Original Research Article

Economics of capsicum and tomato crops production under Protected Cultivation in the regions of Kalyana-Karnataka

Abstract

Protected cultivation is an important initiative for cultivating the high value horticultural crops especially during the off-season which enables the farming communities to generate higher revenues in the limited area. In this context, a study has been undertaken to find out the viability of the protected cultivation structures for the cultivation of horticulture crops of capsicum and tomato in the regions of Kalyana-Karnataka. The research study was conducted in the district of Koppal and Ballari in regions of Kalyana-Karnataka based on the existence of highest number of protected structures. The study was based on primary data through personal interview method of the farmers who have adopted protected cultivation technology.A sample of 60 farmers were drawn as respondents from each district based on their size and composition of the structures and also on the basis of crops grown under protected condition.The cost and return analysis were used to assess the economics of capsicum and tomato crops cultivated under the protected cultivation. The results reported that, the net returns of capsicum and tomato crops in protected cultivation were Rs. 2,92,768 and Rs. 2,28,289 respectively in an area of of 1008 sqm and the B:C ratios of capsicum and tomato crops were reported as 1:3.40 and 1:2.89 respectively.Thus, the protected cultivation structures in the regions of Kalyana-Karnatakafor the cultivation of tomato and capsicum crops were found as economically viable unit. Hence, effort may be needed from the farmers of this region with further government support for increasing the adoption of protected cultivation structures in the cultivation of high value horticultural crops like tomato and capsicum.

Introduction:

Horticulture sector is one of the major drivers of growth in the agriculture. It provides food and nutritional security and it brings prosperity by improving the farmers' economic conditions. Apart it provides employment opportunities to farming community across primary, secondary and tertiary sectors. Horticultural crops in general and fruits crops in particular are resilient to changing in weather conditions. Vegetables are grown mostly by

small and marginal farmers that augments the income of farmers. This sector enables the population to enjoy a diverse and balanced diet for healthy living. In the last decade, sector has gained prominence by contributing a growing share in GVA of agriculture and allied sectors.In order to provide impetus to the horticulture sector, government has taken several initiatives. Among them high-tech horticulture is one of the important initiatives in general protected cultivation in particular among the farming community with an intention to grow the horticultural crops in off-season. Protected cultivation has offered a new dimension to get more income in a limited area.

Promotion of protected cultivation would certainly help in the creation of large scale self-employment opportunities for unemployed educated youth and also raise the national economy by sale of good quality produce in domestic and international markets. Under the new era of World Trade Organization (WTO), these kinds of models possess high potential for enhancing the income of farmers opting for quality and off-season vegetable and cut flower cultivation under protected conditions. The production of vegetable and under protected conditions not only provides high water and nutrient use efficiency but it can easily increase the productivity by 3-5 folds over the open field cultivation of these crops under varied agro climatic conditions of the country. This technology has very good potential, especially in urban and peri urban areas adjoining to the major cities which is a fast growing market for fresh and qualityproduce. (Singh, 2014).

Importance of the study

After economic liberalization, there is rapid urbanization, improved infrastructures and emergence of an urban middle class, creating a demand pull for high value horticultural crops in India. The potential of PCT (Protected cultivation Technology) to meet this demand should not be over looked. PCT provides many fold advantages over open field cultivation. This technology is highly productive, amenable to automation and conserves water, fertilizer and land. It is also eco-friendly and does not require much sophistication. In this century, protected cultivation is likely to be a common commercial practice, not because of its potential but out of its sheer necessity. This provides an opportunity to directly increase the income of farmers with very small landholdings.

Several studies have been conducted on horticulture crops in open field condition to study the cost and return analysis of crops, but very few research studies have been conducted on the economics of crops cultivation under protected cultivation. Some of the studies

revealed that, there is a tremendous scope for development of protected cultivation technologythat is suitable for vegetable production. With this background, the present study was undertaken with an objective to work out the economics of capsicum and tomato crop production under the protected cultivation.

Methodology:

Selection of the district: The research study was conducted in Koppal and Ballari district based on the highest number of protected structures in Kalyana-Karnataka (Anonymous, 2021). The cultivated area in these districts is known for horticultural seed production activities and familiarity of the researcher with whom served as horticultural consultant in the area. Keeping these in mind, Ballari and Koppal considered as the study districts.A separate list of PCT adopted farmers who have constructed protected structures/ units were obtained from the officials of the Department of the Horticulture in the respective districts viz. Koppal and Ballari. Further, the functioning of these units were verified with the help of the field functionaries of line departments and the representatives of NGOs (SKRD, SAMUHA) working in the area.

Selection of the respondents for the study: After verifying the PCT farmers, a sample of 60 farmers were drawn as respondents from each district based on their size and composition of the structures and also on the basis of crops grown under protected condition. The study was based on primary data through personal interview method of the farmers who have adopted protected cultivation technology. A considerable effort and care had been taken in selection of the respondents by following the general guidelines that, the farmers who have at least three years of experience in protected cultivation technology of different crops in the locality. Thus, the total samples of 120 PCT farmers were selected by using simple random sampling procedure.

Analytical tools employed: the cost and return analysis tool was employed to assess the economics of capsicum and tomato crops cultivation under protected cultivation. The computation was done for per unit area (1008 Square meters). The gross return, net returns and benefit cost ratio were calculated.

Results and discussion:

Economics of capsicum production under protected cultivation

The information relating to the cost and returns of capsicum cultivation is presented in Table 1. Data indicate that net returns from the capsicum cultivation in the protected cultivation in an area of 1008 sqm was reported Rs. 2,92,768/- and the cost of production per quintal was reported to Rs.1327.85. The benefit cost ratio of capsicum cultivation was calculated to be 1:3.40. Hence, the results indicate the economic viability of capsicum cultivation in the protected cultivation. The reasons for having higher B:C ratio could be attributed to the higher market price due to high quality of the produce and also obtaining higher yields.

With respect to variable cost, labour cost was found to be high (Rs. 21,205.33) followed by fertilizers cost (Rs. 7,889.33) (Verma (2003)) and Farm Yard Manure (Rs. 7,433.27) and plant protection chemicals (Rs. 4,306), harvesting and packaging (Rs.3,963.00). The higher labour cost in the capsicum cultivationwas due to the requirement of more no. of labours for performing the essential activities like fertigation, harvesting, training and irrigation.

With respect to fixed cost, the amortized establishment cost (Rs.41,328) was found to be high in the fixed cost followed by rental value of land (Rs.10,000) and irrigation cost (Rs.5,454). The higher amortized establishment cost was due to higher cost incurred for the initial/establishment of protected cultivation structure (Sreedhara *et al.* (2013), Itigi *et al.* (2017), Pavithra (2019))which was averaged for 10 years by considering the life of structure as ten years.

Table 1. Economics of capsicum production under shade net technology

(1 unit = 1008 Sq.m)

Sl.No.	Particulars	2019	2020	2021	Overall
I	**Variable cost (Rs)**	**Ist year**	**IInd year**	**IIIrd year**	**Average**
1	Land Preparation	**2150**	**1950**	**4350**	2816.67
2	FYM	**6578**	**7159.8**	**8562**	7433.27
3	Bed preparation	**1526**	**1350**	**2100**	1658.67
4	Planting material	2562	2856.5	2950	2789.50
5	Fertilizer	7523	6945	9200	7889.33
6	PP Chemicals	3259	4268	5391	4306.00
7	Labour cost	**21456**	**22600**	**19560**	21205.33
8	Harvesting&Packing	**3524**	**4100**	**4265**	3963.00
9	Interest on working capital @ 7 %	3154	3299	3648	3367
	Sub-total (Rs)	**51732**	**54528**	**60026**	**55429**
II	**Fixed cost (Rs)**				
10	Land revenue	321	321	321	321
11	Rental value of land	10000	10000	10000	10000
12	Irrigation structure	5854	5854	5854	5854
13	Miscellaneous expenses	2156	3215	3256	2876
14	Amortized establishment cost	41328	41328	41328	41328
15	Interest on fixed capital @ 9 %	5369	7052	7052	6491
	Sub-total (Rs)	**65028**	**67770**	**67811**	**66870**
	Grand Total (I+II)	**116760**	**122298**	**127837**	**122298**
III	**Returns**				
16	Yield (Qtls)	95.00	92.50	89.25	92.25
17	Average sale price(Rs/Kg)	43	48	44	45
18	Gross returns (Rs/Unit)	408500	444000	392700	415067
19	Net returns (Rs/Unit)	291740	321702	264863	292768
20	Cost of production(Rs/qtl)	1229.05	1322.14	1432.35	1327.85
21	Cost of cultivation(Rs/Unit)	116760	122298	127837	122298
22	B:C Ratio	3.50	3.63	3.07	3.40

Economics of tomato production under protected cultivation

The data regarding the cost and returns analysis of tomato cultivation is presented in the Table 2. Results indicate that net returns from the tomato cultivation in the protected cultivation in an area of 1008 sqm was Rs. 2,28,289 and the cost of production per quintal was reported as Rs.957.55 and the benefit cost ratio of tomato cultivation was recorded as 1:2.89. The results obtained indicate the economic viability of tomato cultivation in the protected cultivation. The reasons for having higher benefit cost ratio could be attributed to the higher market price due to production of high quality of the produce in the protected cultivation technology.

With respect to variable cost, labour cost (Thomas *et al.* (2005), Pavithra (2019)) was found to be high (Rs. 15,289) followed by fertilizers (Rs.13,970) (Verma (2003), harvesting and packaging (Rs.7,910). and FYM (Rs. 7,433.27). and The higher labour cost in the tomato cultivation was due to the requirement of more no. of labours for performing the essential activities in the protected cultivation structures like fertigation, harvesting, training and irrigation.

With respect to fixed cost, the amortized establishment cost (Rs.41,238) was found to be high followed by rental value of land (RS.10,000) and irrigation cost (Rs.5,854). The higher amortized establishment cost was due to higher cost incurred for the establishment of protected cultivation structure (Sreedhara *et al.* (2013), Itigi *et al.* (2017), Pavithra (2019))which weretaken for the averages of 10 years by considering the life of structure as ten years.

Table 2. Economics of tomato production under Shade net technology

(1 unit = 1008 Sq.m)

Sl.No.	Particulars	2019	2020	2021	Overall
I	**Variable cost(Rs)**	**Ist year**	**IInd year**	**IIIrd year**	**Average**
1	Land Preparation	1820	1652	1352	1608
2	FYM	8562	6572	5256	6796.67
3	Bed preparation	1152	1325	1256	1244
4	Planting material	3250	3564	4102	3639
5	Fertilizer	12568	14562	14780	13970

6	PP Chemicals	1565	1660	2027	1751
7	Labour cost	14352	16300	15215	15289
8	Harvesting and Packing	7152	8456	8123	7910
9	Interest on working capital @ 7 %	3029	3194	3079	3101
	Sub-total(Rs)	**53450**	**57285**	**55190**	**55308**
II	**Fixed cost(Rs)**				
10	Land revenue	321	321	321	321
11	Rental value of land	10000	10000	10000	10000
12	Irrigation structure	5854	5854	5854	5854
13	Miscellaneous expenses	1433	1433	1433	1433
14	Amortized establishment cost	41328	41328	41328	41328
15	Interest on fixed capital @ 9 %	5304	7052	7052	6469
	Sub-total(Rs)	**64240**	**65988**	**65988**	**65405**
	Grand Total (I+II)	**117690**	**123273**	**121178**	**120714**
III	**Returns**				
16	Yield (Qtls)	123.50	129.20	125.50	126.07
17	Average sale price(Rs/Kg)	25	28	30	28
18	Gross returns (Rs/Unit)	308750	361760	376500	349003
19	Net returns (Rs/Unit)	191060	238487	255322	228289
20	Cost of production(Rs/qtl)	952.96	954.13	965.56	957.55
21	Cost of cultivation(Rs/Unit)	117690	123273	121178	120714
22	B:C Ratio	2.62	2.93	3.11	2.89

Conclusion:The protected cultivation technology is found to be economically viable especially for the horticultural crops as it is evident from the present study that, the net returns for cultivation of capsicum and tomato crops in protected cultivation were Rs. 2,92,768 and Rs. 2,28,289 respectively in per unit area of 1008 sqm and also the B:C ratios of capsicum and tomato crops as 1:3.40 and 1:2.89 respectively. Hence, the protected cultivation structures for the tomato and capsicum is an viable unit in the regions of Kalyana-Karnataka. In this context, the government should make further efforts for increasing the adoption of protected cultivation structures in the farming communities especially for small and marginal farmers by providing higher subsidies through policy interventions.

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