



Economics analysis of tomato cultivation under poly house and open field conditions in Haryana, India

Parveen Kumar*, R. S. Chauhan and R. K. Grover

Department of Agricultural Economics, CCS Haryana Agricultural University, Hisar- 125004 (Haryana), INDIA

*Corresponding author. E-mail: parv2509@gmail.com

Received: September 3, 2015; Revised received: February 6, 2016; Accepted: May 23, 2016

Abstract: In the present paper an attempt has been made to study the comparative economics of tomato cultivation under poly house and open field conditions in Karnal district, Haryana. Production and marketing constraints under poly house cultivation have also been identified. The primary data for the agriculture year 2013-14 were collected by personal interviews of the selected farmers with the help of a specially designed schedule. Simple statistical tool like Averages and percentages were used to compare, contrast and interpret the results properly. The overall findings of the study reveal that the cost of cultivation of tomato under poly houses was higher by Rs. 206816.90/acre as compared to open field conditions. At the same time, the net returns under poly houses were higher by Rs. 51097.54/acre. Farmers realized 53.71 % higher yield of tomato under poly house as compared to open field conditions. The gross return, returns over variable cost and net return were also higher by 106.94 %, 160.70 % and 48.70 %, respectively in case of poly house as compared to open field conditions. The results of the study also revealed that the tomato cultivation under poly houses has significantly contributed to the yield.

Keywords: Comparative economic analysis, Cost, Open field condition, Poly house

INTRODUCTION

Tomato (*Lycopersicon esculentum*) belongs to the genus *Lycopersicon* under Solanaceae family. Tomato is rich source of vitamins A, C, potassium, minerals and fibers. Tomato is one of the most important protective food crops of India. India ranks second in the area as well as production of tomato next to China. Globally, the share of China and India accounts 27.8 and 11.2 %, respectively. Haryana ranks 12th in tomato production with 392.36 thousand tonnes (Anonymous, 2013). It covers approximately 7.6% of the total area under vegetable (356.77 thousand ha) cultivation in Haryana. At present, the estimated area and production under tomato is 27.07 thousand ha and 417.44 thousand tonnes respectively (Anonymous, 2012). Protected cultivation is an improved agro technique being used worldwide to register 3-4 times increase in production. Tomato is grown extensively in the plastic greenhouses for higher productivity (Rana *et al.* 2014). In Haryana, tomato is usually grown from August-September to March under poly house and in open field conditions. In poly houses, mostly Himshona and Himshikhar varieties of tomato are cultivated. Hybrid varieties of tomato are grown in open field conditions. The present study has made an attempt to have comparative economics of tomato cultivation under poly house and open field conditions in Haryana.

MATERIALS AND METHODS

To fulfill the specific objectives of the study, simple

statistical tools like averages and percentages were used to compare, contrast and interpret results properly. To collect the primary data, multistage random sampling technique was used. Karnal district was purposely selected on the basis of predominance of tomato cultivation both under poly houses and open field conditions. Gharaunda and Indri blocks were selected on the basis of predominance tomato cultivation under poly house and open fields. There after two villages from each block were selected. Ten respondent farmers, each under poly house and open field conditions were randomly selected from each village, thus making a total sample of 80 respondents. The primary data for the year 2013-14 were collected from the all the 80 respondent farmers.

RESULTS AND DISCUSSION

Comparative economics of tomato cultivation under poly houses and open field conditions: Comparative economic analysis of tomato cultivation under poly houses and open field conditions were made on per acre basis. As shown in table 1 cost of cultivation of tomato under poly houses was worked out to be Rs. 112878.62. The cost structure of the variable cost shows that the highest proportion amounting to Rs. 43863.63 (12.79%) was spent on harvesting followed by seed, plant protection, fertilizer and manures, ridging/bed preparation, field preparation, irrigation and weed control charges with Rs. 25072.72 (7.30%), Rs. 12295.45 (3.58%), Rs. 9058.40 (2.64%), Rs. 5954.54

(1.74%), Rs. 5318.18 (1.55%), Rs. 1168.18 (0.34%) and Rs. 827.27 (0.24%), respectively. In case of open field cultivation of tomato, the total variable cost was worked out to be Rs. 93033.71. The cost structure of the total variable cost shows that the highest proportion was spent on harvesting with Rs. 34494.12 (25.31%) followed by plant protection, fertilizer and manures, seed, weed control, field preparation, irrigation and ridging/bed preparation charges with Rs. 22541.18 (16.54%), Rs. 15061.76 (11.05%), Rs. 4261.17 (3.13%), Rs. 3828.23 (2.89%), Rs. 2229.11 (1.64%), Rs. 1501.17 (1.10%) and Rs. 1435.29 (1.05%), respectively.

The finding of the study indicated in table-1 shows that the total cost incurred on tomato under poly houses and open field conditions was worked out Rs. 343080.83 and Rs. 136263.97 per acre respectively. It is also clear from the table that the highest proportion in total cost of tomato cultivation under poly houses was incurred as depreciation & interest on fixed capital (46.77%). The share of rental value of land in cost of cultivation of tomato under poly houses and open fields was worked out to be 8.74 and 14.68 %, respectively. In cost of cultivation of tomato under poly houses and open filed, the proportion of management and risk factor was worked out to be 3.9 and 6.83 %, respectively. The share of variable cost among total cost was worked out to be 68.27 % under open field conditions.

An average yield of 415.9 and 270.58 quintal per acre

was obtained under poly houses and open field cultivation of tomato respectively. Thus in open field cultivation of tomato the yield was estimated 145.32 quintal/acre less than the production under poly house cultivation. Also sale price received by poly house and open filed growers was Rs. 1200.02 and Rs. 891.3 per quintal, respectively.

The data pertaining to returns from tomato crop under poly houses and open field conditions as depicted in table 1 revealed that, in case of poly house cultivation of tomato, gross return per acre was estimated Rs. 499090.9. Return over variable cost and net returns were calculated Rs. 386212.27 and Rs. 156010.06 per acre, respectively. In case of open field cultivation of tomato gross returns per acre were estimated Rs. 241176.5. Return over variable cost and net returns were calculated Rs. 148142.79 and Rs. 104912.52 per acre, respectively.

Total cost under poly house and open field conditions was worked out to be Rs. 343080.83 and Rs. 136263.97 per acre, respectively. The reasons for higher total cost were high price of seed/seedlings, large number of labour required and depreciation and interest on fixed cost which increases the total cost of tomato cultivation under poly houses.

The data related to percentage difference between tomato cultivation under poly houses and open field conditions are also shown in table 1. The table reveals that in case of variable cost maximum difference was observed for seed Rs. 20811.55 which was nearly five

Table 1. Comparative economics of tomato cultivation under poly houses and open field conditions (Rs. /acre).

S. N.	Particulars	Poly house cultivation	Open field cultivation	Difference between poly houses and open field conditions	% difference over open field conditions
Cost structure					
1	Field preparation	5318.18 (1.55)	2229.11 (1.64)	3089.07	138.58
2	Ridging/bed preparation	5954.54 (1.74)	1435.29 (1.05)	4519.25	314.87
3	Seed	25072.72 (7.30)	4261.17 (3.13)	20811.55	488.40
4	Fertilizer & manure	9058.4 (2.64)	15061.76 (11.05)	-6003.36	-39.86
5	Irrigation	1168.18 (0.34)	1501.17 (1.10)	-332.99	-22.18
6	Plant protection	12295.45 (3.58)	22541.18 (16.54)	-10245.7	-45.45
7	Weed control	827.27 (0.24)	3828.23 (2.89)	-3000.96	-78.39
8	Harvesting	43863.63 (12.79)	34494.12 (25.31)	9369.51	27.16
9	Subtotal (1 to 8)	103558.37 (30.18)	85352.03 (62.64)	18206.34	21.33
10	Interest on working capital	9320.25 (2.72)	7681.68 (5.64)	1638.57	21.33
11	Variable cost (9+10)	112878.62 (32.90)	93033.71 (68.27)	19844.91	21.33
12	Marketing cost	17159.09 (5.00)	4623.52 (3.39)	12535.57	271.13
13	Management charge	11287.86 (3.29)	9303.37 (6.83)	1984.49	21.33
14	Risk factor	11287.86 (3.29)	9303.37 (6.83)	1984.49	21.33
15	Depreciation & interest on fixed capital	160467.39 (46.77)		160467.4	
16	Rental value of land	30000 (8.74)	20000 (14.68)	10000	50
17	Total cost (11 to 16)	343080.83 (100)	136263.97 (100)	206816.9	151.78
Return structure					
18	Yield (quintal/acre)	415.9	270.58	145.32	53.71
19	Sale price (Rs. /quintal)	1200.02	891.33	308.69	34.63
20	Gross return	499090.9	241176.5	257914.4	106.94
21	Return over variable cost	386212.27	148142.79	238069.5	160.70
22	Net return	156010.06	104912.52	51097.54	48.70

Note- figures in parentheses indicate their percentages to total cost

times more as compared to open field conditions. This was followed by ridging/bed preparation, field preparation and harvesting with Rs. 4519.25 (314.87%), Rs. 3089.07 (138.58%) and Rs. 9369.51 (27.16%), respectively. The plausible reasons for such heavy differences were, in poly houses more seedlings were planted and these were costlier also. Field preparation and bed preparation cost was also found higher in poly house because more agronomical practices were performed. The proportion was spent on harvesting (Rs. 43863.63) which is higher as compared to the open field conditions (Rs. 34494.12) because more number of skilled labour is used due to long harvesting period of tomato in poly houses as compared to open field conditions. The results further reveal that the expenditure on weed control, plant protection, fertilizer and manures and irrigation was higher in case of open field conditions by Rs. 3000.96 (78.39%), Rs. 10245.7 (45.25%), Rs. 6003.36 (39.86%), Rs. 332.99 (22.18%), respectively as compared to cultivation under poly house. This indicates that there was more infestation of weed and attack of insect/pest and diseases in case of cultivation of tomato under open field conditions. Higher doses of fertilizers were used in open field as compared to poly houses because the land fertility was poor in open field conditions. Again marketing cost under poly houses was higher by Rs. 12535.57 (271.13%) as compared to open field conditions. Farmers realized 53.71 % higher yield of tomato under poly houses as compared to open field conditions. The gross return, returns over variable cost and net return were also higher by 106.94 %, 160.70 % and 48.70 %, respectively in case of poly houses as compared to open field conditions. Hence, it can safely be concluded that yield of tomato and income of farmers can be increased by adoption of poly house technology. Findings are in agreement with the study of Nagalakshmi *et al.* (2001) who concluded that the capsicum crops grown in the naturally ventilated poly house had 4 times more yield and yield components compared to those grown in the field of Karnataka state and Sreedhara *et al.* (2013) who reported the labour cost, expenditure on material cost, total cost of cultivation, was higher under protected structure.

Production and marketing constraint under poly house condition: The problems encountered by the respondent farmers in the production and marketing under poly house were ascertained and the results are discussed under this section. Short life of polyethylene sheet was reported as a major production constraint by 92.50 % of the respondent farmers. They were of the view that on account of changing weather condition like storms and heavy rain, the sheet get damaged and leads to huge losses. Infestation of nematodes and whitefly was reported by 90 percent of the respondent farmers. They were of the view that in case of attack of pests the severity is too high. High weather fluctuations, fear of failure of technology, lack of

knowledge about latest package of practices and weed infestation negatively affected the production in poly houses as reported by 62.5 %, 60 %, 60 % and 45 % of the respondent farmers. Lack of minimum support price, high price fluctuations, lack of knowledge regarding market information, high cost of transportation, malpractices in weighing, lack of adequate packing material and heavy losses of vegetables in market were the major marketing constraints as reported by 92.5 %, 87.5 %, 75 %, 70 %, 65 %, 52.5 % and 42.5 % of the respondent farmers.

Conclusion

The present study concluded that in comparative economic analysis, in case of variable cost, maximum difference was observed for seed which was more than four times as compared to open field conditions. In case of open field condition, expenditure on irrigation and weed control was higher by 22.18 and 78.39 % respectively. Total cost of tomato in poly houses was higher as compared to open field conditions. Farmers realized 53.71 % higher yield of tomato under poly houses as compared to open field conditions. The gross return, returns over variable cost and net return were also higher by 106.70 %, 160.70 % and 48.70 %, respectively in case of poly houses as compared to open field conditions. Short life of polyethylene sheet is major production constraint in case of poly house as weather conditions changes instantly. Infestation of nematodes and whitefly, high cost of fertilizer and high cost of seed was one of the major production constraints in poly house. High weather fluctuations, fear of failure of technology, lack of knowledge about latest package of practices and weed infestation negatively affected the production in poly house. Lack of minimum support price, high price fluctuations and lack of knowledge regarding market information, high cost of transportation, malpractices in weighing, lack of adequate packing material and heavy losses of vegetables in market were the major marketing constraints.

REFERENCES

- Anonymous (2012). Model Bankable Project on Protected Cultivation in Haryana.
- Anonymous (2013). Vegetable statistics.
- Nagalakshmi, S., Nandakumar, N., Palanisamy, D. and Sreenarayanan, V.V. (2001). Naturally ventilated poly house for vegetable cultivation. *South Indian Horticulture*. 49: 345-346.
- Rana N., Kumar M, Walia A. and Sharma S. (2014). Tomato fruit quality under protected environment and open field conditions. *International Journal of Bio-resource and Stress Management*. 5(3): 422-426.
- Sreedhara, D.S., Kerutagi, M.G., Basavaraja, H., Kunnal, L.B. and Dodamani, M.T. (2013). Economics of capsicum production under protected conditions in Northern Karnataka. *Karnataka Journal Agriculture Science*. 26 (2): 217-219.