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An economic analysis of tomato production in Jashpur district of Chhattisgarh state

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Abstract
The study was conducted at Jashpur District of Chhattisgarh, where sample of 55 respondents was selected randomly. The respondents were classified into three groups viz., small (>2.00 hectares), medium (2.01- 4.00 hectares) and large (4.01 hectares and above) farms. The total cost of cultivation in tomato was ₹ 144977.84 /ha. The Variable Cost and Fixed Cost were determined to be ₹ 124950.21 /ha and ₹ 20027.64 /ha, respectively, representing 86.19 per cent and 13.81 per cent of the total cost of cultivation. The total cost of cultivation in tomato for marginal, small, medium and large farmers was ₹ 130563.72 /ha, ₹ 145361.13 /ha, ₹ 154054.93 /ha and ₹ 157471.26 /ha, respectively. The overall output value of tomato per hectare came to Rs. 335159.91. On the marginal, small, medium and large farms it was Rs. 312190.20, Rs. 341107.20, Rs. 352884.60 and Rs. 390168.90, respectively. The overall input-output ratio of tomato was observed to be 1:2.31.

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

Introduction
Vegetable cultivation occupies an essential place in the agricultural economy of the country. The agricultural economy of our country has characteristic of advantages mainly for small and marginal land holding and labour family for which vegetable cultivation is most suited. Though vegetable crops grip a great promise for encouraging the economic growth and enhancing the nutrition diet the people, yet they obtained limited attention in marketing research programmers in India. The vegetable industry can be expected to have better growth contributed the producers are ensured better marketing facilities and feasible prices for their produce. Chhattisgarh has different types of agro-climatic conditions conducive to producing a large variety of vegetable crops all year round. The state is well known for cultivating off-season vegetables, and the major state-grown vegetables are brinjal, pea, cucumber, radish, cabbage, tomato, cauliflower, etc. Vegetable farming has been described as one of the main crop diversification activities, considering small and unplaced holdings, and improving the socio-economic conditions of the farming community. Over the past 3-4 decades, the Government has launched and adopted many scheme / programme to provide vegetable cultivation in different parts of the state. In Chhattisgarh state mostly all vegetables crops like solanaceous crops, beans, cucurbits, cabbage, cauliflower etc. are grown very well in the state. The total area in the vegetable is was recorded 4,89,271 ha in the year 2020-21 with the production of 68,68,126 MT with the productivity of 14.03 MT per ha.

Methodology
Sampling technique Jashpur District of Chhattisgarh was purposively chosen as the study area because, it has the larger area under tomato cultivation in the district. A multistage simple random sampling technique (SRS) was adopted to select the villages and the respondents, different farmer involved in Tomato production and marketing in Jashpur District of Chhattisgarh. The details of the sampling techniques at various stages are given as under:

Costs and returns of vegetable cultivation
Despite the costs & return was worked out by old concepts, a standard method of cost of cultivation of tomato 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_1, cost A_2 cost B_1, cost B_2

and cost C_1, cost C_2, and cost C_3.

Cost A1: 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_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
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 taking as managerial allowances.

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 C_3 = Gross Return – Cost C_3

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

Results and Discussion

The cost and returns of tomato

Different Costs utilized in the Process of Production are studied to have a better understanding of the cost of tomato cultivation. The results of this analysis are presented in the table below. According to the table 1, the total cost of cultivation in tomato was ₹ 144977.84 /ha. The Variable Cost and Fixed Cost were determined to be ₹ 124950.21 /ha and ₹ 20027.64 /ha, respectively, representing 86.19 per cent and 13.81 per cent of the total cost of cultivation. It was also found that the total cost of cultivation in tomato for marginal, small, medium and large farmers was ₹ 130563.72 /ha, ₹ 145361.13 /ha, ₹ 154054.93 /ha and ₹ 157471.26 /ha, respectively. For marginal, small and medium and large farmers the variable costs account for 86.02 per cent, 86.04 per cent, 86.34 per cent and 86.47 per cent respectively. Marginal, small, medium and large farmers, are, spending 13.98 per cent, 13.96 per cent, 13.66 per cent and 13.53 per cent on fixed costs respectively.

From the table 1, it is clearly demonstrates that human labour (hired and family labour) cost was maximum and found to be 41.30 per cent followed by plant protection (16.58 per cent), staking (12.05 per cent), manure and fertilizer (6.75 per cent), seed cost (4.97 per cent), interest on working capital (4.16 per cent), machine power cost (3.82 per cent) and irrigation (1.53 per cent). The cost of family labour is decreasing with the increase in farm size.

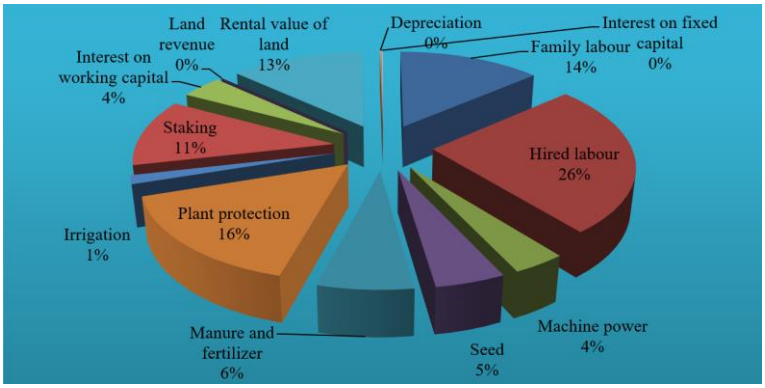

Fig 1: Overall cost of tomato cultivation of sampled household

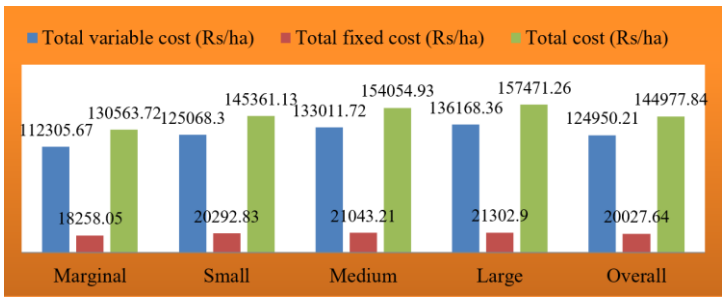

Fig 2: Total Costs of tomato cultivation of sampled household

Table 1: Input wise cost of cultivation of Tomato (Rs /ha)

S. No.	Particulars	Marginal		Small		Medium		Large		Overall	
		Rs./ha	%	Rs./ha	%	Rs./ha	%	Rs./ha	%	Rs./ha	%
A.	Variable cost										
	Human labour										
	a. Family labour	34065.25	26.09	24605.55	16.93	12200	7.92	1156.33	0.73	20807.67	14.35
	b. Hired labour	24125.65	18.48	36125.45	24.85	48253.25	31.32	59455.63	37.76	39068.55	26.95
	Total human labour	58190.9	44.57	60731	41.78	60453.25	39.24	60611.96	38.49	59876.22	41.30
	Machine power	5510.5	4.22	5125.65	3.53	5825.5	3.78144	5915.25	3.76	5542.13	3.82
1.	Seed	6125.32	33.55	7210.25	35.53	7965.45	37.85	8005.25	37.58	7201.76	4.97
2.	Manure and fertilizer	9225.65	50.53	9875.5	48.66	10126.33	48.12	10131.25	47.56	9784.69	6.75
3.	Plant protection	16585.45	90.84	24450.5	120.49	28652.55	136.16	30195.5	141.74	24036.49	16.58
4.	Irrigation	1765.5	9.67	2250.5	11.09	2495.65	11.86	2565.12	12.04	2215.68	1.53
5.	Staking	15650.5	11.99	16580.25	11.41	19022.65	12.35	20165.55	12.81	17465.96	12.05
6.	Interest on working capital	5377.17	4.12	6054.90	4.17	6435.79	4.18	6583.73	4.18	6029.04	4.16
	Total variable cost	112305.67	86.02	125068.30	86.04	133011.72	86.34	136168.36	86.47	124950.21	86.19
B.	Fixed cost										
1.	Land revenue	12	0.01	12	0.01	12	0.01	12	0.01	12.00	0.01
2.	Rental value of land	18000	13.79	20000	13.76	20500	13.31	20650	13.11	19626.88	13.54
3	Depreciation	123.5	0.09	145.5	0.10	165.55	0.11	235.25	0.15	156.75	0.11
4	Interest on fixed capital	122.55	0.09	135.33	0.09	365.66	0.24	405.65	0.26	232.01	0.16
	Total fixed cost	18258.05	13.98	20292.83	13.96	21043.21	13.66	21302.90	13.53	20027.64	13.81
C.	Total cost (A+B)	130563.72	100	145361.13	100	154054.93	100	157471.26	100	144977.84	100

Yield, value of output and cost of production per quintal

In Table 2, the yield, export value per hectare, and production cost per quintal of tomato on the sample farms is elaborated. This indicates overall tomato yield per hectare on the sample farm was 413.78 quintals. The cost of production per quintal was worked out on overall to Rs. 338.76 of tomato. The overall output value per hectare came to Rs. 335159.91. On the marginal, small, medium and large farms it was Rs. 312190.20, Rs. 341107.20, Rs. 352884.60 and Rs. 390168.90, respectively. At large fields, the higher production value was correlated with the higher yield. The amount of net income per hectare came from Rs. 190182.07 and it was varied form Rs. 181626.48, Rs. 195746.07, Rs. 198829.67 and Rs. 232697.64, on the marginal, small, medium and large farms, respectively. The overall input-output ratio of tomatoes on the experimental farms totaled 1.00:2.31.

Table 2: Yield, value of output and cost of production per quintal of Tomato

Particulars	Marginal	Small	Medium	Large	Overall
Cost of cultivation (Rs/ha)	130563.72	145361.13	154054.93	157471.26	144977.84
Cost of production (Rs/qtl)	338.76	345.18	353.61	326.91	350.38
Yield main product (qtl)	385.42	421.12	435.66	481.69	413.78
Rs/qtl	810.00	810.00	810.00	810.00	810.00
Grass Income (Rs/ha)	312190.20	341107.20	352884.60	390168.90	335159.91
Net income (Rs/ha)	181626.48	195746.07	198829.67	232697.64	190182.07
Input output ratio	1:2.39	1:2.35	1:2.29	1:2.48	1:2.31
B:C ratio	1:1.39	1:1.35	1:1.29	1:1.48	1:1.31

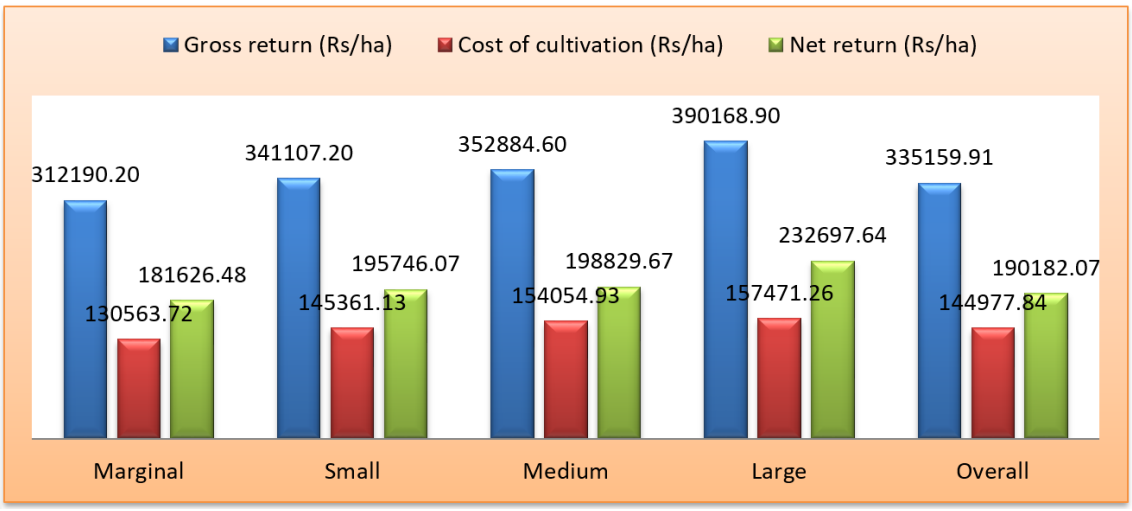

Fig 3: Measures of farm profit in tomato

Cost obtain on the basis of different cost concept of tomato

Cost of cultivation of tomato of sample farms has been worked out and presented in table 3. It is envisaged that Cost A_1 as designated as variable cost was found to be ₹ 104311.30

/ha on an overall basis, which was added of rent paid for lease in land and Cost A_2, was found to be ₹ 104311.30 /ha, indicates that the interest on fixed capital imputed with Cost B_1 was ₹ 104543.30 /ha. Normally, farmers are cultivating the crop in their own land but it has imputed rental value of land of ₹ 19626.88 /ha notified Cost B_2 was ₹ 124170.18 /ha. The Cost C_1 found to be ₹ 125350.97 /ha, includes the value of Cost B_1 and imputed value of family labour was found to be ₹ 20807.67 /ha, The Cost C_2, found to be ₹ 144944.84 /ha, includes the value of Cost B_2 and imputed value of family labour and The Cost C_3, found to be Rs 159475.63 /ha, imputed value of managerial allowances at 10 per cent of Cost C_2.

Return obtained over different cost of tomato

Table 3 shows that the overall returns over Cost A_1, Cost A_2, Cost B_1, Cost B_2, Cost C_1, Cost C_2, and Cost C_3 was obtained to be ₹ 230848.61 /ha, ₹ 230848.61 /ha, ₹ 230616.61 /ha, ₹ 210989.73 /ha, ₹ 209808.94 /ha, ₹ 190182.07 /ha and ₹ 175684.28 /ha, respectively.

Table 3: Break-up of total cost, cost concept wise income over different cost in tomato crop

Break-up of total cost					
Cost/ Category	**Marginal**	**Small**	**Medium**	**Large**	**Overall**
Cost A_1	78375.92	100620.25	120989.27	135259.28	104311.30
Cost A_2	78375.92	100620.25	120989.27	135259.28	104311.30
Cost B_1	78498.47	100755.58	121354.93	135664.93	104543.30
Cost B_2	96498.47	120755.58	141854.93	156314.93	124170.18
Cost C_1	112563.72	125361.13	133554.93	136821.26	125350.97
Cost C_2	130563.72	145361.13	154054.93	157471.26	144977.84
Cost C_3	143620.09	159897.24	169460.43	173218.39	159475.63
Break-up Return over cost					
Return over cost A_1	233814.28	240486.95	231895.33	254909.62	230848.61
Return over cost A_2	233814.28	240486.95	231895.33	254909.62	230848.61
Return over cost B_1	233691.73	240351.62	231529.67	254503.97	230616.61
Return over cost B_2	215691.73	220351.62	211029.67	233853.97	210989.73
Return over cost C_1	199626.48	215746.07	219329.67	253347.64	209808.94
Return over cost C_2	181626.48	195746.07	198829.67	232697.64	190182.07
Return over cost C_3	168570.11	181209.96	183424.17	216950.51	175684.28

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