cultivation, compound growth rate, marketable surplus technique was used to analysis the collected data. The study reviews growth on area, production and productivity of chilli, over the study period (2007-08 to 2016-17), Area production and productivity of chilli in Raigarh district was found significant. Area and production of Chhattisgarh state was found significant. An overall the cost of cultivation per hectare of chilli was calculated as Rs. 93724.87. The cost of cultivation per hectare showed rising trend with the rise in farm size. An overall input-output ratio of chilli came to 1:2.53 on the sample farms. The overall gross return of chilli is estimate as Rs. 289867.56.70 per hectare.

Keywords: Cost, returns and growth, production, rate of area production in chilli crop

Introduction

India is known as the 'The home of spices'. There is no other country in the world that produces as many kinds of spices as India. The climate of the country is suitable for almost all spices. Spices constitute an important group of agricultural commodities which are virtually indispensable in the culinary art. In India, spices are important commercial crops from both domestic consumption and export point of view.

In 2015-16 the total spices area in India is (3,075.5 ha.), Chilli occupies major area (7,91,930 ha.), Chilli rank first (7,91,930 ha), and the production of 13,76,400 tones. In total production of spices followed by other important spices crop like turmeric (20.14%), Ginger (11.09%), Cumin (8.70%), Coriander (5.13%), Rajasthan (7,206 ha.) highest area under growing on spices crops and highest production of Andhra Pradesh (1,187.7 million tonnes) in India.

Chhattisgarh is an agricultural chief land and due to large production of rice, it is known as the "Rice Bowl". The total area under spice is 90174 hectare 3 in the Chhattisgarh state with a production of 617591 metric tons. Highest area under growing chilli (35,499 ha.). Chilli gives the highest production 29,145 metric tons, The total area of spices in Raigarh district is 10,219 ha. And production is 71,910 metric tons. (Directorate of Horticulture, C.G. Raipur, 2015-16).

Martials and Methods

Raigarh district having 9 blocks namely Dharamjaigarh, Gharghoda, Kharsia, Lailunga, Pussore, Raigarh, Baramkela, Sarangarh, and Tamnar. Out of these nine blocks of Raigarh district one blocks namely Pussore was selected purposively for the study because of highest cultivation of spices. 13 villages were selected randomly from pussore block namely Tribhana, Linjir, Loharsingh, Kensara, Ruchida, Thakurpali, Tinmini, Putkapuri, Basanapali, Bulanki, Baradoli, Ghughwa and Semra. A sample of 75 respondents were selected by using probability proportional to size techniques method subject to condition that at least 10 respondents would be included on sample from each of the three categories of farms i.e. small (up to 2 ha.), medium (>2 to 4 ha.) and large farmer (above 4 ha.). The collection of data for the present study was made from the agriculture year 2016-17 as per procedure already mentioned earlier to fulfil the requirements of the objective.

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Computation of compound growth rate

For computing the growth rate following formula were used.

$$Y = aB^t$$

$$\log Y = \log a + t \log B$$

Assuming,

$$\log Y = Y$$

$$\log a = a$$

$$\log B = b$$

So we get,

$$Y = a + bt$$

For,

(Time variable, $t = 1, 2, 3, 4 \dots n$)

$a =$ Constant

$b =$ Coefficient of t

After regression between Y and t we have value of a and b

As

$$b = 1 + r$$

Hence, $r = b - 1$

$R =$ compound growth rate

Therefore,

$$R = (\text{anti-log } b - 1) * 100$$

$t =$ Time variable ($t = 1, 2, 3 \dots n$)

$b =$ Regression coefficient

$Y =$ Area / Production / Productivity

Cost of Cultivation of chilli Crop

To estimate the cost of cultivation of chilli crop whole cost is divided in to two heads i.e. variable cost and fixed cost. The various cost components like human labour, bullock and machine power, manure and fertilizer, seed, irrigation, plant protection material and chemicals are taken in to consideration in order to work out the per hectare variable cost of cultivation. The interest on working capital involved in the cultivation is also computed at the prevailing rate of interest. The cost of cultivation is estimated by using simple mathematical analysis.

To work out the cost of cultivation standard method of were adopted. Which includes cost A_1 , B_1 and C_1 .

Cost A1: Consist of following 15 items of costs

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

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

Cost $A_2 =$ Cost $A_1 +$ Rent paid for Leased in Land.

Cost $B_1 =$ Cost $A_1 +$ Interest on value of Owned fixed Capital assets (excluding land)

Cost $B_2 =$ Cost $B_1 +$ rental value of owned land (Net of land revenue) and rent paid for leased-in land.

Cost $C_1 =$ Cost $B_1 +$ Imputed value of family labour.

Cost $C_2 =$ Cost $B_2 +$ Imputed value of family labour.

Cost $C_3 =$ Cost $C_2 +$ Value of management input at 10% of Cost C_2 .

Income over cost $A_1 =$ Output Value – Cost A_1

Income over cost $A_2 =$ Output Value – Cost A_2

Income over cost $B_2 =$ Output Value – Cost B_1

Income over cost $B_2 =$ Output Value – Cost B_2

Income over cost $C_1 =$ Output Value – Cost C_1

Income over cost $C_2 =$ Output Value – Cost C_2

Income over cost $C_3 =$ Output Value – Cost C_3

Measures of Comparison

The following measures of comparison have been adopted:

- a. Cost of cultivation per hectare.
- b. Net income per hectare.
- c. Cost of production per quintal.
- d. Material cost per hectare.
- e. Input-output ratio.
- f. Income analysis.

a. Cost of Cultivation per hectare

Cost of cultivation per hectare at the different cost concepts has been worked out for the sample holdings. It is worked out by dividing the total cost by the area under the crops.

b. Net Income per hectare

Net income per hectare at the different cost concepts has been worked out by deducting the respective costs from the gross monetary returns per hectare.

c. Material cost per hectare

Material cost concept has been introduced recently. Material cost includes seeds, manures, fertilizers, irrigation and plant protection chemicals etc.

d. Cost of production per quintal

The average cost of production per quintal has been worked out by dividing the cost (i.e. Cost A_1 , Cost B_1 and Cost C_1 , respectively) by total output.

e. Input-Output ratio

Input-output ratio indicates the efficiency of input. It is computed as under:

$$\text{Input-output ratio} = \text{Gross return} \div \text{Total input cost}$$

Marketable Surplus

$$MS = P - (C + C_f + W + S)$$

Where,

MS = Marketable surplus

P = Total production

C = Family consumption

C_f = Quantity used for cattle feed

W = Quantity use for wage

S = Quantity kept for seed purpose

Results and Discussion

1. Demographic features of the Chilli growers

Table 1 represents the demographic features of farm families, family size and level of education at the sampled farms in the study area. The table reveals that the average number of family size of spice growers is observed as 5.72. This size is estimated as 4.76, 5.8 and 6.34 at small, medium and large farms respectively. The overall male-female ratio is 53.37:46.62 per cent in the total population. The level of education in the sampled household in terms of percentage is found to be 92.5 per cent on an average.

Table 1: Demographic feature of the sampled farms in the study area

S. N.	Particular	Small	Medium	Large	Overall
1.	No. of sample	25 (100)	25 (100)	25 (100)	75 (100)
2.	No. of family member				
	Male	67(56.3)	73 (49.65)	89 (53.94)	229 (53.37)
	Female	52(43.69)	72 (48.97)	76 (46.06)	200 (46.62)
	Total	119(100)	145 (100.00)	165 (100.00)	429 (100)
3.	Average family size	4.76	5.8	6.34	5.72
4.	Age				
	<14	35 (29.41)	36 (24.82)	37 (22.42)	108 (25.17)
	14-60	75 (63.02)	98(67.58)	115(69.69)	288 (67.13)
	>60	9 (7.5)	11(7.58)	13(7.87)	33(7.69)
5.	Education level				
	Illiterate	14 (11.7)	9(6.20)	9 (5.45)	32 (7.45)
	Primary	33 (27.23)	40(27.58)	38(23.03)	111 (25.87)
	Middle	28 (23.52)	36(24.82)	45(27.27)	109 (25.40)
	High School	19 (15.94)	24(16.55)	25(15.15)	68 (15.85)
	H.S.S	20 (16.80)	18(12.41)	20(12.12)	58 (13.51)
	Graduate	3 (2.52)	9(6.20)	20(12.12)	32 (7.45)
	Post-Graduation	2 (1.68)	9(6.20)	8(4.84)	19 (4.42)
	Total literate	105 (88.23)	136(93.79)	156(94.54)	397 (92.5)
6.	Social groups				
	OBC	20 (26.66)*	23(15.33)*	24(16.00)*	67 (89.33)*
	ST	1 (1.33)*	2(1.33)*	2(1.33)*	5 (6.66)*
	SC	1 (1.33)*	1 (1.33)*	-	2 (2.66)*
	General	-	1 (1.33)*	-	1 (1.33)*
7.	Occupation				
	Farming	78 (65.5)	96(66.20)	107(64.84)	281 (65.50)
	Business	1 (0.84)	2(1.37)	3(1.81)	6 (1.39)
	Service	1 (0.84)	2(1.37)	2(1.21)	5 (1.165)
	School & college going	13 (25.21)	45(31.03)	53(32.12)	111 (29.88)
	Agriculture labour	9 (7.5)	-	-	9 (2.09)

Note 1: Figures in the parenthesis indicate percentage to the total number of family members.

Note 2: *Figures in the parenthesis represent percentage to the total number of samples

It is observed that 25.87 per cent of the total sampled populations have primary level of education while these figures are 25.40 per cent, 15.85 per cent, 13.51 per cent, 7.45 Per cent, and 4.42 per cent for middle, high school, higher secondary school, graduate and post-graduation level of education. Among various size groups of farms, highest literacy percentage (94.54 per cent) is observed at large farms followed by medium (93.79 per cent) and small farms (88.23 per cent). The table also reveals the caste and occupation pattern at the sampled farms. It is also observed that on an average 89.33 per cent of the sampled families belong to other backward class, 6.66 per cent belong to scheduled tribe, 2.66 per cent belong to scheduled caste, and 1.33 per cent belongs to general category. The occupation of farmers is also presented in the table 1.

2. Growth rate in area, production and productivity of chilli

Growth rate in area, production and productivity of chilli for Raigarh district and Chhattisgarh state is presented in table 2. Area production and productivity of chilli in Raigarh district was found significant. Area and production of Chhattisgarh state was found significant.

Table 2: Growth rate in area, production and productivity of chilli

S. No.	Region	Area (%)	Production (%)	Productivity (%)
1.	Raigarh	20.96*	45.61**	20.37*
2.	Chhattisgarh state	13.74**	16.93*	2.79

Note: ** Significant at 1%

* Significant at 5%

3. Constraints in production of Chilli.

The constraints in chilli cultivation have been presented in the table 3.

Table 3: Farmers perception on constraints in chilli cultivation

S. N.	Particulars	Chilli
1.	Scarcity of labour at the time of harvesting	33 (22.00)
2.	Infestation of insect- pest and diseases	47 (31.33)
3.	High cost of quality seed and pesticide	36 (24.00)
4.	Lack of good quality of seeds and rhizome	22 (14.66)
5.	High price of fertilizer	32 (21.33)
6.	Lack of latest technical know-how about spice production	19 (12.66)
7.	Lack of soil testing facility	28 (18.66)
8.	Imbalance use of fertilizer & pesticide	25 (16.66)

Note: Figure in parentheses indicate percentage of overall farmers.

Table 3 reveals the constraints faced by chilli growers. Under major constraints pertaining to cultivation of chilli. Shortage of labour was the major problem as reported by 69.33 per cent chilli growers. The second most important constraint faced by the growers was problem of insects, pests and diseases (66 per cent). The other most important constraints reported by the growers were high cost of quality seed and pesticide (57.33), lack of good quality of seeds and rhizome (52 per cent), high price of fertilizer (50.66), technical knowledge (50.00 per cent). The other constraints was lack of soil testing facility (42.66 per cent) and imbalance use of fertilizer & pesticide (28 per cent). Looking to the problem faced by the chilli grower it is pertinent to address these constraints. According use of low cost machine for vegetables and cultivation should be given on developing insect and pest tolerant varieties of chili. There is also need to impart training skills to the spice grower on production aspect through extension support such as on farm training, demonstration etc. credit support should made more affordable and accessible to the chilli grower in the region.

Conclusion

The average number of family size of chilli growers is 5.76, 5.8 and 6.34 at small, medium and large farms respectively. The overall male-female ratio is 53.37 and the level of education in the sampled household is 92.5%. The highest literacy percentage is observed at large farms, followed by medium and small farms. The caste and occupation pattern is also revealed, with 89.33% belonging to other backward classes, 6.66% to scheduled caste, and 1.33% to general category.

Spices growers faced major constraints such as shortage of labour, insects, pests and diseases, high cost of quality seed and pesticide, lack of good quality of seeds and rhizome, high price of fertilizer, technical knowledge, soil testing facility, and imbalance use of fertilizer & pesticide. To address these constraints, low cost machines should be used, training skills should be provided, and credit support should be made more affordable and accessible.

This study assessed the cost, returns and growth rate of chilli production in Raigarh district of Chhattisgarh over the 2007-08 to 2016-17 period. The cost of cultivation per hectare was calculated as Rs. 93724.87, with an input-output ratio of 1:2.53 and an overall gross return of Rs. 289867.56.

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