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## Price spread in capsicum cultivation under open-field and protected cultivation in Chikkaballapura district of Karnataka

**Pavithra KN, GM Gaddi and Pooja**

### Abstract

Polyhouse cultivation of vegetables is emerging as a specialized production technology to overcome biotic and abiotic stresses and to break the seasonal barrier to production. It also ensures year round production of high value vegetables, like capsicum, especially, during off-season. The study was conducted to analyze the price spread in capsicum cultivation under open-field and protected condition (Net-house and Polyhouse) in Chikkaballapura district of Karnataka. The numbers of respondents following each marketing channel were identified in all three cases. Mainly five marketing channels were identified in open-field, four channels in net-house and three channels in polyhouse. The main intermediaries involved in these marketing channels were village-merchants, wholesalers and retailers. In case of open-field, about 50 per cent of the respondents followed channel-III (Producer-Commission agent-Wholesaler-Retailer-Consumer). In net-house cultivation, majority of respondents marketed their produce through same channel as followed by open-field respondents. And in polyhouse, farmers followed three channels, of which most of the farmers marketed through channel-V (Producer-Village-merchant-Retailer-Consumer). Producer's share in the consumer's rupee was found highest in case of direct marketing i.e., 93.56 per cent in open-field condition as this channel was found only in open-field situation. In protected cultivation, producer's share in consumer's rupee was found highest in case of channel-IV (Producer-Retailer-Consumer) i.e., 64 percent and 69 percent in net-house and polyhouse respectively.

**Keywords:** Marketing channel, open-field, net-house, polyhouse, direct marketing

### Introduction

India grows a wide variety of horticultural crops namely fruits, vegetables, potato, mushrooms, tropical tuber crops, medicinal and aromatic plants, spices and plantation crops etc. India is the second largest producer of vegetables in the world next to china, with a share of 14 per cent of total world production. India has witnessed voluminous increase in horticulture production over the last few years. Significant progress has been made in area expansion resulting in higher production. Over the last decade, the area under horticulture grew by about 3per cent per annum and annual production increased by 5.4 per cent. Over 60 per cent of the Indian population continue to depend on agriculture and allied activities for their livelihood. Hence, growth of this sector is an essential pre-requisite for overall economic growth.

The financial condition of farmers can be achieved through protected cultivation which has the ability to increase the productivity by 3-5 times. In the era of market-driven production system, suitable technology of growing high value vegetables is the most important aspect to get more benefit per unit of area (Vinod, 2016) [4]. These goal can be achieved at its best particularly by Protected cultivation or greenhouse cultivation. In India, the area under protected cultivation is the highest in Mulching and greenhouse and it stands in fourth position followed by shade nets and plastic tunnels (Anonymous, 2017) [3].

Greenhouses and other technologies for controlled environment plant production are associated with the off-season production of ornamentals and foods of high value in cold climate areas where outdoor production is not possible. The primary environmental parameter traditionally controlled is temperature, usually providing heat to overcome extreme cold conditions. However, environmental control can also include cooling to mitigate excessive temperatures, light control either shading or adding supplemental light, carbon dioxide levels, relative humidity, water, plant nutrients and pest control. Tomato, Capsicum and cucumber are the most extensively grown vegetables under green houses and give higher returns (Chandra *et al.*, 2000) [2].

Karnataka is a progressive state in the adoption of hi-tech horticulture in the country. The diverse agro-ecological conditions prevailing in Karnataka has made it possible to grow different types of horticultural crops such as fruits, vegetables, flowers, spices, plantation crops, root and tuber crops, medicinal and aromatic crops etc. Karnataka occupies a predominant position in the Horticulture map of the country.

Karnataka stands first in Area under capsicum cultivation with 3.82 thousand hectares, and stands first in production of 65.27 thousand metric tons (Indiastat.com, 2017-18). Capsicum is extensively cultivated in most of the districts of Northern Karnataka. However, the large scale cultivation of capsicum is concentrated in Belgaum and Haveri districts, followed by the districts in southern Karnataka like Kolar and Chikkaballapura with the production of 9000 and 1820 metric tonnes respectively.

Capsicum is grown for its mature fruits and has a high content of vitamins A and C than that of tomatoes. Capsicum contains a chemical which is rich in Capsicin. In the recent years capsicum has attained a status of high value crop in India and occupies a pride of place among vegetables in Indian cuisine industry because of its delicate taste and pleasant flavour coupled with rich content of ascorbic acid, vitamins and minerals. The mature fruits (green, red and yellow) of sweet pepper are eaten raw or widely used in stuffing's, baking's, soup, salad, pizza and burger preparations.

Sweet pepper consumption is being increasing now-a-days due to increasing demand by urban consumers and there is a good demand for export too. The export market needs fruits with longer shelf life, medium size, tetra lobed fruits with an attractive dark colour, mild pungency and good taste. But, the supply is inadequate due to low productivity of the crop. To meet this export demand capsicum can be grown in protected condition to increase the productivity of crop.

Chikkaballapura district was purposively chosen for the study due to higher concentration of capsicum area under both protected and open-field condition; and the district has higher productivity per unit area. Further, in this region, capsicum is grown year round. This study would highlight the marketing cost of capsicum, intermediaries involved in reaching the final consumer, producers share in consumers rupee and Marketing margin of the middlemen.

### Methodology

Capsicum cultivation is practiced in almost all the districts in Karnataka. However, the large scale cultivation of capsicum is concentrated in Kolar and Chikkaballapura districts extending an area of 450 ha and 79 ha with a production of 9000 and 1820 tons respectively (2015-16). Even though area is comparatively less in Chikkaballapura district yield per unit was highest. Hence, Chikkaballapura district were purposively selected. Villages were selected from each taluk on the predominance of capsicum area. The sample farmers were randomly selected from each of the selected village for getting required information on capsicum cultivation using pre tested and well-structured schedules. The total size of the sample selected for the study was 120, of which 60 farmers cultivating capsicum in open-field and 60 farmers cultivating capsicum in protected condition (30 each in net-house and polyhouse). Thus making the sample size of 120. The data pertained to 2016-17 agriculture year. The secondary data related to area, production and productivity of capsicum in Karnataka and district-wise (2016-17) were collected from

Directorate of Horticulture, an districts of India web portal.

To know the producer's share in consumer's rupee, price spread was calculated using the following procedure; Firstly, The chain of market intermediaries through which the produce move from producer to the ultimate consumer is called Marketing channel. The major channels through which the produce is marketed were identified. The number of sample respondents marketing the capsicum through each channel was determined to study the most prevalent channel in marketing of produce. Producer's share in the consumer's rupee refers to, it is the price received by the farmer, to the retail price expressed in percentage. If  $P_r$  is the retail price and  $P_f$  is the price received by the farmer, it can be estimated through

$$P_s = (P_f/P_r) \times 100$$

Price spread analysis is the difference between the price paid by the consumer and the price received by the producer. It mainly consists of marketing cost and marketing margin. The price spread analysis was analyzed as follows.

### 1. Marketing margin of the middlemen

It is the difference between the total payments i.e., cost + purchase price of produce and receipts of the middle men, the  $i^{\text{th}}$  agency

Percentage margin of the  $i^{\text{th}}$  middlemen

$$P_{mi} = (P_{ri} - (P_{pi} + C_{mi})) \div P_{ri} \times 100$$

Where,

$P_{ri}$  = Total value of receipts per unit (sale price)

$P_{pi}$  = Purchase value of goods per unit

$C_{mi}$  = Cost incurred in marketing per unit

### 2. Total cost of marketing

It is the total cost incurred in the marketing by the producer and various market intermediaries involved in the sale and purchase of produce till it reaches the final consumers, it can be computed as follows

$$C = C_f + C_{m1} + C_{m2} + \dots + C_{mn}$$

Where

$C$  = Total cost of the marketing of the produce

$C_f$  = Total cost paid by the producer from the time of the produce leaves the farm till it is sold.

$C_{mi}$  = Cost incurred by the  $i^{\text{th}}$  middlemen in the process of buying and selling the Produce.

In the study area, five channels were identified in marketing of produce and are detailed below.

Marketing Channel-I: Producer-Consumer

Marketing Channel- II: Producer-Wholesaler-Retailer-Consumer

Marketing Channel-III: Producer-Commission agent-Wholesaler-Retailer-Consumer

Marketing Channel- IV: Producer-Retailer-Consumer

Marketing Channel-V: Producer-Village-merchant-Retailer-Consumer

In all the above cases, the difference between the prices paid and the prices received was taken as the absolute value of price spread. The components of this price spread were the

expenses, the value of wastage and net profit at each level of intermediaries was considered and analysed.

### Result and Discussion

The selection of marketing channel becomes imperative for the farmers since the real benefit accrued to them is mainly depend upon the choice of agency and channel for disposal of produce. The channel selected by them must account for minimum marketing cost and ensure higher share in consumer's rupee.

In the study area, farmers following five marketing channels for capsicum grown under open-field, four channels for capsicum grown under net-house and three channels for polyhouse cultivated capsicum. The intermediaries involved in the identified marketing channels were village-merchants,

wholesalers and retailers. In case of open-field, about 50 per cent of the respondents followed channel-III followed by 26.67 per cent followed channel-IV, 11.70 per cent operated through channel-II, 8.33 per cent sold via channel-I and remaining 3.33 per cent of respondents practicing Channel-V as shown in Table 1.

In protected cultivation, farmers growing under net-house marketed more quantity of produce through Channel-III (40%) followed by 36.67 per cent in Channel-IV, 16.67 per cent in Channel-V, and remaining 6.67 per cent of farmers through Channel-I, while farmers growing capsicum under polyhouse condition followed three channels of which most of the farmers marketed their produce through channel-V (46.66%) followed by channel-IV(36.67%) and 16.67 per cent of farmers through channel-II(Table 1).

**Table 1:** Identification of marketing channels, estimation of marketing cost, margins and price spread for Capsicum

Sl. No.	Channels	Open-field			Net-house			Polyhouse		
		no. of farmers selling	Quantity Sold(ctl)	per cent	no. of farmers selling	Quantity Sold(ctl)	per cent	no. of farmers selling	Quantity Sold(ctl)	per cent
1	Marketing channel-I	5	9	8.33	-	-	-	-	-	-
2	Marketing channel-II	7	11.34	11.7	2	37.50	6.67	5	46.36	16.67
3	Marketing channel-III	30	13.62	50	12	40.16	40	-	-	-
4	Marketing channel-IV	16	15.96	26.67	11	19.8	36.67	11	50.42	36.67
5	Marketing channel-V	2	23.34	3.33	5	28.9	16.67	14	78.28	46.66

### Price spread and marketing margin in various marketing channels of capsicum cultivation

The details of price spread in various marketing channels of capsicum in study area are presented below in following sub-headings.

#### Channel-I

In this channel, the farmer performed the dual function of both producer and seller (Table 2). It could be observed that farmer received Rs.1600 and incurred a marketing cost of Rs.110 per quintal of capsicum. This channel was found only in case of open-field condition, and none of the farmers practicing protected cultivation marketed through their produce through this channel. The share of marketing cost accounted for 6.43 per cent in consumer's rupee the Producer's Share in Consumer's Rupee (PSCR) was 93.56 per cent in open-field condition (Table 3).

Higher share of farmers in consumer's rupee was mainly due to the non-existence of market intermediaries. Thus, with the lower prices, consumers were attracted and farmers cleared off the produce grown in open-field. This implies the direct sale by farmer producer is beneficial and also consumers got the fresh vegetables at reasonable prices. Hence, there is a need to encourage direct marketing of produce through Raitara santé. Similar results were reported by Sreedhara *et al.*, (2013)<sup>[1]</sup>.

#### Channel-II

Per quintal price received by farmers operating in this channel was Rs.1336, Rs.1550 and Rs.2900 under open-field, net house and polyhouse conditions. Retailer's margin was Rs.404, Rs.847 and Rs.1068 formed 20.39 per cent, 31.13 per cent, 23.82 per cent of the consumer price in case of open-field, net-house and polyhouse respectively. The total marketing cost amounted to Rs.241, 364 and 515 which was 11.80 per cent, 13.18 per cent and 11.48 per cent of consumer's price in the case of net-house and polyhouse respectively. The retailer's price was Rs.2041, Rs.2761 and

Rs.4483, while the PSCR was 67.4 per cent, 56.98 per cent, and 65.39 per cent in the case of capsicum cultivated under open-field, net-house and polyhouse, respectively (Table 3, 5 and 7).

It was the next best channel, through which the farmer got the 67.76per cent producer's share in consumer's rupee in open-field. Sreedhara *et al.*, (2013)<sup>[1]</sup> was also of same opinion in their study area. Farmers received lesser share in the consumer's rupee compared to channel-I because of marketing cost and the intermediaries' margin.

#### Channel-III

Per quintal price received by the farmers was Rs.1276 and Rs.1684 in open-field and net-house respectively. Polyhouse cultivating farmers do not market their produce through this channel in the study area. The total marketing cost incurred was Rs.267, Rs.429 which is 10.99 and 13.42 per cent in open-field and net-house respectively. And the intermediaries margin was 36.44 and 33.86 per cent respectively in open-field and net-house while (Producer's share in consumer rupee) PSCR was 52.55 and 52.70 per cent in open-field and net-house respectively (Table 3, 5 and 7).

Among the different marketing channels, market functionaries, marketing costs and margins were high in channel-III owing to large number of market functionaries involved in the process of marketing of capsicum. So that producer's share was less when compared to other channels.

#### Channel-IV

Most commonly followed channel in all three types of cultivation, it is observed from the table 3, 5 and 7, that net price received by farmer was Rs.1349, Rs.1753 and Rs.3038 in open-field, net-house and polyhouse respectively. The intermediaries' margin was Rs.525, Rs.745, and Rs.915 which is about 25.57 per cent, 27.41 per cent and 20.85per cent respectively in open-field, net-house and polyhouse. The total marketing cost was 179 (8.71%), 219 (8.06%) and 435 (9.91%) in open-field, net-house and polyhouse respectively,

while PSCR was 69.23 in polyhouse and in open-field and net-house it was 65.70 and 64.51 per cent which was lesser than in the channel-I due to the presence of higher marketing cost and intermediaries margin.

#### Channel-V

In this channel, price received by the farmers was Rs.1488, Rs.1780 and Rs.2935 respectively in open-field, net-house and polyhouse as presented in the Table 3, 5 and 7 respectively. The total marketing cost incurred was Rs.210, Rs.311, and Rs.391 which was about 8.86 per cent, 10.22 per cent and 8.15 per cent in open-field, net-house and polyhouse. And the total intermediaries margin was Rs.670, Rs.950, and Rs.1271 which is about 28.29, 31.23 and 27.64 per cent in open-field, net-house and polyhouse respectively. The PSCR

was 62.83, 58.53 and 63.84 per cent respectively in open-field, net-house and polyhouse.

PSCR was less in polyhouse, even though most of the farmers market their produce in this channel, it is due to high marketing cost and margin charged by the intermediaries. In case of open-field and net-house the PSCR was less when compared to all other channel's followed by farmers due to the high marketing margin involved in the process of marketing of capsicum.

It could be observed that, the channels involving more number of intermediaries were adopted by the majority of respondents cultivating capsicum. However, the producer's share in consumer's rupee was found more in direct sale of capsicum to consumers.

**Table 2:** Price spread in different marketing channels in open-field (Rs. Per quintal)

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Net price received by the producer	1600	1336	1287	1349	1498
Marketing cost of producer	110	121	85	115	64
Sale price of producer	1710	1457	1372	1464	1562
Purchase price of village merchant	-	-	-	-	1562
Marketing cost	-	-	-	-	88
Margin	-	-	--	-	265
Sub-total	-	-	-	-	343
Sale price of village merchant	-	-	-	-	1905
Purchase price of commission agent	-	-	1372	-	-
Marketing cost	-	-	58	-	-
Margin	-	-	210	-	-
Sub-total	-	--	268	-	-
Sale price	-	-	1640	-	-
Purchase price of wholesaler	-	1457	1642	-	-
Marketing cost	-	60	55	-	-
Margin	-	181	280	-	-
Sub-total	-	241	335	-	-
Sale price of wholesaler	-	1698	1975	-	-
Purchase price of retailer	-	1698	1975	1464	1905
Marketing cost	--	60	69	64	58
Margin	-	283	395	525	405
Sub-total	-	343	453	589	463
Sale price of retailer	-	2041	2428	2053	2465
Final price paid by the consumer	1710	2041	2428	2053	2368

**Table 3:** Price spread in various marketing channels of capsicum in open-field (Rs. per quintal)

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Retailer's sale price or consumer's purchase price	1710	2041	2428	2053	2368
Total marketing cost (MC)	110	241	267	179	210
Total net margins of intermediaries (MM)	-	404	885	525	670
Net price received by the producer	1600	1396	1276	1349	1488
Producer's share	93.56	68.39	52.55	65.70	62.83

**Table 4:** Price spread in different marketing channels in net-house (Rs. Per quintal)

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Net price received by the producer	-	1550	1684	1753	1880
Marketing cost of producer	-	128	95	134	75
Sale price of producer	-	1678	1779	1887	1955
Purchase price of village merchant	-	-	-	-	1955
Marketing cost	-	-	-	-	145
Margin	-	-	-	-	385
Sub-total	-	-	-	-	430
Sale price of village merchant	-	-	-	-	2385
Purchase price of commission agent	-	-	1779	-	-
Marketing cost	-	-	112	-	-
Margin	-	-	315	-	-
Sub-total	-	-	427	-	-

Sale price	-		2206	-	-
Purchase price of wholesaler	-	1678	2206	-	-
Marketing cost	-	138	128	-	-
Margin	-	324	285	-	-
Sub-total	-	462	413	-	-
Sale price of wholesaler	-	2140	2619	-	-
Purchase price of retailer	-	2140	2619	1887	2385
Marketing cost	-	98	94	85	91
Margin	-	523	482	745	565
Sub-total	-	621	576	830	656
Sale price of retailer	-	2761	3195	2717	3041
Final price paid by the consumer	-	2761	3195	2717	3041

**Table 5:** Price spread in various marketing channels of capsicum in net-house (Rs. per quintal)

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Retailer's sale price or consumer's purchase price	-	2761	3195	2717	3041
Total marketing cost (MC)	-	364	429	219	311
Total net margins of intermediaries (MM)	-	847	1082	745	950
Net price received by the producer	-	1550	1684	1753	1780
Producer's share	-	56.13	52.70	64.51	58.53

**Table 6:** Price spread in different marketing channels in polyhouse (Rs. Per quintal)

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Net price received by the producer	-	2900	-	3038	2855
Marketing cost of producer	-	205	-	290	145
Sale price of producer	-	3105	-	3328	3080
Purchase price of village merchant	-	-	-	-	3080
Marketing cost	-	-	-	-	138
Margin	-	-	-	-	586
Sub-total	-	-	-	-	724
Sale price of village merchant	-	-	-	-	3804
Purchase price of commission agent	-	-	-	-	-
Marketing cost	-	-	-	-	-
Margin	-	-	-	-	-
Sub-total	-	-	-	-	-
Sale price	-	-	-	-	-
Purchase price of wholesaler	-	3105	-	-	-
Marketing cost	-	185	-	-	-
Margin	-	395	-	-	-
Sub-total	-	580	-	-	-
Sale price of wholesaler	-	3685	-	-	-
Purchase price of retailer	-	3685	-	3328	3804
Marketing cost	-	95	-	125	108
Margin	-	673	-	915	685
Sub-total	-	768	-	1040	793
Sale price of retailer	-	4453	-	4368	4822
Final price paid by the consumer	-	4453	-	4368	4597

**Table 7:** Price spread in various marketing channels of capsicum in polyhouse (Rs. per quintal)

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Retailer's sale price or consumer's purchase price	-	4483	-	4388	4597
Total marketing cost (MC)	-	515	-	435	391
Total net margins of intermediaries (MM)	-	1068	-	915	1271
Net price received by the producer	-	2900	-	3038	2935
Producer's share	-	64.68	-	69.23	63.84

## Conclusion

Producer's share in the consumer's rupee was found highest in case of direct marketing i.e., 93.56 per cent in open-field condition as this channel was found only in open-field condition. Majority of farmers in protected condition (net-house and polyhouse) in the study area expressed the problem of price fluctuations. Another major problem was high transportation cost and commission agents charged 8-10 per cent commission on the produce in the study area. The study revealed that farmers in the study area were facing the major

problem of high intermediary charges, which ultimately reduced the producer's share in consumer rupee. And improper weighing of produce and high fluctuations in market prices were the other problems faced by farmer cultivating capsicum in open-field and protected condition.

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