Economic Analysis of Marketing and Storage of onion cultivation in Yamunanagar, Haryana

Abstract

The current research was carried out in the Yamunanagar district of the state of Haryana due to the greater area of onions being grown there. In the study multi stage purposive sampling was used. The current research concluded that the cost of production per quintal in the studied region was ₹594.62. The major cost incurred on items included rental value of land (₹17365.20), fertilizers (₹3948.41), plant protection (₹1479.28) and seed cost (₹8753.73), respectively. The average yield of onion was 126.53 quintals per acre. The average variable cost was ₹45401. The gross return per acre was ₹165754.30 and net return was recorded ₹90515.90 per acre. While channel-I was observed that to have the greatest disposal of onion produce, channel-III was determined to be the most effective of the different marketing channels. It was shown that onion producers might increase their profits up to six months of storage before they began to lose money. After 2 months, 4 months, and 6 months in storage, the farmer earned ₹125.89, ₹176.52, and ₹210.53 per quintal, respectively.

Keyword: Economics, onion, marketing and storage

Introduction

The onion (Allium cepa L.) is one of the most important commercially grown and eaten vegetables. It has been grown and eaten almost everywhere in the world since at least 4000 BC. It started in the area that includes North-West India, Afghanistan, Kazakhstan, Uzbekistan, Western Tianshan, and Western Asia. The area around the Mediterranean Sea is where it spread to other parts of the world. Dehydrated onions come in the form of powder and flakes that can be used as spices. Onions can also be used to make oil and pectin, which are full of phosphorus, calcium, carbs, proteins, and vitamins (B and C). Onions can be used to treat many diseases and conditions. The most common ones are dropsy, heart disease, liver cirrhosis, diabetes, tuberculosis, and heart attacks (Kumar *et al.*, 2016). India is the biggest producer in the world. It makes up 25.57 percent of the total global output (FAO, 2020), with a production of 26.74 million tonnes (2020) and an average productivity of 18.65 tonnes per hectare. Between 1991–1992 and 2017–2018, the area under onion cultivation almost tripled, while output grew by roughly four times (Horticultural Statistics at a Glance, 2018). Maharashtra (8854.09 thousand MT), Madhya Pradesh (3701.01 thousand MT), Karnataka (2986.59 thousand MT), Bihar (1240.59 thousand MT), and Andhra Pradesh are the top five states in terms of onion output (915.73 thousand MT). About 90% of India's production of

onions comes from the top of 10 states. The production per hectare varied throughout the states, with Gujarat leading with 24.25 tonnes/ha and Odisha coming in last with 10.77 tonnes/ha. Yamunanagar, Mewat, and Ambala are the main onion producing regions, but district Fatehabad, with productivity of 39.89 tonnes per ha, is at the top, followed by Karnal and Sonipat, with productivity of 36.34 and 32.63 tonnes per ha, respectively (hortiharyana.gov.com). Haryana is in ninth place with an average productivity of 20.45 tonnes/ha and production of 6.40 lakh tonnes (Usha *et al.*, 2022; Kumar *et al.*, 2020). Onion has the benefit of being less perishable and enters the marketing channels for interstate and international commerce to a significant degree since it can endure harsh handling and long-distance transportation. Even under bad weather conditions, it may be preserved for a substantial amount of time after harvest and afterwards sold on the market when prices are feasible for the growers. It may be sold on the market for a longer period of time other than veggies. Thus, there are vast opportunities to preserve onion pricing by providing onion farmers with improved marketing and storage facilities, as well as high-yielding cultivars and contemporary farming methods. Hence, present study was conducted to assess costs-returns in onion cultivation, analyses the marketing patterns, costs margins & price spread through different marketing channels and their efficiency, losses at different stages of marketing and different time periods of storage.

Methodology

Economic analysis of onion production

For computing the costs and returns of the onion crop; cost of farm inputs, variable as well as total cost and net returns of onion growers were calculated in Yamunanagar.

Valuation of farm inputs

Some of the production inputs were derived from family resources, while others were acquired from the market. Farm inputs such as human labour (both family and hired), tractor power, seed, manures, fertilizers, insecticides and pesticides, irrigation fees, and other agronomic operation fees were priced based on real expenditures spent at current market rates.

Regression analysis

The input-output relationship was determined by fitting the Cobb-Douglas production function. Gross return per farm as a dependent variable and eight inputs including land, preparatory tillage, seed, FYM, fertilizers, human labour and machine power, plant protection chemicals, and irrigation expenditures as independent variables. The overall shape of the function was as described below:

$$Y = ax_1^{b1}\ x2^{b2}\ x_3^{b3}\ x_4^{b4}\ x_5^{b5}\ x_6^{b6}\ x_7^{b7}\ x_8^{b8}$$

Y = Gross returns of onion in rupees

Where,

a	=	Constant
X_1	=	Area under crop in hectare
X_2	=	Value of preparatory tillage in rupees
X_3	=	Value of seed in rupees
X_4	=	Value of manures in rupees
X_5	=	Value of fertilizers in rupees
X_6	=	Value of human labour and machine power in rupees
X_7	=	Value of plant protection chemicals in rupees
X_8	=	Value of irrigation in rupees
bi	=	The regression coefficient of the ith independent variable (i = 1 to 8)

Total variable cost

Total variable costs comprised the cost of all agricultural inputs such as human and bullock labour, tractor power, seed, manures and fertilizers, insecticides and pesticides, irrigation charges, repair and maintenance of farm tools, and interest on working capital at 9% per year throughout the onion crop's growth season.

Total fixed cost

Fixed costs include the current rental value of owned and leased-in land, as well as depreciation on agricultural tools, equipment, and buildings at 10% per year of the present worth of the building and machinery.

Market charges paid by the farmers

Farmers' expenses for transporting their goods from the field to the market, such as transportation, unloading, and cleaning fees, were also calculated.

Valuation of output

The production was valued based on the selling price of the onion crop.

$$GR = TP \times P$$

Where,

GR	=	Gross Return
TP	=	Total Produce
P	=	Price at which produces was sold.

Returns over variable cost

Returns over variable cost were calculated by subtracting the total variable cost from the

gross return.

Return over variable cost = Gross return – Total variable cost

Evaluation of marketing system

The data gathered from various market functionaries were evaluated to predict marketing expenses, margins, efficiency, and pricing spreads in various marketing channels.

Marketing pattern of onion

Information regarding the marketing channels of onion were collected from the producers and marketing agencies involved in marketing of onion through different marketing channels.

Marketing cost

The marketing cost incurred on different marketing function was calculated from the data collected through different marketing functionaries and finally computed in form of total and percentage form.

$$C = C_F + C_{M1} + C_{M2} + C_{M3} \ldots\ldots\ldots\ldots\ldots\ldots C_{MN}$$

Where,

C = Total marketing cost

C_F = Cost paid by the farmer at the time produce brought from farm, till up to sale.

C_{Mi} = Cost incurred by the i^{th} middlemen in the process of buying and selling.

I = 1, 2, 3, …….. N

Marketing margins

This is the difference between the middleman's total payments (cost + purchase price) and receipt (selling price).

Marketing efficiency

Marketing efficiency was worked out by employing the formula given by Acharya's approach:

$$ME = \frac{NP_F}{MC + MM + ML}$$

Where,

NP_F = Net price received by the farmers

MC = Total Marketing Cost

MM = Total Marketing Margin

ML = Total Loss incurred during marketing

Price spread

Price spread analysis was carried out as follows:

$$\text{Price spread} = \frac{\text{Prie paid to Retailer}}{\text{Consumer‟s Price} - \text{Producer Selling Price}}$$

Producer's share in consumer's rupee

It is the farmer's price stated as a percentage of the consumer's price.

$$\text{Producer's Share in Consumer's Rupee} = \frac{\text{Producer's Price}}{\text{Consumer's Price}} \times 100$$

Economic efficiency of storage

Costs incurred for the purchase of materials required for the construction of local storage structure included in total fixed cost while labour and maintenance charges included in the variable cost. The overall profit was computed by deducting the whole cost of storage from the extra revenue obtained after storage.

$$\text{Profit earned} = Q_2 \times P_2 - (Q_1 \times P_1 + TC)$$

Where,

Q_2 = Quantity left after storage i.e. quantity after storage losses

P_2 = Price at which produce sold after the storage

Q_1 = Quantity stored

P_1 = Price just after harvesting of onion

Results and Discussion

To work out costs and returns of onion cultivation

Average cost of cultivation in different zones

The cost and returns of onion in the district Yamunanagar of Haryana have been presented in table 1. Cost of production in Yamunanagar was found ₹594.62. In the district cost incurred on major items included rental value of land, irrigation, fertilizer use, plant protection, seed cost, hoeing/weeding and harvesting were 23.06, 3.80, 5.24, 1.96, 11.63, 5.32 and 10.83 percent of total cost, respectively. The average yield of onion was 126.53 quintals per acre (Ahmed *et al.*, 2014; Kumar *et al.*, 2016; Kumar *et al.*, 2017).

Table 1: Average cost of production of onion in Yamunanagar (value in ₹ acre^{-1})

Inputs	Yamunanagar
Preparatory tillage	1237.67 (1.64)
Nursery raising	11089.23 (14.70)
a. Seed	8753.73 (11.63)
b. Seed treatment	607.52 (0.74)
c. FYM	1366.56 (1.81)
d. Irrigation	361.42 (0.48)
Transplanting	3543.38 (4.71)

Ridging	1372.73 (1.82)
FYM	4098.77 (5.45)
Transplanting irrigation	361.42 (0.48)
Fertilizer nutrients	
a. Nitrogen	766.78 (1.01)
b. Phosphatic	1975.54 (2.62)
c. Potassic	849.25 (1.13)
d. Zinc Sulphate	356.84 (0.47)
Total fertilizer investment	3948.41 (5.24)
Fertilizers application	312.00 (0.41)
Irrigation	2864.51 (3.80)
Weeding	
a. Manual	4002.07 (5.32)
b. Chemical	-
Plant protection	1479.28 (1.96)
Harvesting/digging	8149.65 (10.83)
Miscellaneous	986.90 (1.31)
Total working capital	43446.02 (57.7)
Interest on working capital @9 percent per annum	1955.07 (2.60)
Variable cost	45401.09 (60.34)
Transportation	3391.89 (4.51)
Management charges @ 10 percent per annum	4540.11 (6.03)
Risk factor @ 10 percent per annum	4540.11 (6.03)
Rental value of land	17365.20 (23.06)
Total cost	75238.40 (100)
Production (qtl)	
a. Main	126.53
b. By product	-
Gross return	165754.3
Return over variable cost	120353.21
Net return	90515.90
Cost of production (₹ per qtl)	594.62
B:C Ratio	2.2

Figures in parenthesis indicate the percentage to total cost.

The rental value of land was contributed highest to the total cost which accounted for ₹17365.20 (23.06 percent) followed by ₹11089 (14.70 percent) expenses incurred on nursery raising in the district. The seed cost was found ₹8752.73 (11.63 percent). The average variable cost was ₹ 45401 (60.34 percent) in Yamunanagar (Ahmed *et al.*, 2008). The gross return per acre was ₹165754.30 in the district. The net return was recorded ₹90515.90 per acre (Kumar *et al.*, 2016; Pajankar *et al.*, 2000; Verma *et al.*, 2004; Shrichand and Jain 2008; Amarnath and Velmurugan, 2015; Kumar *et al.*, 2020).

Input-output relationship of onion cultivation

Cobb-Douglas production function was employed to study the relationship between the onion production and the inputs used in the onion production. The estimated Cobb- Douglas

production functions of onion farms are furnished in Table 2. The adjusted coefficient of multiple determinations was 0.96 in Yamunanagar district which reveals that the production function model was a good fit and 96 percent of the variation in onion yield was influenced by the explanatory variables included in the model. In log linear production function, the coefficient represents the production elasticity of the resources used. The coefficients of land, preparatory tillage, seed, fertilizers, labour and machine power and irrigation were positive and significant at one percent level with the co-values of 0.0120, 0.008, 0.250, 0.064, 0.676 and 0.160 in the district, respectively. This indicated that an increase in the usage of land, preparatory tillage, seed, fertilizers, labour and machine power and irrigation number by one percent from the existing mean level. While the coefficient for manures and plant protection chemicals are negative. The results indicated that planting material/seed and labour had a positive and significant influence in onion cultivation since these were the major operation in onion cultivation.

Table 2: Regression coefficients of different inputs used for onion cultivation

Particulars	**Yamunanagar**
Constant	1.2399
Land	0.0120*(0.1398)
Preparatory tillage	0.008* (0.2775)
Seed	0.250* (0.1080)
Manures	-0.010NS (0.0200)
Fertilizers	0.064** (0.0768)
Labour and machine power	0.676** (0.1496)
Plant protection chemicals	-0.014NS (0.0080)
Irrigation	0.160** (0.0190)
Coefficient of determination (R^2)	0.96
F-value	18.053
Return to Scale	0.9725

Figures in parenthesis are the standard error of regression coefficient.
**Significance at 1 percent level of significance*
*** Significance at 5 percent level of significance, NS-Non-significant.*

Price spread of onion through different marketing channels and their efficiency

Marketing channels

For the marketing of onion, three major marketing channels were studied in the area.

- Producer → Wholesaler-cum-commission agent → Retailer → Consumer
- Producer → Retailer → Consumer
- Producer → Consumer

Price spread of onion through different marketing channels

Channel–I: Producer → Wholesaler-cum-Commission agent → Retailer → Consumer

In this channel, two intermediaries namely wholesaler-cum-commission agent and

retailer were involved between producers and ultimate consumers (Naik *et al.,* 1995). The marketing margins, price spread and cost in this channel were given in table 3. The results revealed that producers received a net price of ₹1193.48 per quintal accounting for 68.19 percent of consumer's price in Yamunanagar market. The costs incurred by the producers in the marketing of the produce were ₹101.04 per quintal. The major cost items incurred by producers were transportation, packaging charges, loading and unloading charges which accounted ₹22.80, ₹ 22.08 and ₹4.00 per quintal, respectively.

Table 3: Price spread of onion in marketing channel- I (value in ₹ qtl^{-1})

Sr. No.	Particulars	Yamunanagar
1.	Net Price received by the producer	1193.48 (68.19)
2.	**Expenses incurred by the producer**	
	a. Transportation	22.80 (1.30)
	b. Loading and unloading charges	4.00 (0.22)
	c. Cleaning and dressing charges	3.50 (0.20)
	d. Grading charges	4.30 (0.24)
	e. Packaging/cost of gunny bags	22.08 (1.26)
	f. Post-harvest losses	44.36 (2.53)
	Sub-total	101.04 (5.77)
3.	Sale price of producer/ Purchase price at wholesaler	1294.52 (73.97)
4.	**Expenses incurred by the wholesaler**	
	a. Filling	8.00 (0.49)
	b. Weighing and sewing	10.60 (0.60)
	c. Market fees @ 2 percent	29.41 (1.68)
	d. Storage charges	3.00 (0.17)
	e. Miscellaneous	0.50 (0.03)
	f. Storage losses	3.41 (0.19)
	Sub-total	54.92 (3.14)
5.	Net margin of wholesaler	121.33 (6.93)
6.	Sale price of wholesaler / Purchase price of retailer	1470.77 (84.04)
7.	**Expenses incurred by the retailer**	
	a. Commission	87.50 (5.00)
	b. Loading and unloading charges	4.00 (0.22)
	c. Transportation	17.50 (1.00)
	d. Storage charges	4.50 (0.25)
	e. Spoilage and losses	3.40 (0.19)
	Sub-total	116.90 (6.68)
8.	Net margin of retailer	162.33 (9.27)
9.	Sale price of retailer/ Consumer's purchase price	1750 (100)

Figures in parenthesis indicate the percentage to the sale price of retailer

Post-harvest losses were accounted to ₹ 44.36 per quintal. Purchase prices of wholesalers were ₹1294.52 per quintal. Wholesaler sold the produce to the retailer and costs incurred by wholesalers were ₹54.92 per quintal. The items of cost were filling, weighing and sewing, market fees and storage charges. Wholesaler sold the produce to retailer at the price

of ₹1470.77 per quintal. The net margins of wholesalers were ₹121.33 per quintal and accounted for the 6.93 percent of consumer's price in the market. The retailers incurred marketing costs of ₹116.90 per quintal in the market. Sale prices of retailer or purchase prices of consumer were ₹1750.00 per quintal. The retailers received net margin of ₹ 162.30 per quintal sharing about 9.27 percent of the consumer's price in the market. Total price spread through channel-I was found to ₹556.52 per quintal.

Channel- II: Producer → Retailer →Consumer

Marketing margins, price spread and cost in the channel-II are depicted in table 4. The producer brings their produce in the market and sold to retailer directly without any Commission agent. Thus, only one intermediary i.e., the retailer is involved between the producer and consumer. The producer's shares as percentage of consumer's price were 78.67 percent in the district. The marketing costs incurred by the producer were ₹76.36 per quintal and the sale prices of producer/purchase prices at retailer for the produce were ₹1224.98 per quintal (Bhonde *et al.*, 1991).

Table 4: Price spread of onion in marketing channel-II (value in ₹ qtl^{-1})

Sr. No.	Particulars	Yamunanagar
1.	Producer selling price	1148.62 (78.67)
2.	**Expenses incurred by the producer**	
	a. Transportation	19.80 (1.35)
	b. Loading charges and unloading	4.00 (0.27)
	c. Cleaning charges and dressing	3.50 (0.24)
	d. Grading	4.00 (0.27)
	e. Packaging/cost of gunny bags	22.08 (1.51)
	f. Post-harvest losses	22.98 (1.57)
	Sub-total	76.36 (5.23)
3.	Sale price of producer / Purchase price of retailer	1224.98 (83.90)
4.	**Expenses incurred by the retailer**	
	a. Loading and unloading charges	2.0 (0.14)
	b. Market fees @ 2 percent	29.20 (2.00)
	c. Transportation	16 (1.09)
	d. Storage charges	1.90 (0.13)
	e. Spoilage and losses	3.40 (0.23)
	Sub-total	52.50 (3.59)
5.	Net margin of retailer	182.52 (12.50)
6.	Sale price of retailer / Consumer purchase price	1460 (100)

Figures in parenthesis indicate the percentage to the sale price of retailer

Therefore, net price receive by the producers were ₹1148.62 per quintal. Marketing costs incurred by the retailer were ₹52.50 per quintal, sale price of retailer or purchase prices of consumer were ₹1460 per quintal. The net margins received by retailers were ₹182.50

per quintal and accounted for 12.50 percent of the sale price of the retailer/purchase price of consumer in different zones.

Channel-III: Producer → Consumer

It was the shortest channel in onion marketing. In this channel, no intermediaries between producer and consumer were involved i.e. direct marketing. The result presented in the table 5 reveals that producer received a net price of ₹1310.00 per quintal, accounting for 94.85 percent of consumer price, respectively. The major cost items incurred by producer were packaging charge, transportation, loading and unloading charges accounting for ₹15.08, ₹22.80 and ₹2.00 per quintal, respectively. The producer's share of the consumer's rupee was found to be greatest in direct sales, followed by wholesaler-cum-commission agency and retailer. The producer's share of the consumer's rupee grew as the number of middlemen between producer and consumer decreased.

T**able 5: Price spread of onion in marketing channel-III** (value in ₹ qtl^{-1})

Sr. No.	Particulars	Yamunanagar
1.	Producer selling price	1310.00 (94.88)
2.	Expenses incurred by the producer	
	a. Transportation	22.80 (1.65)
	b. Loading charges	2.00 (0.14)
	c. Cleaning and dressing charges	3.50 (0.25)
	d. Grading	4.30 (0.31)
	e. Packaging/cost of gunny bags	15.08 (1.09)
	f. Post-harvest losses	22.98 (1.66)
	Sub-total	70.66 (5.12)
3.	Sale price of producer / purchase price of consumer	1380.66 (100)

Figures in parenthesis indicate the percentage to the sale price of retailer

Marketing efficiency of different marketing channels

Table 6 displays the marketing efficacy of onion across several marketing platforms. The marketing efficiency determined using Acharya's approach (Modified measure of marketing efficiency) for distinct marketing channels was 2.14, 3.68, and 18.45, respectively, for channel-I, channel-II, and channel-III. This efficiency rating revealed that channel-III was the most efficient of all marketing channels. This was because of the fact that in channel III, intermediaries were not involved and hence this channel was most efficient than all other channels (Barakade *et al.,* 2011; Nimbrayan *et al.,* 2022).

Table 6: Marketing efficiency of different marketing channels (value in ₹ qtl^{-1})

Sr. No.	Particulars	Yamunanagar		
Marketing channels		I	II	III
1.	Consumer’s purchase price	1750	1460	1381

2.	**Marketing cost (MC)**			
a.	MC incurred by farmer	101.04	76.36	70.66
b.	MC incurred by wholesaler	54.92	-	-
c.	MC incurred by retailer	116.90	52.50	-
	Total marketing cost	272.86	128.85	70.66
3.	**Net margin of intermediaries (MM)**			
a.	MM received by wholesaler	121.33	-	-
b.	MM received by retailer	162.3	182.5	-
	Total margin	283.63	182.5	-
4	Net price received by farmers	1193.48	1148.62	1310
5.	Total price spread	556.52	311.38	71
6.	Producer shares in consumer's Rupee	68.19	78.67	94.85
Index of marketing efficiency				
A	Acharya's method (4/2+3)	2.14	3.68	18.45
B	Conventional method (5/2)	2.03	2.41	1.00
C	Shepherd's method (1/2)	6.41	11.33	19.51

Moreover, marketing efficiency increased with the decreased in number of market intermediaries between producer and consumer. The traditional marketing efficiency under various marketing channels, namely channel-I, channel-II, and channel-III, was 2.03, 2.41, and 1.00, respectively. According to this efficiency measure, channel II was the most efficient of all marketing channels. According to Shepherd's technique, the marketing efficiency for distinct marketing channels, namely channel I, channel II, and channel III, was 6.41, 11.33, and 19.51, respectively. According to this efficiency measure, channel III was the most efficient of all marketing channels (Nimbrayan *et al.*, 2021).

Marketing behavior of onion growers

The volume of transaction through different marketing channels was presented in table 7 It is evident from the table that channel-I was most effective in which farmers transacted 47.50 percent of their marketed surplus while in channel-III has lowest transaction. Pattern of disposal revealed that farmers sold major portion of produce through channel-I where wholesaler plays an important role in study area (Nandal and Karwasra, 1979; Sarfraz *et al.*, 2008).

Table 7: Marketing behavior of onion growers Yamunanagar

Marketing channels	Volume of transaction (percent of total marketed surplus)
Channel-I	47.50
Channel-II	34.50
Channel-III	18.00

Average producer's surplus of onion in Yamunanagar

Average onion bulbs produced by selected onion growers were 126.53 in the district. Total marketable surplus was recorded 94.69 quintal per acre and unmarketable bulbs at field

level were recorded 29.07 quintal per acre at the time of harvesting due to various losses at field levels like doubles, bolters, rotted bulbs, drying, bulbs injuries, de-topping, packing, transportations and marketing. Out of the total marketable produce 1.28 and 1.49 quintals of onion bulbs retained by the sample onion growers for home consumption and for gift purpose and remaining quantity was sold in the market (Table 8).

Table 8: Producer's surplus use pattern of onion in Yamunanagar (value in qtl acre^{-1})

Sr. No.	Particulars	Yamunanagar
1.	Average area allotted for onion crop (percent of total cropped area)	29.58
2.	Average yield of onion (qtl per acre)	126.53
3.	Used for home consumption	1.28 (1.01)
4.	Used to gift relatives/ friends	1.49 (1.17)
5.	Post-harvest losses at farmers level	29.07 (22.98)
6.	Total use and losses	31.84 (25.16)
7.	Total marketable surplus	94.69 (74.84)

Figures in parenthesis indicate the percentage to total yield.

Profit earned by onion growers at different periods of storage through different marketing channels

Profit earned by the onion growers after different periods of storage was calculated and explained in table 9. It is clear from the table that price obtained by farmers by marketing of onion just after harvesting was highest (₹1310/qtl) in channel-III and lowest (₹1148/qtl) in channel-II (Shroff *et al.,* 2012). Total marketed surplus just after harvesting were found 93.8 percent.

Table 9: Profit earned by onion growers at different period of storage

(value in kg qtl^{-1} and ₹ qtl^{-1})

Sr. No.	Particulars	Yamunanagar
1.	Just after harvesting	
	a. Losses at farm level	6.20
	b. Total marketed surplus	93.8
	c. Quantity sold	93.8
Marketing of onion through different marketing channels:		
C- I	a. Selling price of onion	1193
	b. Farmer's share in consumer's rupee	68.19
C-II	a. Selling price of onion	1148
	b. Farmer's share in consumer's rupee	78.67
C-III	a. Selling price of onion	1310
	b. Farmer's share in consumer's rupee	94.85
2.	Total quantity Stored	93.8
3.	After 2 months of Storage	
	a. Storage losses within two months	5.08
	b. Quantity sold	88.72
	c. Storage cost incurred	64.13

Marketing of onion through different marketing channels			
C- I	a.	Selling price of onion	1390
	b.	Farmer’s share in consumer’s rupee	71.40
	c.	Storage efficiency / Profit	-20.63
C-II	a.	Selling price of onion	1440
	b.	Farmer’s share in consumer’s rupee	82.22
	c.	Storage efficiency	64.35
C-III	a.	Selling price of onion	1580
	b.	Farmer's share in consumer's rupee	95.75
	c.	Storage efficiency	28.56
4.	0-4 Months of storage		
	a.	Storage losses during 0-4 months	9.33
	b.	Quantity sold	84.47
	c.	Storage cost incurred	113.92
Marketing of onion			
C- I	a.	Selling price of onion	1730
	b.	Farmer’s share in consumer’s rupee	75.66
	c.	Storage efficiency	66.96
C-II	a.	Selling price of onion	1740
	b.	farmer’s share in consumer’s rupee	83.59
	c.	Storage efficiency	116.69
C-III	a.	Selling price of onion	1830
	b.	Farmer's share in consumer's rupee	96.26
	c.	Storage efficiency	32.37
5.	0-6 Months of storage		
	a.	Storage losses during 0-6 months	13.19
	b.	Quantity sold	80.61
	c.	Storage cost	150.49
Marketing of onion			
C- I	a.	Selling price of onion	2120
	b.	farmer’s share in consumer’s rupee	79.20
	c.	Storage efficiency	140.22
C-II	a.	Selling price of onion	2140
	b.	farmer’s share in consumer’s rupee	87.29
	c.	Storage efficiency	215.49
C-III	a.	Selling price of onion	2200
	b.	Farmer's share in consumer's rupee	96.87
	c.	Storage efficiency	103.97
6.	After 6 months of storage		
	a.	Storage losses after 6 months	16.74
	b.	Quantity sold	77.06
	c.	Storage cost	178
Marketing of onion:			
C- I	a.	Selling price of onion	1525
	b.	farmer’s share in consumer’s rupee	73.26
	c.	Storage efficiency	-377.15
C-II	a.	Selling price of onion	1540
	b.	farmer’s share in consumer’s rupee	84.36

	c.	Storage efficiency	-325.89
C-III	a.	Selling price of onion	1680
	b.	Farmer's share in consumer's rupee	95.59
	c.	Storage efficiency	-393.41

Marketing of onion after 2 months of storage

Storage losses within two months were calculated to 5.08 kg/qtl in Yamunanagar district and marketed surplus was 88.72 percent of total stored quantity. Storage costs incurred during 2 months were calculated ₹64.13. Marketing of onion through channel-I after 2 months of storage was uneconomical but through channel-II and III, farmers earned a maximum profit of ₹64.35/qtl.

Marketing of onion after 4 months of storage

Storage losses within four months were estimated to 9.33 kg/qtl and marketed surplus reported was 84.47 percent of total stored quantity, respectively. Storage costs incurred during 4 months were ₹113.92. Marketing of onion through channel-I after 4 months of storage was economical and profitable in all cases but farmers earned a maximum profit of ₹ 116.69/qtl in channel-II (Ahmad *et al.*, 2008).

Marketing of onion after 6 months of storage

Storage losses within six months were calculated to 13.19 kg/qtl in district which decreases marketed surplus to 80.61 percent of total stored quantity. Storage costs incurred during 6 months were ₹150.49. Marketing of onion through channel-I after 6 months of storage was found most economical compared to after 4 months of storage and farmers earned maximum ₹215.49/qtl in the district (Kulkarni *et al.*, 2012). More than 6 months of storage of onion was found uneconomical in all channels and farmers lose an amount of ₹ 325.89/qtl to a maximum of ₹ 393.41/qtl, due to decline in onion market prices observed due to new market arrivals of new season crop. Therefore, profit earned by farmers through storage of onion was found increasing upto 6 months of storage but after 6 months, farmers incurred losses due to low prices and high storage cost.

Conclusion

Onion is very important crop in the state as well as in the nation. India is the biggest producer in the globe. Haryana state is come under top ten production state in the nation. The present study was conducted to know the economics, marketing and storage aspect of onion cultivation. This was conducted in Haryana state. Yamunanagar district was selected from the state because of higher area under cultivation. Two villages and one market were randomly selected and data was collected for the year 2019-20. The present study revealed that the cost

of production in the study area was found ₹594.62 per quintal. The major cost incurred on items included rental value of land (₹17365.20), fertilizers (₹3948.41), plant protection (₹1479.28) and seed cost (₹8753.73), respectively. The average yield of onion was 126.53 quintals per acre. The average variable cost was ₹45401. The gross return per acre was ₹165754.30 and net return was recorded ₹90515.90 per acre. Channel-III was shown to be the most effective of all marketing channels, whereas channel-I had the greatest disposal of onion output. Profit obtained by onion producers was observed to increase up to 6 months of storage duration, however farmers had to experience loss beyond 6 months. After 2 months, 4 months, and 6 months of storage, the farmer earned 64.35, 116.69, and 215.49 per quintal.

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