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The Pharma Innovation

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Cost and return of tomato in Mungeli district of Chhattisgarh state

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Abstract
The study was carried out the cost and return of tomato in Mungeli district of Chhattisgarh. Out of 03 blocks in Mungeli district 02 blocks namely Mungeli and Lormi were selected. Three villages from each selected block were be randomly selected. A total of six villages have been selected. Out of 6 villages, 1037 farmers' family, a sample of 5.7 per cent respondents (i.e.60 vegetable growers) was selected by using probability proportional to size technique method. The cost of cultivation of tomato, on an overall basis was estimated Rs 70998.97/ha. The cost of production of tomato was estimated Rs 596.31 /q. The overall gross income and net income was estimated to Rs 160628.89/ha and 119532.78/ha respectively. The input –output ratio of tomato production estimated 1: 2.27.

Keywords: Tomato, income, output-input, cost and return

Introduction
India's diversified climate secure availability of all varieties of fresh fruits & vegetables. It is the second largest producer of fruits, as well as vegetables in the world, after China. As per National Horticulture Database (Second Advance Estimates) published by National Horticulture Board, during 2019-20, India produced 191.77 million metric tonnes of vegetables. The production of Vegetables is estimated to be 196.27 Million Tonne in 2020-21 compared to 188.28 Million Tonne in 2019-20, an increase of 4.24% contributed mainly by Potato, Onion, tomato, Brinjal and Cabbage.

In farm economics, estimating the cost of tomato crop cultivation and return is crucial because it influences decisions made by farmers, scientists, governments, financiers, and administrators at many levels. Using data gathered from the sample villages using a rapid rural appraisal approach, the cost of cultivation and returns from the tomato crop were calculated. A very broad variety of cost data users are extremely interested in the analysis of cost and returns, and it also has significant planning implications in an economy that is primarily agricultural. Both from the perspective of creating solid production plans and for the creation of price strategy, cost and return analysis is crucial. The enterprise cost study also offers highly helpful data that is beneficial in enhancing agricultural efficiency.

The major vegetables grown in Mungeli district of Chhattisgarh are brinjal, tomato, cabbage, cauliflower, okra. The total area of vegetable crops in the district was recorded 19.976 ha. (in '000 Ha) in the year 2020-21with the production of 329.038 MT. (in '000 MT).

Methodology
The methodology adopted for the present study concerning the selection of study area, selection of respondents, collection of data, and analytical techniques. Chhattisgarh state consists 32 districts out of which Mungeli district have been selected purposively. Out of 03 blocks in Mungeli district 02 blocks namely Mungeli and Lormi were selected. Three villages from each selected block were be randomly selected. A total of six villages have been selected. Out of 6 villages, 1037 farmers' family, a sample of 5.7 per cent respondents (i.e.60 vegetable growers) was selected by using probability proportional to size technique method and the collection of data was based totally on primary and secondary information. To work out the cost of cultivation, a standard approach of cost of cultivation has been adopted.

Cost of cultivation
The CACP provided common cost ideas to quantify the costs and returns of vegetable farming. It's measured in rupees per hectare.

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Cost A 1: All actual expenses in cash and kind incurred in production

Cost A 1: Consist of following 16 items of cost as under.

1. Value of hired human labour
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 & 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 bullocks drawn & 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_2 = Cost A, Rent paid for Leased in land
Cost B_1 = Cost A+ Interest on value of Owned Capital assets (excluding land)
Cost B_2 = Cost B_1+ Rental value of owned land 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+ 10 per cent of Cost C_2 on account of managerial function performed by farmer.

Income over different cost
Income over cost A_1 = Gross Return-Cost A_1
Income over cost A_2 = Gross Return-Cost A_2
Income over cost B_1 = Gross Return-Cost B_1
Income over cost B_2 = Gross Return - Cost B_2
Income over cost C_1= Gross Return-Cost C_1
Income over cost C_2= Gross Return-Cost C_2
Income over cost C3= Gross Return - Cost C3

3.3.3 Income measures
(a) Gross income
It includes the final price of main product and by product of the crop.
Gross income = Net income + Cost C

(b) Net income
Net income Gross income - Cost C

(c) Farm business income
Farm business income Gross income – Cost A

(d) Family labour income
Family labour income - Gross income - Cost B

(e) Farm investment income
Farm investment income Farm business income - Imputed value of family labour
(OR)
Net income + imputed rental value of owned land interest on owned fixed
Capital invested

(f) Input-output ratio
It can be expressed as the ratio of output to input. The ratio was calculated as
Input-output ratio = O/I
Where,
1 = Total input
O = Total output

Results and Discussion
Economics of tomato crop
Table 1: clearly shows that the cost of cultivation per hectare of tomato was higher on large farms as compared to marginal farms.

On overall, the cost of tomato growing per hectare came to Rs. 70998.97. Large farms had higher cultivation costs (Rs.92556.77) than marginal farms (Rs. 60575.58), small farms (Rs.71630.55), and medium farms (Rs.80401.49). With the increase in farm size, the cost of cultivation per hectare has also increased. It was because large farmers spent more on modern farm inputs such as quality seed, fertilizer, plant protection chemicals, hired labour, and other items as a result of borrowing from various financial institutions and having a better economic situation than marginal, small, and marginal farmers. Large farms, in comparison to others, have higher expenses that result in higher yields and profits.

Table 1: Economics of tomato on different size groups of farms (Rs. /ha)

S. No.	Particulars	Farm Size				Overall
		Marginal	Small	Medium	Large	
A	Variable cost					
1	Family human labour	12965.77 (66.52)	9765.71 (46.43)	6221.42 (27.44)	4765.23 (19.73)	9802.03 (46.54)
2	Hired human labour	6525.30 (33.48)	11265.22 (53.57)	16454.17 (72.56)	19392.56 (80.27)	11257.29 (53.46)
	Total human labour	19491.07 (58.28)	21030.93 (53.25)	22675.59 (50.29)	24157.79 (45.32)	21059.31(53.27)
3	Bullock labour	0	0	0	0	0
4	Machine power	2982.69 (8.92)	3825.95 (9.69)	6240.73 (13.84)	10356.46 (19.43)	4596.30 (11.63)
5	Seed cost	2842.53 (8.50)	3154.96 (7.99)	3694.10 (8.19)	3941.62 (7.39)	3221.34 (8.15)
6	Manure & Fertilizer	3546.78 (10.60)	4879.12 (12.35)	5149.49 (11.42)	5748.23 (10.78)	4481.70 (11.34)
7	Plant protection	2954.87 (8.83)	4664.45 (11.81)	5150.90 (11.42)	6654.33 (12.48)	4259.95 (10.78)
8	Irrigation charges	654.10 (1.96)	786.08 (1.99)	866.14 (1.92)	896.05 (1.68)	761.13 (1.93)
9	Interest on working capital	974.16 (2.91)	1150.24 (2.91)	1313.31 (2.91)	1552.63 (2.91)	1151.39 (2.91)
	Total variable cost	33446.20(55.21)	39491.73 (55.13)	45090.25 (56.08)	53307.11 (57.59)	39531.12 (55.68)
B	Fixed cost					
1	Depreciation	1256.48 (4.63)	1465.33 (4.56)	1914.13 (5.42)	2046.47 (5.21)	1534.94 (4.88)
2	Land revenue	15.00 (0.06)	15.00 (0.05)	15.00 (0.04)	15.00 (0.04)	15.00 (0.05)
3	Rental value of land	25045.23 (92.32)	29730.07 (92.51)	32408.60 (91.78)	36140.12 (92.08)	29015.30 (92.21)

4	Interest on fixed capital	1052.67 (3.88)	1248.42 (3.88)	1373.51 (3.89)	1528.06 (3.89)	1222.61 (3.89)
	Total fixed cost	27129.38 (44.79)	32138.82 (44.87)	35311.24 (43.92)	39249.65 (42.41)	31467.84 (44.32)
C	Total cost (A+B)	60575.58 (100.00)	71630.55 (100.00)	80401.49 (100.00)	92556.77 (100.00)	70998.97 (100.00)

Yield, value of output and cost of production per quintal of tomato
Table 2: shows the yield, value of output per hectare, and cost of production per quintal of tomato on the sample farms. The overall yield per hectare of tomato on the sample farms was 118.61 quintals.

Table 2: Per hectare yield, value of output and cost of production per quintal of tomato (Rs. / ha)

S.N.	Particulars	Marginal	Small	Medium	Large	Overall
1	Total Cost (Rs)	60575.58	71630.55	80401.49	92556.77	70998.97
2	yield (qt/ha)	105.13	122.52	128.45	142.49	118.61
3	Price (Rs/qt)	1354.24	1354.24	1354.24	1354.24	1354.24
4	Gross return (Rs.)	142371.25	165921.48	173952.13	192965.66	160628.89
5	Cost of production (Rs./qt.)	576.20	584.64	625.94	649.57	596.31

The overall cost of production per quintal was calculated to be Rs. 596.31. For marginal, small, medium, and large farm sizes, the cost of production per quintal of tomato was Rs. 576.20, Rs. 584.64, Rs. 625.94, and Rs. 649.57, respectively. It decreased with the increase in the size of farms due to higher yields in return for the cost of cultivation on the large farms. The average production cost per hectare was Rs. 70998.97. On marginal, small, medium, and large farm sizes, the value of output per hectare was Rs. 60575.58, Rs. 71630.55, Rs. 80401.49, and Rs. 92556.77, correspondingly. The higher value of output on large farms was associated with the higher expenditure incurred on modern farm inputs.

Measures of farm profit of tomato
Table 3: show that the average net income, family labour income, and farm business income from the tomato crop were Rs. 119532.78, Rs. 118310.17, and Rs. 119532.78 per hectare, respectively. The input-output ratio was calculated to be 1:2.27 overall on average. It increased as the farm's size increased due to the higher value of output in relation to total input cost.

Table 3: Cost and return of tomato on the sample farms for different group of farms (Rs. /ha)

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
1	Total cost (Rs.)	60575.58	71630.55	80401.49	92556.77	70998.97
2	Output value (Rs/qt)	142371.25	165921.48	173952.13	192965.66	160628.89
3	Net income (Rs.)	107653.57	124937.42	126896.74	137558.07	119532.78
4	Family labour income (Rs.)	106600.90	123689.00	125523.24	136030.01	118310.17
5	Farm business income (Rs.)	107653.57	124937.42	126896.74	137558.07	119532.78
6	Input-Output ratio	1:2.35	1:2.32	1:2.16	1:2.08	1:2.27

Cost and returns on the basis of cost concept of tomato
The Cost and returns on the basis of cost concept in the production of tomato have been presented in the Table 4: show that, on an Overall cost- A1 &A2, cost-B1, Cost B2, cost-C1, cost-C2, and cost-C3 were worked out to Rs. 41096.11, Rs. 42318.72, Rs. 71319.02, Rs. 52120.75, Rs. 81121.04 and Rs. 78450.92 per hectare respectively on the sample farms. The Overall income per hectare over cost- A1 &A2, cost-B1, Cost B2, cost-C1, cost-C2, and cost-C3 were worked out to Rs. 119532.78, Rs. 118310.17, Rs. 89309.87, Rs. 108508.14, Rs. 79507.85 and Rs. 82177.97 respectively. The income over different costs also increased with the increase in the farms size because of higher output in relation to total input cost.

Table 4: Break-up of total cost, cost concept wise income over different cost in tomato

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
A.	Break-up of costs					
	Cost A1 & A2	34717.68	40984.06	47055.38	55407.58	41096.11
	Cost B1	35770.35	42232.48	48428.89	56935.65	42318.72
	Cost B2	60800.58	71947.55	80822.49	93060.77	71319.02
	Cost C1	48736.12	51998.19	54650.31	61700.88	52120.75
	Cost C2	73766.35	81713.26	87043.91	97826.00	81121.04
	Cost C3	66880.64	79142.31	88904.74	102366.84	78450.92
B	Income over different cost					
	1. Income over cost A1 & A2	107653.57	124937.42	126896.74	137558.07	119532.78
	2. Income over cost B1	106600.90	123689.00	125523.24	136030.01	118310.17
	3. Income over cost B2	81570.67	93973.93	93129.64	99904.89	89309.87
	4. Income over cost C1	93635.13	113923.29	119301.82	131264.78	108508.14
	5. Income over cost C2	68604.90	84208.22	86908.22	95139.66	79507.85
	6. Income over cost C3	75490.61	86779.18	85047.39	90598.81	82177.97
C	Gross income	142371.25	165921.48	173952.13	192965.66	160628.89

Conclusion

The overall cost per hectare for tomato growing came to be Rs. 70998.97. The estimated total cost of tomato production was Rs 596.31 per quintal. The predicted total gross income and net income were Rs. 160628.89 and Rs. 119532.78 per hectare, respectively. The highest gross income, Rs 192965.66, was earned by large farms, followed by marginal farms, Rs 142371.25, small farms, Rs 165921.48, and medium farms, Rs 173952.13. The production of tomatoes has an estimated 1: 2.27 input-output ratio.

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