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Cost and Return Analysis of Tomato Cultivation in Haryana

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ABSTRACT

The study was carried out in Yamuna Nagar, Kurukshetra, and Karnal districts of Haryana during 2021-22. A total of 210 tomato growers were interviewed to collect data to study the thorough cost and return analysis of tomato cultivation. Tomato cultivation was a profitable venture for farmers with a BC ratio of 1: 1.86. The per hectare cost of cultivation was worked out to be Rs. 305701.14 of which major contributors were rental value of land (24.96%), picking/harvesting charges (15.44%), transportation (11.61%) and nursery raising/seed (5.74%). The gross return, return over variable cost and net return per hectare were Rs. 569528.28, 412210.72, and 263827.14 on an overall basis. The production cost per quintal of tomato was computed to be Rs. 707.23 per quintal. It was suggested that farmers should take tomato cultivation with a business and market-oriented approach to compete with the challenges of the glut situation and opt cooperative approach in the production and selling of crops to avail maximum profit by reducing the cost of inputs and transportation and ultimately improving bargaining and negotiating power for better price availing.

INTRODUCTION

Tomato (*Solanum lycopersicon*) is one of the most regularly utilized vegetable in the world, acting as a fundamental element in raw, cooked, and processed cuisines. After China, India is the world's second largest tomato grower. The fruits and vegetables sector offers numerous opportunities enabling farmers to boost their income and possesses a capacity to propel the agriculture sector's overall growth to greater heights. In view of the sensitivity and perishability of tomatoes, producers need to pay meticulous attention to each and every step during the cultivation process, and negligence in any operation might result in substantial post-harvest losses and crop deterioration. Tomato is a labor-intensive crop and needs labor in field operations like transplanting, manual weeding, earthing up, harvesting/picking and post-harvest management, which further helps in providing employment opportunities. In terms of production costs, seed and labor costs are major contributors (Agarwal & Banerjee, 2019). The tomato crops encounter challenge of wastage and quality deterioration due to large gap in demand and supply. The major problems faced by vegetable growers are high prices of hybrid seeds, fertilizers and chemicals (Kumar et al., 2020). To reduce transportation cost and post-harvest losses, provision of better marketing facilities at village or major tomato producing blocks will be a great help (Kumari et al., 2022). Despite substantial efforts and significant investments, tomato cultivation has been repeatedly hampered by erratic production, disappointing yields, and recurrent swings in prices, causing hampered yield potential and poor livelihood status of tomato producers. Kisan rail facilitated transport will help in improving return by reducing losses and intermediaries' interference (Dubey et al., 2023). Cost and return analysis estimate are crucial for decision making at numerous phases of production and selling for farmers, researchers, policymakers, and government agencies.

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(Nain et al., 2019) It will also aid in providing useful information for enhancing agricultural and marketing efficiency. Further, it will help in evaluating the financial viability of cultivation practices, profitability improvement, input optimization and maximizing returns on investment and ultimately sustainability in tomato cultivation. In light of this, the current study was carried out with the objective of evaluating the cost and return analysis of tomato cultivation in Haryana.

METHODOLOGY

The current study was conducted in the Kurukshetra, Karnal, and Yamuna Nagar districts of Haryana, since the aforementioned districts account for a substantial amount of the state's tomato area and production. Yamuna Nagar was chosen for the current research on the basis of its maximum production in 2019-2020. Karnal and Kurukshetra districts have been selected for their proximity to Yamuna Nagar, and together they represent an extensive tomato producing belt in Haryana, accounting for 20.96 per cent of total area and 27.35 per cent of total tomato output in the state. One block from each district was purposively chosen based on their closeness, and together they formed a large pocket of tomato area and production. Five villages were conveniently picked from each block, and 14 farmers were randomly selected from each village, generating a sample of 70 farmers from each district. As a result, 210 tomato producers were interviewed in order to get the necessary information. The primary data was collected using survey schedule to study cost and return analysis of tomato cultivation. For this, the data regarding details of expenditure on various operations involved in tomato cultivation like seed, nursery raising, fertilizers, plant protection chemicals, manure, land preparation, transplanting, irrigation, manual weeding, harvesting, transportation, rental value of land, packaging and labour charges were calculated and analysed to determine total of variable and fixed cost. Statistical tools like averages and percentages were used to analyse and interpret the results. Variable cost is calculated by adding total working capital and interest on working capital. Interest on working capital was calculated at annual interest rate of 9 percent, but as tomato is a six-month crop so, it was calculated at interest rate of 4.5 per cent. Transportation cost, packaging, risk factor, management charges and rental value of land were added to calculate fixed cost. Variable cost and fixed cost were added to approximate the total cost of cultivation. Production per hectare was multiplied with the average price received by tomato growers to determine gross return and to calculate net return and return over variable cost, the total cost and variable cost were subtracted from gross return. Cost of production was determined by dividing total cost by production per hectare. B:C ratio was used to show relationship between investment and return from one hectare of land which was calculated by dividing gross return with total cost.

RESULTS AND DISCUSSION

The thorough analysis of cost and return structure of tomato cultivation was presented in Table 1 and 2. The data presented in Table 1 disclosed that the total cost of cultivation of tomato per hectare in Kurukshetra, Karnal and Yamuna Nagar districts were found to be Rs. 301831.93, 304672.25 and 310599.23, respectively. The average total cost of cultivation of tomato for all three districts was found to be Rs. 305701.14 per hectare, out of which 51.46 per cent was variable cost and 48.54 per cent was fixed cost. Major items that contributed to variable cost were picking/ harvesting, nursery raising, plant protection chemicals, fertilizers, earthing up and FYM/poultry manure with a share of 15.44, 5.74, 5.06, 3.70, 3.22 and 3.18 per cent of total cost of cultivation, respectively. Major contributors to fixed cost were rental value of land and transportation charges with a share of 24.96 and 11.61 per cent of the total cultivation cost, respectively.

The high cost of picking was due to labour intensive nature of tomato cultivation and labour scarcity. It was also observed in the study area that peak harvesting/picking season and the schedule of MGNREGP (Mahatma Gandhi Rural Employment Program) clashes which resulted in labour scarcity that led to high labour cost. Kondal (2017) also reported this in his study conducted in Telangana that the problem of labour scarcity had increased after implementation of MGNREGP which leads to high labour cost. Further, he suggested that government should implement the MGNREGP in agricultural lean season in order to reduce problem of labour scarcity and labour cost.

The high cost of nursery raising/seed was caused by direct purchasing of seedlings from market due to which growers had to pay more price which was found 0.80-1.5 rupee per seedling. Tomato is a perishable crop and attracts insect pest and diseases easily which resulted into high cost of plant protection chemicals. The high cost of transportation was due to distant market as majority of tomato growers sold their produce in Azadpur Mandi of New Delhi and other market of Saharanpur, Dehradun, and Chandigarh. The results were in line with Mango et al., (2015) & Kushwaha et al., (2018), which stated that major contributors of the total cost of cultivation were human labour (35.88%), rental value of land (15.19%), manure and fertilizers (12.98%), plant protection chemicals (6.40%) and seed (4.41%). Sai et al., (2022) also observed that labour cost (50.00 percent of total cultivation) was major contributor in variable cost due to labour-oriented nature of tomato cultivation followed by plant protection (8.30%), fertilizers (7.25%) and seed/seedling (6.31%), respectively.

Return analysis of per hectare tomato cultivation

Returns from tomato cultivation were presented in Table 2. The data presented in Table 2 disclosed that average production per hectare in Kurukshetra, Karnal, Yamuna Nagar and overall was 424.24, 432.12,440.40 and 432.25 quintal per hectare, respectively. The gross return per hectare in Kurukshetra, Karnal and Yamuna Nagar was found to be Rs. 557442.87, 569780.47 and 581429.29, respectively. Overall gross return per hectare was amounted to be Rs. 569528.28 and return over variable cost was Rs. 412210.72 per hectare. Net return per hectare of tomato cultivation was worked out to be Rs. 255610.94, 265108.22, 270830.06 and 263827.14 in Kurukshetra, Karnal, Yamuna Nagar and overall, respectively. The results are consistent with the findings of Kumar et al., (2016).

The average price received by tomato growers on overall basis was Rs.1317.59 per quintal. The average cost of production was Rs. 711.46, 705.06, 705.27 and 707.23 per quintal of tomato

Table 1. Costs of cultivation of tomato in(Rs. /ha)

S.No.	Particulars	Kurukshetra		Karnal		Yamuna Nagar		Overall	
		Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
1	Nursery raising/seed (g)	140.85	17071.12(5.66)	135.91	17987.13(5.90)	138.38	17541.92(5.65)	138.38	17533.39(5.74)
2	Preparatory tillage (Units)	4.7	4767.58(1.58)	4.6	4574.98(1.50)	4.8	4938.23(1.59)	4.7	4760.26(1.56)
3	Ridging (Units)		6141.16(2.03)		6093.57(2.00)		6218.93(2.00)		6151.22(2.01)
4	Transplanting (Units)	16	7742.59(2.57)	15	7797.08(2.56)	17	7686.47(2.47)	16	7742.04(2.53)
5	F.Y.M./ Poultry manure (tons)	8.15	9540.97(3.16)	8.4	9709.42(3.19)	8.75	9959.34(3.21)	8.43	9736.57(3.18)
	a. Nitrogenous (kg)	185.33	1196.98(0.40)	182.85	1096.44(0.36)	181.09	1114.44(0.36)	183.09	1135.95(0.37)
	b. Phosphatic (kg)	70.6	1754.23(0.58)	74.84	1895.22(0.62)	73.25	1844.77(0.59)	72.90	1831.41(0.60)
	c. Potassic (kg)	58.07	1579.80(0.52)	61.95	1512.48(0.50)	60.01	1534.02(0.49)	60.01	1542.10(0.50)
	d. Zinc (kg)	12.36	311.06(0.10)	14.83	353.36(0.12)	17.3	436.38(0.14)	14.83	366.93(0.12)
	e. Sulphur (kg)	14.83	1502.22(0.50)	12.36	1254.97(0.41)	17.19	1677.72(0.54)	14.79	1478.30(0.48)
	f. Boron (kg)	8.51	1093.64(0.36)	9	1149.02(0.38)	9.85	1217.72(0.39)	9.12	1153.46(0.38)
	g. Gypsum (kg)	298.29	2652.33(0.88)	305.35	2719.44(0.89)	310.64	2932.43(0.94)	304.76	2768.07(0.91)
	h. Mycorrhiza (kg)	9.88	940.43(0.31)	11.37	1219.38(0.40)	9.35	974.84(0.31)	10.20	1044.89(0.34)
6	Total fertilizer (a-h)		11030.69(3.65)		11200.31(3.68)		11732.32(3.78)		11321.11(3.70)
7	Fertilizer and weedicide application (Units)		1901.21(0.63)		1881.45(0.62)		1971.53(0.63)		1918.06(0.63)
8	Irrigation (Units)	11.96	9038.77(2.99)	10.94	9000.68(2.95)	12.36	9288.85(2.99)	11.75	9109.44(2.98)
9	Weeding (Units)								
	a. Manual		9091.83(3.01)		9105.10(2.99)		9096.75(2.93)		9097.89(2.98)
	b. Chemical		669.35(0.22)		637.22(0.21)		680.28(0.22)		662.28(0.22)
11	Earthing up (Units)		9793.15(3.24)		9920.93(3.26)		9850.10(3.17)		9854.73(3.22)
12	Plant protection chemicals		14938.65(4.95)		15555.89(5.11)		15903.30(5.12)		15465.94(5.06)
13	Picking/Harvesting		46396.66(15.37)		46865.07(15.38)		48308.80(15.55)		47190.18(15.44)
	Total working capital (1-13)		148123.73(49.07)		150328.83(49.34)		153176.80(49.32)		150543.12(49.25)
14	Interest on working capital @ 4.5 per cent per annum		6665.57(2.21)		6764.80(2.22)		6892.96(2.22)		6774.44(2.22)
A	Variable cost (1-14)		154789.29(51.28)		157093.63(51.56)		160069.76(51.54)		157317.56(51.46)
15	Transportation		35176.47(11.65)		34932.07(11.47)		36356.71(11.71)		35488.41(11.61)
16	Packaging charges		5055.88(1.68)		5130.43(1.68)		5158.54(1.66)		5114.95(1.67)
17	Management charges @ 10%		15478.93(5.13)		15709.36(5.16)		16006.98(5.15)		15731.76(5.15)
18	Risk factor @ 10 per cent		15478.93(5.13)		15709.36(5.16)		16006.98(5.15)		15731.76(5.15)
19	Rental value of land		75852.43(25.13)		76097.40(24.98)		77000.28(24.79)		76316.70(24.96)
B	Fixed cost (15-19)		147042.64(48.72)		147578.63(48.44)		150529.47(48.46)		148383.58(48.54)
20	Total cost (A+B)		301831.93(100)		304672.25(100)		310599.23(100)		305701.14(100)

Note: Figures in the parentheses represent percentage to respective total cost

Table 2. Returns from per hectare tomato cultivation

S.No.	Particulars	Kurukshetra	Karnal	Yamuna Nagar	Overall
1	Production (Quintal)	424.24	432.12	440.40	432.25
2	Price (Rs./quintal)	1313.98	1318.57	1320.23	1317.59
3	Gross return (Units)	557442.87	569780.47	581429.29	569528.28
4	Return over variable cost (Units)	402653.58	412686.84	421359.53	412210.72
5	Net return (Units)	255610.94	265108.22	270830.06	263827.14
6	Cost of production (Rs./quintal)	711.46	705.06	705.27	707.23
7	B:C Ratio	1: 1.85	1: 1.87	1: 1.87	1: 1.86

production in Kurukshetra, Karnal, Yamuna Nagar and overall, respectively. The B:C ratio was determined to be 1.85, 1.87, 1.87 and 1.86 implying that the tomato producer obtained a return of 1.85, 1.87, 1.87 and 1.86 rupees on a one-rupee investment in Kurukshetra, Karnal, Yamuna Nagar and overall, respectively and it is evident that tomato farming is a profitable venture in study area. The results were in line with Shende & Meshram (2015); Kushwaha et al., (2018) & Tambe et al., (2018). Samshunnahar et al., (2016); Kondal (2017); Vanitha et al., (2018); Gaikwad et al., (2020) & Sai et al., (2022) also concluded that tomato cultivation is profitable venture for the tomato growers.

CONCLUSION

Tomato cultivation is a profitable venture for farmers as indicated by the higher returns on per rupee investment of 1.86 due to its wide demand and short life period. Major constraints in tomato farming were high cost of labor, transportation, plant protection chemicals and seeds or nursery raising. It is suggested to build processing units and cold storage facilities with facility of sorting, grading and packaging in the major tomato producing belts to face challenges of glut situation during high production periods and reduction of post-harvest losses and spoilages of tomato. The government should take initiative to build processing units, cold storage units and refrigerated vehicles for transportation in the major tomato producing belts to save tomato growers from poor price in glut situation during period of higher production, reducing post-harvest losses and spoilage and also improving export capacity of the country.

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