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Post-harvest profile and marketing constraints in cultivation of chilli in Khammam district of Telangana

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Abstract
The study is based on primary data collected from Chilli growers during 2018-19 with a sample of 120 chilli farmers across Khammam district of Telangana. Relevant information was collected through a survey method with the help of pre-tested questionnaire. Chilli is an important crop in India which earns crores of rupees to the country hence many intermediaries play pivotal role in the markets like village merchants, commission agents, wholesalers and retailers for disposal in the domestic market, exporters and their agents in the export trade. Village traders are the initiators of the trade as they play an important role for assembling the produce after harvest of chillies. They have good relations with commission agents and wholesalers from whom they get the trade information quite regularly. Traditionally, village merchants are in the trade as they play the role of financiers to the farmers, therefore there is a commitment on the part of the farmers to prefer village merchants. For their services they take certain price advantage with the farmers. Post-harvest profile included the activities like grading, packing, transport, distance, mode of sale, storage of the produce. Three marketing channels were found in marketing, they are Channel-I Producer Consumer, Channel-II Producer Retailer Consumer, Channel-III Producer Wholesaler Retailer Consumer. The price spread through the three channels was Rs. 741.28, Rs. 2536.41 and Rs. 3185.86 per quintal respectively. The marketing efficiency of chilli in Channel-I was 26.02, in Channel-II it was 12.07 whereas marketing efficiency of chilli in Channel-III was 11.63.

Keywords: Spice, chilli, post-harvest, marketing channels

Introduction
Chilli (*Capsicum annum* L.) popularly known as 'wonder spice' is a major spice crop as well as vegetable crop grown in many countries. It gained its popularity through more than 400 varieties available all over the world with different pungency, size, shape and colours and its usage. India the 'Land of spices' is the largest producer, consumer and exporter of spices with mammoth share in the world trade and rich in almost 50 varieties with contribution about 36% to the total world production. India is meeting approximately 25% of the world's chilli requirement and considered to be leader in chilli export followed by China with 24%. Chilli is today one of India's major export attraction. It is the major spice contributing 40-42 per cent by volume, 22 per cent by value of total spices exported from India (Jagtap *et al*. 2014) [6]. Chilli is said to have originated in the Latin American regions of the New Mexico and Guatemala as a wild crop around 7500BC. The people native to these places domesticated this crop in 5000BC, as per the remains of the pre-historic Peru. At that time, chilli was cultivated by the farmers together with a primary crop to protect the primary crop from any damage that the birds could do. It is an indispensable item in the kitchen as it is consumed daily as a condiment in one form or the other, it is an essential condiment in foods for its pungency and red colour. Indian chilli is considered to be world famous for two important commercial qualities colour and pungency levels.

Indian chilli is mainly exported to Asian countries like Vietnam, Thailand, Sri Lanka, Bangladesh, U.A.E., Middle East and the Far East. During 2019-20, 4.44 lakh tonnes of chilli was exported to different countries (Source: Annual report 2019-20, Spices board of India, 2020) [1] generating an income of 425632.74 lakhs (Source: Annual report 2019-20, Spices board of India, 2020) [1]. Many varieties of chilli are grown for vegetables, spices, condiments, sauce and pickles. Products are available as powder and oleoresins. Chilli is considered as one of the commercial spice crops. It is the most widely used universal spice, named as wonder spice. There are over 50 spices produced in India and good numbers of them are grown in the countries which are indigenous.

Among the spices consumed per head, dried chilli fruits constitute a major share (Rajur *et al*. 2008) [10]. In daily life, chillies are integral and the most important ingredient in many different cuisines around the world as it adds pungency, taste, flavour and colour to the dishes. Some varieties are famous for the red colour because of the Capsanthin pigment and others are known for biting pungency attributed to capsaicin. India also offers high capsaicin content chilli with or without stalks and with clipped stalks, and fresh and dried capsicum. Besides these properties chilli is a rich source of Vitamins A, C, E and P and has certain medicinal properties. They are also packed with potassium, magnesium and iron. Every 100 gms of dried pods yield about 160 calories of energy through 36gms carbohydrate, 18gms proteins, 16gms fat, 480mg calcium, 3.1mg phosphorous, 31mg iron, 2.5mg niacin, 640 I.U. vitamin 'A' and 40mg vitamin 'C' (Narayanan *et al*. 1999) [9]. The most important chilli growing states in India are Andhra Pradesh (25%), Telangana (15%), Maharashtra (13%), Karnataka (12%), Madhyapradesh (10%), and Tamil Nadu (3%) (Source: Horticulture Statistics Division, Department of Agriculture, Cooperation & Farmers Welfare. - Horticultural Statistics at a Glance 2020) [4] which together constitute nearly 75 percent of the total area. The major chilli growing areas in Telangana are Khammam, Mahabubabad, Gadwal and Warangal districts. In Khammam, chilli is the predominant crop grown in almost all the mandals in an area of 19828 hectares (Season and Crop Coverage Report, Department of Agriculture, 2020) [11]. It is one of the important chilli growing areas of the country. This paper is an attempt to study the postharvest profile of chilli to give information on various aspects of Post-Harvest Management, Marketing Functions and Services, Marketing Channels.

Materials and Methods

Multistage random sampling technique was adopted in designing sampling frame for the study. Khammam district was purposively selected as it is the largest chilli growing district in Telangana state. The sample covers 120 chilli farmers from 6villages. The district has 21 mandals, out of these 3 mandals were selected. In the second stage, from each of the mandals, 2 villages were selected on purposive basis. In the final stage, from each of the sample villages, 20 farmers were selected on the purposive basis. Thus 120 farmers were selected from 6 villages. Primary data was collected using a pretested interview schedule from the selected farmers by personal interview method on production and marketing of chilli. The data was collected for the year 2018-2019.

Price spread: In marketing of agricultural commodities the difference between price paid by the consumer and price received by the producer for an equivalent quantity of farm produce is often known as price spread.

Results and Discussion

The results obtained from the present investigation as well as relevant discussions have been summarized below

I. Profile of chilli growers: It is evident from Table 1 that nearly 44.17 percent of the respondents selected were in the middle age group, 65.83 percent of the respondents were educated up to high school or had acquired higher studies than that. Nearly 48.34 percent of the farmers selected were under small farm size followed by farming experience of 8-14 years for 55.84 percent of the respondents. These selected farmers, 45.00 percent also maintained high extension contact for agricultural information and advisories from Scientists and department officials. Area under chilli was upto 2.5 acre for 43.33 percent of the respondents. The results are in uniformity with the results of Madhu Shekar *et al*., (2020) [7].

Table 1: Profile of the chilli growers selected for the study

N=120

S. No	Variables	Category	Frequency & Percentage
1	Age	Young (22-37)	29(24.17)
		Middle (38-53)	53 (44.17)
		Old (54-69)	38 (31.66)
2	Education	Illiterate	09 (7.50)
		Primary school	13 (10.83)
		Upper school	19 (15.83)
		High school	28 (23.33)
		Intermediate	37 (30.84)
		Degree	09 (7.50)
		Post-graduation	05 (4.17)
3	Farm Size	Marginal(0-2.5)	29 (24.16)
		Small(2.5-5)	58 (48.34)
		Large(5 & above)	33 (27.50)
4	Farming experience	Low (0-7)	22 (18.33)
		Medium (8-14)	67 (55.84)
		High (15-21)	31 (25.83)
5	Extension Contact	Low (11-17)	27 (22.50)
		Medium (18-25)	39 (32.50)
		High (26-33)	54 (45.00)
6	Area under chilli	Up to 2.5 acres	52 (43.33)
		2.5 - 5.0 acres	35 (29.17)
		5.1 - 7.5 acres	22 (18.33)
		7.5 acres and above	11 (9.17)

II. Post-harvest profile: It includes the various post-harvest related activities taken up by the farmers for marketing of his produce after harvesting

1. Grading of the produce: The respondents were classified into four categories based on grading of the produce as in Table 2. An insight into the Table 2 revealed that, nearly two thirds of the farmers were not grading their produce i.e.; 60.83 percent, followed by grading based on size 20.83 percent, based on size and shape 12.50 percent and grading based on size, shape and colour were 5.83 percent.

Table 2: Distribution of chilli growers according to grading of the produce

N = 120

S. No	Grading of the produce	F	P
1.	Without Grading	73	60.83
2.	Grading based on size	25	20.83
3.	Grading based on size and shape	15	12.50
4.	Grading based on size, shape and colour	07	5.83
	Total	120	100.00

2. Mode of packing: The respondents were classified into three categories based on mode of packing of the produce as in Table 3.

Table 3: Distribution of chilli growers according to mode of packing of the produce

S. No	Mode of packing	F	P
1.	Gunny bag	109	90.83
2.	Palm baskets	05	4.17
3.	Bamboo baskets	06	5.00
	Total	120	100.00

It can be inferred from Table 3 that, 90.83 percent of the farmers preferred gunny bags for packing their produce for transport to the market for sale because of cheaper price and easy availability, followed by palm baskets 4.17 percent and bamboo baskets 5.00 percent for packing their produce. The other modes of packing are used by tribal people.

3. Mode of transport: The respondents were classified into five categories based on mode of transport of the produce to the market as in Table 4.

Table 4: Distribution of chilli growers according to mode of transport of the produce

S. No	Mode of Transport	F	P
1	Head load	8	6.67
2	Auto rickshaw	14	11.67
3	Tractor	35	29.17
4	Tata ace/ Mini vehicle	41	34.17
5	DCM/ Lorry	22	18.33
	Total	120	100.00

It can be seen from the Table 4 that, 34.17 percent of the farmers transported their produce by Tata ace or mini vehicle because of coverage of more distance in short period of time and cheaper availability and is used by most of the small & marginal farmers whose produce is less, followed by tractor used by 29.17 percent of the respondents, whereas most of big farmers used DCM or lorry for transport of their produce to the market. 11.67 percent of the farmers used auto-rickshaw for transport of the produce and if sold within the village the farmers carried the produce as headload and it accounted for 6.67 percent of the respondents.

4. Distance of the market: The respondents were classified into six categories based on distance of the market from the place of production for sale of the produce as in Table 5.

Table 5: Distribution of chilli growers according to distance of the market for sale of the produce

S. No	Distance of the market	F	P
1.	Below 10 km	9	7.50
2.	10-20 km	15	12.50
3.	21- 30 km	23	19.17
4.	31– 40 km	41	34.17
5.	41– 50 km	19	15.83
6.	Above 50 km	13	10.83
	Total	120	100.00

It is revealed from the Table 5 that, with regard to distance of the market, more than one third of farmers selected for the study belonged to 31to 40 km category (34.17 percent), followed by 19.17 percent between 21 to 30 km category, 15.83 percent under 41 to 50km category, 12.50 percent under 10 to 20km category, above 50 km category (10.83 percent) and 7.50 percent of the farmers below 10 km category.

5. Place of the sale: The respondents were classified into five groups based on place of sale of the produce as in Table 6.

Table 6: Distribution of chilli growers according to place of the sale of the produce

	Place of sale	F	P
1.	Local market	13	10.83
2.	Retail market	17	14.17
3.	Whole sale market	67	55.83
4.	Rythu bazaar	12	10.00
5.	Cooperative societies	11	9.17
	Total	120	100.00

It can be inferred from Table 6 that, more than half of the farmers, 55.383 percent of them sold their produce in wholesale markets, followed by 14.17 percent in retail markets, 10.83 percent of them in local markets, mostly small and marginal farmers sold the produce in local and retail markets present close to their villages, 10.00 percent of the farmers sold in rythu bazaar and 9.17 percent to the cooperative societies which in turn sold to commission agents present in the wholesale markets.

6. Mode of sale of produce: The respondents were classified into three categories based on mode of sale of the produce in the market as in Table 7.

Table 7: Distribution of chilli growers according to mode of sale of produce

S. No	Mode of sale	F	P
1.	Through auction	46	38.33
2.	Through middlemen	50	41.67
3.	Self-marketing	24	20.00
	Total	120	100.00

It can be reported from Table 7 that, 41.67 percent of the respondents sold their produce through or to middlemen present in the markets, followed by 38.33 percent through auction conducted in the market whereas 20.00 percent of the respondents sold the produce through self-marketing. Big farmers who were acquainted with market procedures sold through auction and most of the small and marginal farmers

sold the produce through middlemen.

7. Storage facilities: The respondents were classified into two categories based on storage methods used in chilli as in Table 8.

Table 8: Distribution of chilli growers according to storage facilities (Method of storage)

S. No	Storage facilities	F	P
1.	Conventional storage	35	29.17
2.	Cold storage	85	70.83
	Total	120	100.00

It is clear from the Table 8 that, more than two thirds of the farmers, 70.83 percent of them were storing their produce in cold storage units to retain its pungency and colour and 29.17 percent of them followed conventional storage that storing the produce in air tight containers or bags in closed rooms and the produce is sold on getting good price.

8. Terms and conditions for sale: The respondents were classified into two categories based on terms and conditions for sale that a grower had with regard to payment in chilli cultivation as in Table 9.

Table 9: Distribution of chilli growers according to their terms and conditions for sale of the produce

S. No	Terms and conditions for sale	F	P
1.	Prior payment	49	40.83
2.	Immediate payment	71	59.17
	Total	120	100.00

It is observed from the Table 9 that, more than half of the farmers, 59.17 percent of them sold their produce through immediate payment or payment within few days of sale of produce and remaining 40.83 percent of the respondents had Prior payment agreement with the buyers or traders in the market who provide them with necessary credit and inputs for chilli cultivation.

III. Marketing aspects of chillies

In a dynamic and growing economy, the agricultural marketing system provides important linkages between the farm production sector and the non-farm sector. Apart from performing physical and infrastructure functions of transferring the goods from producers to consumers, the marketing system also performs the function of discovering the prices at different stages of marketing and transporting the price signals in the marketing chain. An efficient market system guaranties the farmers, better prices for farm products and induces them to invest their surpluses in the purchase and use of modern inputs so that the productivity and production may increase. An attempt was made to study and analyze the market structure, marketing costs and price spread in the marketing of chillies in the study area.

1. Marketing channels: Marketing channels are the routes through which produce reaches the final consumer. The following three types of marketing channels were identified in the marketing of chillies in the study area.

Channel 1 Producer - Consumer
Channel 2 Producer - Retailer - Consumer
Channel 3 Producer - Wholesaler - Retailer - Consumer

Table 10: Marketing of chilli through channel I (Producer – Consumer)

S. No	Particulars	Channel I Producer – Consumer
1	Price received by farmer as producer per quintal	9275.75
A	**Marketing cost incurred by producer**	
i)	Loading	31.06
ii)	Cost of Gunny bags/ crates	75.92
iii)	Transportation	131.14
iv)	Market fee	69.02
	Weighing charges	12.08
	Unloading	29.33
	Miscellaneous expenditure	22.09
	Marketing cost of producer	370.64
	Net price received by farmer	8904.36
	Consumer price	9645.64
	Price spread (Consumer price- Farmer price)	741.28
	Producer share in consumer's rupee (%)	92.31

It can be inferred from Table 10, that through marketing Channel-I Producer- Consumer, the farmer got the highest share i.e.; 92.31 percent to the consumer price. This is mainly due to the non- intervention of middle men and sale of produce directly by the farmers. The share of total marketing cost of chilli was Rs. 370.64. The total price spread in chilli through this channel was Rs. 741.28 per quintal. The results are in conformity with the results of Srikala *et al*., (2016) [13]

Table 11: Marketing of chilli through channel II (Producer – Retailer – Consumer)

S. No	Particulars	Channel II Producer – Retailer - Consumer
1	Price received by farmer as producer	9275
A	**Marketing cost incurred by producer**	
i)	Loading	29.33
ii)	Cost of Gunny bags/ crates	57.98
iii)	Transportation	115.26
iv)	Market fee	10.35
	Weighing charges	15.53
	Commission	556.51
	Unloading	15.53

	Miscellaneous expenditure	12.08
	Marketing cost of producer	812.58
	Price paid by retailer to producer	10087.58
B	**Marketing cost incurred by retailer**	
i)	Transportation	56.94
ii)	Hamali	8.28
iii)	Weighing charges	6.56
iv)	Market cess	6.90
v)	Other Expenses	20.02
4.	Marketing cost of retailer	98.70
5.	Retailer margin	810.99
6.	Total Marketing cost	911.28
7.	Net price received by farmer	8462.42
8.	Selling price of retailer or consumer price	10998.83
9.	Price spread	2536.41
10.	Producer Share in Consumer's rupee (%)	76.93

From Table 11, it can be observed that Channel II as the second best channel through which the farmer got 76.93 percent share of consumer price of chilli. Marketing cost borne by the retailer accounted for Rs. 98.70 per quintal of chilli and the retailer sold the produce to the final consumer with a profit of Rs. 810.99 per quintal. The total price spread through this channel was Rs. 2536.41. The total marketing cost incurred by the farmer was Rs.812.58 per quintal. The results are in conformity with the results of Mishra *et al*., (1999) [8]

Table 12: Marketing of chilli through channel III Producer – Wholesaler - Retailer – Consumer

S. No	Particulars	Channel III Producer – Wholesaler - Retailer - Consumer
1	Price received by farmer as producer	2687.60
A	**Marketing cost incurred by producer**	
i)	Loading	29.33
ii)	Cost of Gunny bags/ crates	57.98
iii)	Transportation	98.35
iv)	Market fee	9.32
	Weighing charges	15.53
	Commission	556.51
	Unloading	16.56
	Miscellaneous expenditure	12.77
	Marketing cost of producer	796.33
	Producer selling price to wholesaler	10071.36
	Marketing cost incurred by Wholesaler	
	Transportation	55.56
	Hamali	15.53
	Weighing charges	12.08
	Market cess	6.90
	Other Expenses	23.47
	Marketing cost of wholesaler	113.54
	Wholesaler margin or Profit	754.88
	Selling price of Wholesaler	10939.78
	Marketing cost incurred by retailer	
	Transportation	50.39
	Hamali	10.35
	Weighing charges	12.08
	Other Expenses	20.36
	Marketing cost of retailer	93.18
	Price received by retailer	11664.50
	Retailer margin or profit	631.54
	Net price received by farmer	8478.64
	Total Marketing cost	1003.08
	Total market margin	1386.42
	Consumer price	11664.50
	Price spread	3185.86
	Producer Share in Consumer's rupee (%)	72.68

It is evident from Table 12, marketing channel-III was the most commonly practiced channel through which more than 50 percent of chilli in the district was marketed. Here, the producer share in consumer rupee was 72.68 per cent. In this marketing channel, the total marketing cost of chilli was Rs. 1003.08 per quintal. The margin of wholesaler or profit through this channel of chilli was Rs. 754.88 per quintal. Thus, out of these three channels under study, the Price spread in chilli was found to be high in channel –III i.e. Rs. 3185.86 per quintal owing to large number of market intermediaries or

functionaries involved in the process of marketing of chilli. The results are in conformity with the results of Jagtap *et al.* (2012) [5].

Table 12: Marketing efficiency of chilli with different marketing channels

Channel	Value of goods sold/ Consumer Price (Rs./q)	Total Marketing cost (Rs./q)	Marketing efficiency
Channel I	9645.64	370.64	26.02
Channel II	10998.83	911.28	12.07
Channel III	11664.50	1003.08	11.63

It is evident from table 12 that Marketing efficiency is value of goods sold by total marketing cost which is highest in channel I i.e.; 26.02 compared to 12.07 in Channel II and 11.63 in Channel III. It could be seen that marketing efficiency was inversely related to total marketing cost. Therefore, in order to improve the marketing efficiency and producer share in consumer price, it is necessary to reduce the number of intermediaries in marketing supply chain as well as to reduce marketing cost and marketing losses.

Table 13: Marketing Constraints faced by the chilli growers

n = 120

S. No	Marketing Constraints	Frequency	Percentage	Rank
1	Irregular & delay in payment by intermediaries	53	44.17	IV
2	Lack of market information & Intelligence	87	72.50	II
3	Heavy price fluctuation for the produce	90	75.00	I
4	No support price for chilli from govt	42	35.00	V
5	Heavy commission charges	71	59.17	III
6	Low remunerative price at peak time	35	29.17	VI

From Table 13 it is inferred by the respondents that the major marketing constraints expressed by chilli growers were heavy price fluctuation for the produce (75.00 percent), lack of market information & Intelligence (72.50 percent), heavy commission charges (59.17 percent), Irregular & delay in payment by intermediaries (44.17 percent), no support price for chilli from government (35.00 percent), Low remunerative price at peak time (29.16 percent). The results were in agreement with the findings of Shasikant *et al* (2012), Dangore *et al* (2015) and Deore *et al* (2015) [12, 2, 3].

Conclusion

The study was conducted during the year 2018-2019 with 120 chilli farmers on various aspects of Post-Harvest Management, Marketing Functions, Services and Marketing Channels. The results collected during pre-testing were structured. List of chilli growers in each selected village was prepared with the help of local Leaders, sarpanch and Horticultural officers. A proportionate random sample of chilli growers from each selected village was taken to make total sample size as 120. On the basis of results obtained from the study, following conclusions are drawn. Farmer got the highest share i.e.; 92.31 percent to the consumer price in Channel I. Marketing efficiency is also highest in channel I i.e.; 26.02 compared to 12.07 in Channel II and 11.63 in Channel III. The national policy is to encourage condiments production; the purpose cannot be achieved without fair and remunerative price and adequate incentive to the chilli growers in the area. The price has to be remunerative enough to earn a legitimate profit. Alternatively, the marginal farmers could also be encouraged to augment to get maximum profit, the proper use of improved technology and improved practices of chilli production need to be demonstrated. An efficient marketing system is precondition for ensuring remunerative prices to the producers for their products and to deliver maximum satisfaction to the consumers for the price they pay. It helps the grower to increase the production and productivity on the one hand, get remunerative price and generate additional income on the other. The future lies in selling of the farm produce at Inter-state trade platforms in wholesale markets through e-NAM (Electronic National Agriculture market) thereby preventing involvement of the middlemen. It should be encouraged by networking all the markets in the state as it helps the farmers in getting better market access and earn higher income.

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