

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

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 data collected from the farmers with respect to the cost and return of capsicum and tomato under protected cultivation were analysed using cost and returns analysis techniques. 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 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-Karnataka for 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.

keywords: protected cultivation, tomato, capsicum, cost and returns, B:C ratios

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 which was includes in the Karnataka State alone around 20 lakh farm families are involved in horticulture and provides employment to the extent of 75 lakh population (anonymous, 2024). 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 More Self-employment opportunities for educated youth on farm (Rakesh Kumar et al. 2021) 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 periurban areas adjoining to the major cities which is a fast growing market for fresh and quality produce (Singh, 2014).

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 Nita et al. (2020). 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 technology that is suitable for vegetable production. With this background, the present study was undertaken with the following 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 (lies between $15^{\circ}09'$ to $16^{\circ}01'$ North latitude and $75^{\circ} 46'$ to $76^{\circ} 48'$ East longitude) and Ballari (lies between 15.1394° North latitude, 76.9214° East longitude) district (Fig 1.) 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.

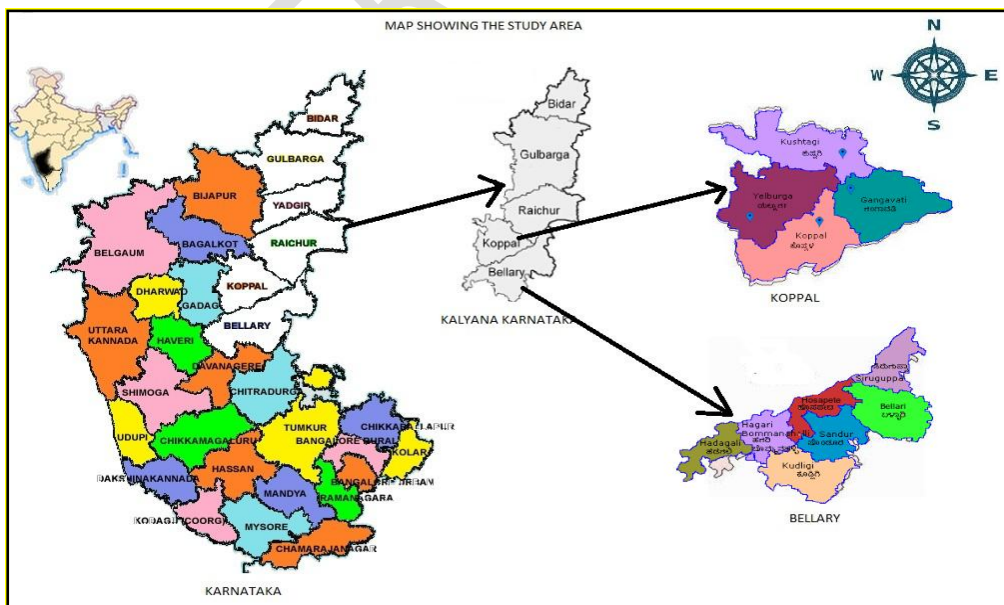


Fig 1 Map showing the study area

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.

Data analysis: The data of cost and returns information of capsicum and tomato crops cultivated by farmers under protected cultivation were analysed using the cost and return analysis techniques. The computation of cost and return analysis was done for an area of 1008 Square meters for the periods of 2019, 2020 and 2021 and also for the averages of 2019-21. The gross return, net returns and benefit cost ratio were worked out from the information of fixed cost, variable costs, yields, market prices etc.

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) 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 cultivation was 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), Itigiet *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)	I st year	II nd year	III rd 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/ctl)	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), Tanuja Sahu (2018) were found to be high (Rs. 15,289) followed by fertilizers (Rs.13,970)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 (Sreedharavet *al.* (2013), Itigiet *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)	I st year	II nd year	III rd 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/ctl)	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: it was observed from the study that, protected cultivation technology is found to be economically viable as the results of the net returns for cultivation of capsicum and tomato in protected cultivation were reported as Rs. 2,92,768 and Rs. 2,28,289 in an area of 1008 sqm and the B:C ratios as the 1:3.40 and 1:2.89 for capsicum and tomato respectively. Hence, the protected cultivation structures for the crops like tomato and capsicum area viable unit in the regions of Kalyana-Karnataka. In this context, it is urged the government 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. And, also urged the farmers of kalayan-kanataka regions of these district

farmers to take up adoption of protected cultivation technologies for reaping the higher revenues from such of these crops.

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