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## An economic of tomato (*Solanum lycopersicon*) in Durg district of Chhattisgarh

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### Abstract

Tomato has become one of the most popular and widely grown vegetables in the world. The present study is carried out in the year 2015-2016 to The study portrays that on an average cost of cultivation per hectare of tomato crop was found to ₹ 40573.97 (cost A<sub>1</sub>), ₹ 41164.70 (cost B<sub>1</sub>), ₹ 51164.70 (cost B<sub>2</sub>), ₹ 57823.21 (cost C<sub>1</sub>), ₹ 67823.21 (cost C<sub>2</sub>) and ₹ 74605.53 (cost C<sub>3</sub>) respectively. The average income over cost-A, cost-B, cost-C and cost C<sub>3</sub> were calculated as ₹ 155183.27, ₹ 144592.55, 127934.04 and ₹ 121151.74 ha<sup>-1</sup>, respectively.

**Keywords:** Tomato, cost, marketable surplus and marketed surplus

### Introduction

Tomato (*Solanum lycopersicon*) is the world's largest vegetable crop and known as protective food, both because of its special nutrient value and also because of its wide spread production. Tomato is one of the important vegetable crops cultivated for fleshy fruit. Tomato is also considered as "poor man's orange" in India. Tomato is considered as important commercial and dietary vegetable crop. Tomato is used in preserved product like ketchup, sauce, chutney, soup, paste, puree etc. It is an important cash-generating crop to small-scale farmers and provides employment in the production and processing industries.

In Chhattisgarh, it is grown in 50.38 thousand hectares area with the production of 814.22 thousand million tones and productivity is 16.2 tones ha<sup>-1</sup> (National Horticulture Board database, 2013-14) which hold 10<sup>th</sup> rank in the total tomato production in India. In Durg<sup>1</sup> district tomato is grown in 3785 ha with the production of 94663 million tones approx. and productivity is 25 tons ha<sup>-1</sup>.

<sup>1</sup>The study was conducted in Durg district of Chhattisgarh. Durg district is one of the densely populated districts of the Chhattisgarh state of India. Durg district is located in the west central part of Chhattisgarh State. Area of district Durg is 8535.00 Sq. Km. The total geographical area of the district is more than 2.32 lakh hectare. The district lies between 20°54' and 21°32' north latitude & 81°10' and 81°36' east longitude. District is 317 meters above mean sea level.

### Research Methodology

The respondents were classified into four categories viz. marginal (up to 1.0 Ha) small (> 1.0-2.0 Ha.), Medium (>2.0 – 4.0 Ha.) and large (>4.0 Ha.)

### Sources Data Collection

Both the primary and secondary data were collected for this study. Primary data have been collected from a total of 60 households those who have been selected by randomly from the three villages in population proportionate to sample size. The primary data was collected during the period of 2015-16 *Rabi* season.

### Methods of Data Collection

#### Primary Data

The data was collected using survey method. The data on different aspects was collected through pre-tested interview schedule. Each of the selected sample Tomato growers were approached personally for recording relevant data.

#### Secondary Data

The secondary data was collected from Directorate of Horticulture, Directorate of Land record, Directorate of Economics and Statistics, and annual horticultural statistics, Raipur Chhattisgarh.

The annual area, production and productivity of Tomato in Durg district is collected from Deputy Directorate of Horticulture Raipur, Chhattisgarh.

### Period of the Study

All the collected primary data was related to the agricultural year 2015-16 Rabi season.

### Cost Concepts

The cost of cultivation classified and recommended by "special expert committee on cost estimates, GOI, New Delhi" was used in this study. The Cost concepts are given Cost A<sub>1</sub>, A<sub>2</sub>, B<sub>1</sub>, B<sub>2</sub>, C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub>.

### Cost of production

It is the ratio of total cost incurred on tomato production and physical output obtained on sample farms.

### Profitability concepts

For estimation of profitability from Tomato, the following efficiency measures are used in this study:

- 1) Gross income
- 2) Net farm income
- 3) Input-output ratio

### These are defined as under:-

- i. Gross income: It is defined as: total value of main product + by-Product.
- ii. Net farm Income: It is defined as: gross income – cost 'C<sub>3</sub>'
- iii. Input – output ratio

$$\text{Input – output ratio} = \frac{\text{Gross income}}{\text{Cost of cultivation}}$$

### Result and Discussion

#### Cost of Cultivation of Tomato

The cost of cultivation of tomato under different sample farms was estimated in ₹ ha<sup>-1</sup>, which is presented in Table 1. It reveals that overall cost of cultivation of tomato was found to be ₹ 74605.53 ha<sup>-1</sup>. The maximum cost of cultivation of tomato was noticed to be in small farms (₹ 75469.50ha<sup>-1</sup>) followed by medium farms (₹ 74925.38 ha<sup>-1</sup>), large farms (₹ 74209.57 ha<sup>-1</sup>) and marginal farms (₹ 73817.07 ha<sup>-1</sup>).

An overall, input / material cost was accounted ₹ 18897.27 ha<sup>-1</sup> and shared 25.33 per cent to the total cost of cultivation of tomato. The share of input/material cost was noticed to be maximum under small farms (26.54%) and decreases with

increase in the size of farm holdings under medium (26.05%) and large (25.59%) farm and minimum under marginal farms (23.08%).

The share of human labour cost was noticed to be the maximum under marginal farms (46.21%) followed by small farms (41.41%), medium farms (39.92%) and large farms (39.57%). The overall expenditure on human labour cost was found to be 41.76 per cent.

The average cost on power use was accounted ₹ 3081.37 ha<sup>-1</sup>, was sharing only 4.13 per cent and bullock power use cost was noticed to be 0.91 per cent. It indicates that sample farms had used very small proportion of machine power for cultivation of tomato. The share of power use was varying from 3.69 to 4.33 per cent of different land holding farmers.

The fixed cost is comprised of land revenue, rental value of land, depreciation and interest on fixed assets. It indicated that average share of fixed cost was 16.62 per cent to the total cost of cultivation of tomato and the rental value of land itself contributed 13.40 per cent to the total fixed, irrespective to the farm size of holding. The fixed cost was ranging from 15.88 to 17.52 per cent of different size of land holding.

Thus, it could be concluded that average share of human labour was maximum (41.76%) to the total cost of cultivation of tomato followed by inputs/materials cost (25.33%), and fixed cost (16.62%) respectively.

### Cost concept

The cost and returns on the basis of cost concept in the production of tomato as presented in Table 2 portrays that on an average cost-A, cost-B, cost C and cost-C<sub>3</sub> were worked out to ₹ 40573.97 ₹ 51164.70, ₹ 67823.21 and ₹ 73605.53 ha<sup>-1</sup>, respectively on the sample farms. It was noted that ₹ 10000 were considered as imputed rental value of owned land for each crop season.

### Yield, value of output and cost of production (ha<sup>-1</sup>)

Average cost of production of tomato was worked out in ₹ Qt<sup>-1</sup> and found to be 323.94 irrespective to the farm size. While it was maximum under marginal farms (₹ 349.18) followed by small farms (₹ 337.67), medium farm (₹ 318.81) and large farms (₹ 295.30).

Input-output ratio can be termed as the return per rupee of investment. The input-output ratio was more favorable to large farm (1:2.87), followed by medium (1:2.66), small farm (1:2.51) and marginal farm (1:2.43). The cost of production per quintal varied from ₹ 295.30 to ₹ 349.18 with an average of ₹ 323.94. It can be said that the difference was not quite extra-ordinary between the different classes.

**Table 1:** Cost of cultivation of tomato on sample farm ( ₹ ha<sup>-1</sup>)

S. No.	Particulars	Marginal	Small	Medium	Large	Average
<b>A. Human Labour</b>						
a.	Family labour	29830.85 (40.41)	26188.49 (34.70)	6507.02 (8.68)	4107.67 (5.53)	16658.50 (22.33)
b.	Hired labour	4282.08 (5.80)	5066.14 (6.71)	23407.91 (31.24)	25246.33 (34.02)	14500.61 (19.43)
	Total Human Labour	34112.93 (46.21)	31254.63 (41.41)	29914.93 (39.92)	29354.00 (39.57)	31159.12 (41.76)
<b>B. Material cost</b>						
a.	Seed	3650.00 (4.94)	3371.62 (4.46)	3270.09 (4.36)	3194.60 (4.30)	3371.57 (4.52)
b.	FYM	2448.15 (3.32)	2390.47 (3.17)	2360.23 (3.15)	2329.91 (3.14)	2382.19 (3.19)
c.	Fertilizer	6230.91 (8.44)	6140.94 (8.14)	5981.44 (7.98)	5943.15 (8.01)	6074.11 (8.14)
d.	Plant protection	1711.15 (2.32)	1606.02 (2.12)	1511.07 (2.02)	1409.26 (1.90)	1559.37 (2.09)
e.	Staking	0.00 (0.00)	3560.61 (4.71)	3509.35 (4.68)	3481.84 (4.69)	2637.95 (3.54)
f.	Irrigation	3000.00 (4.06)	2973.73 (3.94)	2880.32 (3.84)	2634.22 (3.55)	2872.06 (3.85)
	Total Material cost	17040.21 (23.08)	20043.39 (26.54)	19512.50 (26.05)	18992.98 (25.59)	18897.27 (25.33)

C. Power cost						
a.	Bullock power	2724.50 (3.69)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	681.12 (0.91)
b.	Machine power	0.00 (0.00)	3200.05 (4.24)	3250.55 (4.33)	3150.40 (4.25)	2400.25 (3.22)
Total power cost		2724.50 (3.69)	3200.05 (4.24)	3250.55 (4.33)	3150.40 (4.25)	3081.37 (4.13)
Interest on working capital (12.5%)		1502.92 (2.04)	1769.34 (2.34)	2885.68 (3.85)	2961.37 (3.99)	2279.95 (3.05)
Total operational cost		55380.56 (75.02)	56267.36 (74.55)	55563.66 (74.15)	54458.75 (73.38)	55417.71 (74.28)
D. fixed cost						
a.	Rental value of land	10000.00 (13.54)	10000.00 (13.25)	10000.00 (13.34)	10000.00 (13.47)	10000.00 (13.40)
b.	Land revenue and irrigation cess	32.75 (0.04)	32.75 (0.04)	32.75 (0.04)	32.75 (0.04)	32.75 (0.04)
c.	Depreciation	1134.77 (1.54)	1720.85 (2.28)	1919.95 (2.56)	2352.49 (3.17)	1782.01 (2.38)
d.	Interest on fixed capital (10%p.a)	558.37 (0.76)	587.68 (0.68)	597.63 (0.80)	619.26 (0.84)	590.73 (0.79)
Total fixed		11725.89 (15.88)	12341.28 (16.35)	12550.33 (16.75)	13004.50 (17.52)	12405.50 (16.62)
Operational cost + fixed cost		67106.45 (90.91)	68608.64 (90.91)	68118.99 (90.91)	67463.25 (90.91)	67823.21 (90.91)
E. Managerial cost		6710.64 (9.09)	6860.86 (9.09)	6811.39 (9.09)	6746.32 (9.09)	6782.32 (9.09)
Total cost		73817.07 (100.00)	75469.50 (100.00)	74925.38 (100.00)	74209.57 (100.00)	74605.53 (100.00)

**Table 2:** Cost of cultivation of tomato according to cost concept on sample farms (₹ha<sup>-1</sup>).

S. No.	Cost	Size group				
		Marginal	Small	Medium	Large	Average
1	Cost A <sub>1</sub> and A <sub>2</sub>	26717.23	31832.52	51009.34	52736.32	40573.97
2	Cost B <sub>1</sub>	27275.60	32420.20	51606.97	53355.58	41164.70
3	Cost B <sub>2</sub>	37275.60	42420.20	61606.97	63355.58	51164.70
4	Cost C <sub>1</sub>	57106.45	58608.64	58113.99	57463.25	57823.21
5	Cost C <sub>2</sub>	67106.45	68608.64	68113.99	67463.25	67823.21
6	Cost C <sub>3</sub>	73817.09	75469.50	74925.38	74209.57	74605.53

**Table 3:** Profitability of tomato production on sample farm (₹ha<sup>-1</sup>).

S No.	Particulars	Marginal	Small	Medium	Large	Average
1.	Gross cost (₹ha <sup>-1</sup> )	73817.07	75469.50	74925.38	74209.57	74605.53
2.	Yield (Qt ha <sup>-1</sup> )	211.40	223.50	235.01	251.30	230.30
3.	Price (₹Qt <sup>-1</sup> )	850.00	850.00	850.00	850.00	850.00
4.	Value of production(₹ha <sup>-1</sup> )	179690.00	189975.00	199758.50	213605.00	195755.00
5.	Net income (₹ha <sup>-1</sup> )	105872.93	114505.50	124833.12	139395.43	121151.74
6.	Cost of production(₹Q <sup>-1</sup> )	349.18	337.67	318.81	295.30	323.94
7.	Input output ratio	1:2.43	1:2.51	1:2.66	1:2.87	1:2.62
8.	Cost: Benefit ratio	1:1.43	1:1.51	1:1.66	1:1.87	1:1.62

### Summary

- The study portrays that on an average cost of cultivation per hectare of tomato crop was found to be ₹ 40573.97 (cost A<sub>1</sub> and A<sub>2</sub>), ₹ 41164.70 (cost B<sub>1</sub>), ₹ 51164.70 (cost B<sub>2</sub>), ₹ 57823.57 (cost C<sub>1</sub>), ₹ 67823.21 (cost C<sub>2</sub>) and ₹ 74605.53 (cost C<sub>3</sub>).
- The proportion of operational cost, fixed cost and managerial cost to total cost on sample farm was 74.28, 16.62 and 9.09 per cent, respectively of the total cost.
- On an average the input-output ratio of tomato came to 1:2.62 on the sample farms.
- On an average the Cost: Benefit ratio of tomato came to 1:1.62 on the sample farms.
- The calculated average income over cost-A, cost-B, cost-C and cost C<sub>3</sub> were ₹ 155183.27, ₹ 144592.55, 127934.04 and ₹ 121151.74 per hectare, respectively.

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