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Economic analysis of tomato production in Akola district

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Abstract

Vegetables play an important role in both the regional and national economy of the agriculture sector. India continues to be the second largest producer of vegetables in the world next to China. Tomato (*Lycopersicon esculentum* Mill.) is an important *solanaceae* family crop, it is originated by native of tropical America. From the tropical America it is spread to other part of world in the 16th century and become popular within last nine decades. The present study of economic analysis of Tomato production in Akola district was carried out during the year 2018-2019. The primary data of 90 growers were collected from three tahsils for Tomato growers. Collected data was using simple tabular analysis worked out by using standardized cost concept by CACP i.e. cost-A₁, A₂, cost-B₁, B₂, cost-C₁, C₂ and benefit-cost ratio. Per hectare total cost of cultivation of Tomato was highest in the large group i.e. Rs.126412.96 per hectare followed by medium group (Rs. 122593.62) and small group (Rs.111806.84). The benefit cost ratio of tomato at cost 'C₃' was 1.62 in small group, 1.65 in medium group and 1.68 in large group.

Keywords: tomato, cost of cultivation and B:C ratio

Introduction

Vegetables play an important role in both the regional and national economy of the agriculture sector. These crops are generally of short duration hence more than once this crop can be raised on the basis of early, medium and late duration varieties. India continues to be the second largest producer of vegetables in the world next to China. In India, vegetable crops are grown in open field. During 2016-2017 in India area and production of vegetables was 10238 thousand ha, and 178172 metric tonnes. Maharashtra is leading state in vegetable cultivation. Its area under vegetable cultivation during 2016-2017 was 572 thousand ha and production was 9043 metric tonnes. West Bengal is highest in vegetable production in India. (Indian horticulture database 2017, National Horticulture Board). Tomato (*Lycopersicon esculentum* mill.) is an important *solanaceae* family crop; it is originated by native of tropical America. Tomato crop in India was cultivated on the area of 797 thousand hectare and its production was 20708 metric tonnes, and Maharashtra area was 43.64 thousand hectare and production was 957.17 metric tonnes during the year 2016-17. In Akola during year 2017-18 area under cultivation was 215 hectare and production was 3440 thousand tonnes.

Objectives

To estimate cost and returns of tomato production

Methodology

For the present study the Akola district was selected considering the maximum area under vegetable cultivation in Akola District. Multistage – random sampling Technique. In the first stage, Akola district was selected for the study. In the second stage, three tahsils were selected purposively from Akola district, namely Akola, Akot and Telhara. In the third stage, from these selected tahsils, three villages from each tahsils and from each village 10 farmers for tomato grower were randomly selected for the study. Thus, a total 90 tomato growers were selected for collect the required information for the year 2018-19.

Techniques of Data Analysis

Collected data was further tabular and analysed for fulfilment of different objective of study. The economic analysis of tomato production was using simple tabular analysis worked out by using standardized cost concept by CACP i.e. cost-A₁, cost-B₁, B₂, cost-C₁, C₂ and benefit-cost ratio.

Results and Discussion

Cost of cultivation of selected tomato growers

The cost of cultivation is helpful for crop planning therefore in order to know the cost and profitability, the cost of cultivation of tomato for small, medium and large farmer was workout.

Per hectare cost of cultivation of tomato for Small farmers

The per hectare cost of cultivation of tomato for small farmers was workout and presented in Table 1. The estimation of cost helps us to know the profitability of crop enterprises. The per hectare cost of cultivation of tomato was worked out by

the standard cost concept i.e. cost C₃ for tomato was observed Rs.111694.17 for small farmers.

Table 1. It revealed that per hectare cost of cultivation of tomato for small farmer was Rs. 111694.17 The major item was rental value of land (26.94 per cent) followed by hired human labour 17.95 per cent, manures 7.19 per cent, Seed 4.35 per cent and Family labour 6.74 per cent share to cost C₃ respectively. The percent share of Cost A₂ and Cost B₂ were Rs 56.16 per cent and Rs. 84.17 per cent in total cost, respectively. The per hectare cost A₂ and cost B₂ for cultivation of tomato was Rs.62726.40 and Rs.94014.59.

Table 1: Per hectare cost of cultivation of tomato for small farmer (Rs)

S N	Item	Unit/ha		Input	Cost / Input (Rs.)	Total Cost	Percentage to total cost
1	2	3		4	5	6	7
1	Hired Human Labour	Male	Days	25.20	200.20	5045.00	4.52
		Female	Days	100.00	150.00	15000.00	13.43
	Subtotal					20045.00	17.95
2	Bullock Labour		(Pair Days)	7.31	500.15	3656.10	3.27
3	Machine charges		Hours	6.69	300.31	2009.09	1.80
4	Seeds		gms	135.34	35.86	4853.25	4.35
5	Manures		qtls	80.12	100.18	8026.42	7.19
6	Fertilizers	N	Kg.	95.25	24.15	2300.29	2.06
		P	Kg.	48.56	44.56	2163.83	1.94
		K	Kg.	46.87	22.15	1038.17	0.93
7	Irrigation charges	(Rs.)				1964.96	1.76
8	Plant Protection	(Rs.)				11571.02	10.36
9	Incidental charges	(Rs.)				150.28	0.13
10	Repairing Charges	(Rs.)				214.77	0.19
11	Working Capital (1 to 10)	(Rs.)				57993.18	51.92
12	Int.on wor.Cap. @ 6% /annum	(Rs.)				3479.59	3.12
13	Depreciation	(Rs.)				1063.35	0.95
14	Land Rev. cess & other taxes	(Rs.)				190.28	0.17
15	COST "A1" (Items 11 to 14)					62726.40	56.16
16	Rental Value Leased in land	(Rs.)				0.00	0.00
17	COST "A2" (Items 15 to 16)					62726.40	56.16
18	Int. on Fix.Cap. @ 10%/annum	(Rs.)				1200.00	1.07
19	COST "B1" (Items 17 + 18)					63926.40	57.23
20	Rental Value of Land	(Rs.)				30088.19	26.94
21	COST "B2" (Items 19 to 20)	(Rs.)				94014.59	84.17
22	Family Human Labour	Male	Days	15.00	200.02	3000.00	2.69
		Female	Days	30.17	149.12	4525.57	4.05
	Subtotal					7525.57	6.74
23	Cost " C1 " (Items 19+22)	(Rs.)				71451.97	63.97
24	Cost " C2 " (Items 21+22)	(Rs.)				101540.16	90.91
25	10% of "Cost C2"	(Rs.)				10154.02	9.09
26	Cost "C3"	(Rs.)				111694.17	100.00
27	Yield per hectare	(Rs.)		167.42	1085.12	181670.79	
28	Per qtl. cost of main produce at Cost C ₃	(Rs.)				606.50	

(Figures in parentheses indicates the percentage to cost C₃)

Per hectare cost of cultivation of tomato for Medium farmers

The per hectare cost of cultivation of tomato for Medium farmers was workout and presented in Table 2. The estimation of cost helps us to know the profitability of crop enterprises. The per hectare cost of cultivation of tomato was worked out by the standard cost concept i.e cost C₃ for tomato was observed Rs.122593.62 for medium farmers.

It observed from the table that the per hectare cost of cultivation for medium farmers was incurred at cost C₃. Among the different items of expenditure rental value of

land accounted highest (27.41 per cent) share in total cost C₃ followed by hired human labour (20.93 per cent), Manure(8.21 per cent), Seed (3.89 per cent), Fertilizer (4.62 per cent) and family labour (3.69 per cent) of the total cost. The per hectare yield obtained by the farmer was 173.85 quintal. The total cost A₁, cost A₂, cost B₁ and cost B₂ incurred by the medium farmers in the cultivation of tomato was Rs. 69448.19, Rs.69448.19, Rs.73323.52 and Rs.106923.52, respectively. The per quintal cost of production for tomato was observed Rs.705.17 for medium group of farmers.

Table 2: Per hectare cost of cultivation of tomato for medium farmers (Rs)

S N	ITEM	Unit/ha		Input	Cost / Input (Rs.)	Total Cost	Percentage to total cost
1	2	3		4.00	5.00	6.00	
1	Hired Human Labour	Male	Days	34.40	200.00	6880.00	5.61
		Female	Days	125.16	150.01	18775.00	15.31
	Subtotal					25655.00	20.93
2	Bullock Labour		(Pair Days)	6.50	500.56	3253.64	2.65
3	Machine charges		Hours	8.02	300.25	2408.01	1.96
4	Seeds		gms	133.00	35.87	4770.71	3.89
5	Manures		qtls	100.17	100.52	10069.09	8.21
6	Fertilizer	N	Kg.	100.17	24.12	2416.10	1.97
		P	Kg.	49.17	44.12	2169.38	1.77
		K	Kg.	48.25	22.16	1069.22	0.87
7	Irrigation charges	(Rs.)				2068.33	1.69
8	Insecticide (Plant Protection)	(Rs.)				10116.66	8.25
9	Incidental charges	(Rs.)				157.40	0.13
10	Repairing Charges	(Rs.)				227.33	0.19
11	Working Capital (1 to 10)	(Rs.)				64380.86	52.52
12	Int.on wor.Cap. @ 6% /annum	(Rs.)				3862.85	3.15
13	Depreciation	(Rs.)				1032.66	0.84
14	Land Rev. cess & other taxes	(Rs.)				171.81	0.14
15	COST "A1" (Items 11 to 14)					69448.19	56.65
16	Rental Value Leased in land	(Rs.)				0.00	0.00
17	COST "A2" (Items 15 to 16)					69448.19	56.65
18	Int. on Fix.Cap. @ 10%/annum	(Rs.)				3875.33	3.16
19	COST "B1" (Items 17 + 18)					73323.52	59.81
20	Rental Value of Land	(Rs.)				33600.00	27.41
21	COST "B2" (Items 19 to 20)	(Rs.)				106923.52	87.22
22	Family Human Labour	Male	Days	10.47	200.02	2095.23	1.71
		Female	Days	16.20	149.12	2430.00	1.98
	Subtotal					4525.23	3.69
23	Cost " C1 " (Items 19+22)	(Rs.)				77848.75	63.50
24	Cost " C2 " (Items 21+22)	(Rs.)				111448.75	90.91
25	10% of "Cost C2"	(Rs.)				11144.87	9.09
26	Cost"C3"	(Rs.)				122593.62	100.00
27	Yield per hectare	(Rs.)		173.85	1165.55	202630.87	
28	Per qtl. cost of production	(Rs.)				705.17	

(Figures in parentheses indicates the percentage to total cost C₃)

Per hectare cost of cultivation of tomato for Large farmers

The per hectare cost of cultivation of tomato for Large farmers was worked out and presented in Table 3. The estimation of cost helps us to know the profitability of crop enterprises. The per hectare cost of cultivation of tomato was worked out by the standard cost concept i.e. cost C₃ for tomato was observed Rs.126412.96 for large farmers.

It is seen from the table that per hectare expenditure of Rs. 126412.96 /- was incurred in the cultivation of tomato as Cost

C₃ by the cultivators. The major item of cost were rental value of land, hired human labour, manure, plant protection, seed and family labour which accounted 27.91, 21.19, 9.61, 6.36, 3.69, and 3.22 per cent respectively. The per hectare yield was 178.65 quintal.

The total cost A₁, cost A₂, cost B₁ and cost B₂ incurred by the large farmers in the cultivation of tomato was Rs.72327.20, Rs. 72327.20, Rs.75576.60 and Rs.110855.41, respectively. The per quintal cost of production for tomato was observed Rs.643.27 for large group of farmers.

Table 3: Per hectare cost of cultivation of tomato for Large farmers (Rs)

S N	ITEM	Unit/ha		Input	Cost / Input(Rs.)	Total Cost	Percentage to total cost
1	2	3		4	5	6	
1	Hired Human Labour	Male	Days	38.84	200.05	7769.84	6.15
		Female	Days	126.80	150.01	19020.83	15.05
	Subtotal					26790.67	21.19
2	Bullock Labour		(Pair Days)	5.00	500.65	2503.25	1.98
3	Machine charges		Hours	11.74	300.45	3527.28	2.79
4	Seeds		gms	130.00	35.88	4664.40	3.69
5	Manures		qtls	120.54	100.75	12144.41	9.61
6	Fertilizer	N	Kg.	102.23	44.10	4508.34	3.57
		P	Kg.	50.12	24.52	1228.94	0.97
		K	Kg.	49.57	22.30	1105.41	0.87
7	Irrigation charges	(Rs.)				2144.84	1.70
8	Insecticide (Plant Protection)	(Rs.)				8043.65	6.36
9	Incidental charges	(Rs.)				165.07	0.13
10	Repairing Charges	(Rs.)				243.45	0.19

11	Working Capital (1 to 10)	(Rs.)				67069.71	53.06
12	Int.on wor.Cap. @ 6% /annum	(Rs.)				4024.18	3.18
13	Depreciation	(Rs.)				1058.13	0.84
14	Land Rev. cess & other taxes	(Rs.)				175.17	0.14
15	COST "A1" (Items 11 to 14)					72327.20	57.22
16	Rental Value Leased in land	(Rs.)				0.00	0.00
17	COST "A2" (Items 15 to 16)					72327.20	57.22
18	Int. on Fix.Cap. @ 10%/annum	(Rs.)				3249.40	2.57
19	COST "B1" (Items 17 + 18)					75576.60	59.79
20	Rental Value of Land	(Rs.)				35278.82	27.91
21	COST "B2" (Items 19 to 20)	(Rs.)				110855.41	87.69
22	Family Human Labour	Male	Days	10.47	200.02	2095.23	1.66
		Female	Days	13.13	149.12	1970.23	1.56
	Subtotal					4065.46	3.22
23	Cost " C1 " (Items 19+22)	(Rs.)				79642.06	63.00
24	Cost " C2 " (Items 21+22)	(Rs.)				114920.87	90.91
25	10% of "Cost C2"	(Rs.)				11492.09	9.09
26	Cost"C3"	(Rs.)				126412.96	100.00
27	Yield per hectare	(Rs.)		178.65	1190.73	212723.91	
28	Per qtl. cost of production	(Rs.)				643.27	

(Figures in parentheses indicates the percentage to cost C3)

Per hectare cost of cultivation of tomato for Overall farmers

The per hectare cost of cultivation of tomato for Overall level was worked out and presented in Table 4. The estimation of cost helps us to know the profitability of crop enterprises. The per hectare cost of cultivation of tomato was worked out by the standard cost concept i.e. cost C₃ for tomato was observed Rs.122370.50 for overall farmers.

It is seen from the table 4, that the overall level the cost of cultivation was Rs. 122370.50 /- The major item contributed

to total cost C₃ were Rental value of land (27.20 per cent), Followed by followed by hired human labour (19.72 per cent), plant protection (8.45 per cent), Manure (8.36 per cent), seed(3.89 per cent) and family labour (4.05 per cent). The average main production was 172.12 q/ha.

The total cost A₁, cost A₂, cost B₁ and cost B₂ incurred by the overall farmers in the cultivation of tomato was Rs.68875.38, Rs. 68875.38, Rs.73016.44 and Rs.106295.91, respectively. The per quintal cost of production for tomato was observed Rs.646.33 for overall group of farmers.

Table 4: Per hectare cost of cultivation of tomato for Overall farmers (Rs)

S N	ITEM	Unit/ha		Input	Cost / Input (Rs.)	Total Cost	Percentage to total cost
1	2	3		4	5	6	7
1	Hired Human Labour	Male	Days	32.58	200.02	6516.66	5.33
		Female	Days	117.43	150.01	17615.97	14.40
	Subtotal					24132.63	19.72
2	Bullock Labour		(Pair Days)	6.12	500.23	3061.41	2.50
3	Machine charges		Hours	8.24	299.45	2467.47	2.02
4	Seeds		gms	133.28	35.75	4764.64	3.89
5	Manures		qtls	101.25	101.01	10227.26	8.36
6	Fertilizer	N	Kg.	110.61	24.10	2665.70	2.18
		P	Kg.	58.38	44.06	2572.22	2.10
		K	Kg.	47.56	22.05	1048.70	0.86
7	Irrigation charges	(Rs.)				2035.64	1.66
8	Insecticide (Plant Protection)	(Rs.)				10343.28	8.45
9	Incidental charges	(Rs.)				265.23	0.22
10	Repairing Charges	(Rs.)				224.95	0.18
11	Working Capital (1 to 10)	(Rs.)				63809.13	52.14
12	Int.on wor.Cap. @ 6% /annum	(Rs.)				3828.55	3.13
13	Depreciation	(Rs.)				1053.61	0.86
14	Land Rev. cess & other taxes	(Rs.)				184.10	0.15
15	COST "A1" (Items 11 to 14)					68875.38	56.28
16	Rental Value Leased in land	(Rs.)				0.00	0.00
17	COST "A2" (Items 15 to 16)					68875.38	56.28
18	Int. on Fix.Cap. @ 10%/annum	(Rs.)				4141.06	3.38
19	COST "B1" (Items 17 + 18)					73016.44	59.67
20	Rental Value of Land	(Rs.)				33279.47	27.20
21	COST "B2" (Items 19 to 20)	(Rs.)				106295.91	86.86
22	Family Human Labour	Male	Days	12.00	200.02	2400.00	1.96
		Female	Days	17.00	149.12	2550.00	2.08
	Subtotal					4950.00	4.05
23	Cost " C1 " (Items 19+22)	(Rs.)				77966.44	63.71
24	Cost " C2 " (Items 21+22)	(Rs.)				111245.91	90.91
25	10% of "Cost C2"	(Rs.)				11124.59	9.09
26	Cost"C3"	(Rs.)				122370.50	100.00

27	Yield per hectare	(Rs.)		172.12	1166.52	200781.42	
28	Per qtl. cost of production	(Rs.)				646.33	

(Figures in parentheses indicates the percentage to cost C3)

Per hectare cost and returns from tomato

The per hectare cost and returns of the tomato was workout for small, medium and large farmers were presented in Table 5.

The table 5 indicates that the per hectare production of tomato for small medium and large farmer was 167.42, 173.85 and 178.65 quintal, respectively. At overall level it was 172.12 quintal/ha. The average per hectare net returns received by the

small, medium and large farmers at total cost i.e. cost C3 was Rs. 69863.95/-, Rs. 80037.25/- and Rs. 86310.95/-. At an overall the net returns was Rs. 78410.92/-. The input-output ratio at cost C3 was 1.62, 1.65 and 1.68 for small, medium and large farmer, respectively. At overall level output-input ratio was 1.64. It indicates that the tomato cultivation was profitable.

Table 5: Per hectare cost and returns from tomato (Rs)

Sr. No.	Particulars	Small	Medium	Large	Overall
1	Main produce (q/ha)	167.42	173.85	178.65	172.12
2	Value of Main Produce	181670.79	202630.87	212723.91	200781.42
3	Gross Return	181670.79	202630.87	212723.91	200781.42
4	Cost of Cultivation at				
	Cost "A1"	62726.40	69448.19	72327.20	68875.38
	Cost "A2"	62726.40	69448.19	72327.20	68875.38
	Cost "B1"	63926.40	73323.52	75576.60	73016.44
	Cost "B2"	94014.59	106923.52	110855.41	106295.91
	Cost "C1"	71451.97	77848.75	79642.06	77966.44
	Cost "C2"	101197.03	111448.75	114920.87	111245.91
	Cost "C3"	111806.84	122593.62	126412.96	122370.50
5	Return at				
	Cost "A1"	118944.39	133182.68	140396.72	131906.04
	Cost "A2"	118944.39	133182.68	140396.72	131906.04
	Cost "B1"	117744.39	129307.35	137147.32	127764.98
	Cost "B2"	87656.20	95707.35	101868.50	94485.51
	Cost "C1"	110218.82	124782.12	133081.86	122814.98
	Cost "C2"	80473.76	91182.12	97803.04	89535.51
	Cost "C3"	69863.95	80037.25	86310.95	78410.92
5	Output input ratio at				
	Cost "A1"	2.90	2.92	2.94	2.92
	Cost "A2"	2.90	2.92	2.94	2.92
	Cost "B1"	2.84	2.76	2.81	2.75
	Cost "B2"	1.93	1.90	1.92	1.89
	Cost "C1"	2.54	2.60	2.67	2.58
	Cost "C2"	1.80	1.82	1.85	1.80
	Cost "C3"	1.62	1.65	1.68	1.64

Conclusions

The following broad conclusions are drawn from the present study:

1. Per hectare cost 'A1' was the highest in large size group i.e. Rs. 72327.20 followed by medium size group (Rs. 69448.19) and small size group (Rs. 62726.40), respectively.
2. The per hectare total cost of cultivation of tomato i.e. cost 'C3' was highest in the large size group i.e. Rs. 126412.96 per hectare followed by medium size group (Rs. 122593.62) and small size group (Rs. 111806.84) respectively.
3. The benefit cost ratio of tomato cultivation at cost 'C3' was higher in large size group i.e. 1.68, followed by medium size group (1.65) and small size group (1.62). At overall level it was 1.64

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