

RESEARCH PAPER

Study of storage losses, price realized and comparative profitability of the storage methods of onion in Ahmednagar district of Maharashtra

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ABSTRACT

Onion is one of the important vegetable/ spice crop. In view of global economic scenario, India is the second largest producer of onion in the world next only to China and accounts for 16 per cent of the world area and 12 per cent of the total production of onion in the world. An attempt has been made in this study to find out the economics of storage and profitability of storage methods. In all, 96 onion growers, 32 each of small, medium and large size groups were randomly selected from Shevgaon and Pathardi tehsils of Ahmednagar district. The data pertained to the reference year 2011-2012. Percentage of loss during storage period of onion was more in traditional type storage structure as compared to improved or bottom ventilated storage structure. Storage cost of onion was also more for the traditional type storage structures particularly due to high storages losses. Per quintal net price realized was more for stored onion as compared to un stored onion in all the market. Storage cost of onion was also more for the traditional type storage structures particularly due to high storages losses. Per quintal net price realized was more for stored onion as compared to un stored onion in all the market. In study area there were four onion storage structures and considering all, improved type of storage structure was most adopted by the farmers because it is well ventilated with less storage losses.

KEY WORDS : Storage losses, Prices of onion, Methods of onion storage

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Onion (*Allium cepa* L.) is an important and indispensable item in every kitchen as condiment and vegetable. Hence, it is also called as “queen

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of kitchen”. It is used either in raw form or dehydrated form to add flavour and taste to cuisine. Since, onion has medicinal value, it has many uses and recent reports suggest that onion plays a part in preventing heart diseases and other ailments. Onion bulb is rich in minerals like phosphorus, calcium, carbohydrate, proteins and vitamin C.

India is the second largest producer of onion in the world next only to China and accounts for 16 per cent of the world area and 12 per cent of the total production of onion in the world. In Maharashtra, total area under onion

crop during year 2011-12 was 35.900 thousand hectares and the production was 1.20 million tonnes which accounted 28.50 per cent of India's total onion production. The average productivity of onion in Maharashtra was 12 tonnes per hectare during last ten years. (Source: *Agrostat.com*, 2011-2012)

Ahmednagar district stands third in order next only to Nasik and Pune. The area under onion in Ahmednagar during the year 2011-2012 was 18,480 hectares with total annual production of 2.70 lakh metric tonnes.

In this context, the onion is traditionally stored in temporary structure built and thatched by using stalks of jowar, pigeonpea and cotton, sugarcane straws etc. Heavy storage losses particularly of rotting and sprouting have been noticed in traditionally built onion storage structures during long-term storage. At present, Maharashtra state has the largest onion storage capacity of 5.0 lakh metric tonnes, which accounts for 40 per cent of India's total onion storage capacity. The other states having noticeable onion storage capacity are Gujarat, Bihar and Karnataka. Generally in Ahmednagar, there are four types of storage structure found such as wooden, stone, mixed and improved type storage structure. Onion being a semi-perishable, its storage is required to be done properly to avoid subsequent storage losses. The prices of onion are very low during post-harvest period and rise thereafter. So far very few systematic efforts have been made to find out different types of local and modified storage structures, marketing pattern of onion, prices realized, and economics of storage to get maximum net profit, etc.

Objectives :

- To study storage losses, price realized and comparative profitability of the storage methods
- To study price spread in different marketing channels.

METHODOLOGY

Multistage sampling design has been used for selection of district, tehsils, villages and onion storage growers.

At first stage, Ahmednagar district was purposively selected for the present study. At second stage, two tehsils of district were selected on the basis of higher onion growers and onion storage farmers. At third stage, from two selected tehsils, 8 villages were selected and from each village, 12 onion growers that is four onion

growers from each of the three predetermined size classes such as small (< 2 ha), medium (2-4 ha) and large (> 4 ha) were selected randomly. Thus, from 8 villages, 96 onion growers were selected with equal distribution of 32 onion growers in each of the class. The survey method was adopted for collecting the primary data on storage and marketing of onion.

A separate schedule was also prepared for collecting the information from commission agents, wholesalers and retailers. The primary data for the year 2012-2013 were collected by paying personal visits and interviewing the selected onion growers as well as intermediaries in the marketing of onion. In addition to this, the related secondary data were also obtained from Government offices and other institutions, bulletins, publications etc.

ANALYSIS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under the following heads :

Marketing cost of onion :

The total marketing cost comprises of sum total of costs of all the functions such as packaging, transportation, Hamali, weighing charges, commission, market rent, postage etc. The information on these items was collected from the sample onion growers as well as market intermediaries and per quintal cost of marketing of onion in Ahmednagar and Rahuri markets was worked out and have been presented in Tables.

Ahmednagar market :

The information on item wise per quintal cost of marketing of onion in Ahmednagar market is presented in Table 1. It is seen from the table that per quintal cost of marketing at the overall level was Rs. 67.15. Transport cost, packaging material cost and commission charges had the share of 39.08, 26.34 and 25.38 per cent in the total marketing cost, respectively. These items together shared 90.80 per cent of the per quintal marketing cost. The 8.44 per cent of the marketing cost was incurred on wages for grading, Hamali and weighing etc., which separately accounted for 1.97, 4.09 and 2.38 per cent, respectively. The cost on account of these items was relatively low as compared to other items of market cost. Among the different size groups, it was noticed that per quintal marketing cost of onion was little bit higher in

small size group (Rs. 67.55) as compared to medium (Rs. 67.44) and large (Rs. 66.56) size groups.

Rahuri market :

The details of per quintal cost of marketing of onion in Rahuri market are presented in Table 2. At the overall level, per quintal cost of marketing of onion in Rahuri market was worked out to Rs. 82.65. The marketing items such as transportation, packaging and commission charges were observed to be the major items in order to be the major items comprising 47.65, 22.63 and 21.49 per cent in the total marketing cost, respectively. Grading, Hamali and weighing charges were the other items having measurable contribution in the total marketing cost. They all together shared 7.52 per cent of the total marketing cost. The other marketing charge which included postage, market levy, etc., was noticed to be negligible items of marketing cost having just 0.71 per cent share in the total marketing cost. Among the different size groups, it was noticed that per quintal marketing cost of onion was little bit higher in small size group (Rs.

83.03) followed by medium (Rs. 82.73) and large (Rs. 82.22) size groups. Transport, packaging and commission charges were the major items of marketing costs in all the size groups.

Price spread in different marketing channels :

Price spread refers to the difference between the price paid by the consumer and the price received by the producer. This consists of marketing cost and margins of the intermediaries. The cost and margin of each intermediary in different marketing channels were worked out and depicted in Table 3. It can be revealed from the table that per quintal net price realized by the onion growers ranged from Rs. 204.72 to Rs.342.60 in different marketing channels. The higher net price was received in Channel-III (Producer-Co-operative Sangh - Export agent - Consumer). The producer's share in consumer's rupee was the highest 88.93 per cent in Channel-V (Producer - Consumer) *i.e.* direct sell to consumer and the lowest 59.48 per cent in Channel-I (Producer - Commission agent -Wholesaler - Retailer -

Table 1 : Item wise per quintal marketing cost of onion in Ahmednagar market					(Rs.)
Sr. No.	Item of marketing cost	Size group			Overall
		Small	Medium	Large	
1.	Grading	1.27 (1.88)	1.30 (1.93)	1.41 (2.12)	1.32 (1.97)
2.	Packaging	17.42 (25.79)	17.65 (26.17)	18.05 (27.11)	17.69 (26.34)
3.	Transportation	27.05 (40.04)	26.52 (39.32)	25.15 (37.79)	26.24 (39.08)
4.	Commission	16.98 (25.14)	17.10 (25.36)	17.05 (25.62)	17.04 (25.38)
5.	Hamali	2.75 (4.07)	2.75 (4.08)	2.75 (4.13)	2.75 (4.09)
6.	Weighing	1.60 (2.37)	1.60 (2.37)	1.60 (2.40)	1.60 (2.38)
7.	Other	0.48 (0.71)	0.52 (0.77)	0.55 (0.83)	0.51 (0.76)
	Total	67.55 (100.00)	67.44 (100.00)	66.56 (100.00)	67.15 (100.00)

Figures in parentheses are the percentages to the total marketing cost

Table 2 : Item wise per quintal marketing cost of onion in Rahuri market					(Rs.)
Sr. No.	Item of marketing cost	Size group			Overall
		Small	Medium	Large	
1.	Grading	1.37 (1.65)	1.33 (1.60)	1.42 (1.73)	1.37 (1.66)
2.	Packaging	18.23 (20.96)	18.67 (22.57)	19.20 (23.35)	18.70 (22.63)
3.	Transportation	40.27 (48.50)	39.75 (48.05)	38.12 (46.36)	39.38 (47.65)
4.	Commission	17.69 (21.31)	17.57 (21.24)	18.02 (21.92)	17.76 (21.49)
5.	Hamali	3.10 (3.73)	3.10 (3.75)	3.10 (3.77)	3.10 (3.75)
6.	Weighing	1.75 (2.10)	1.75 (2.11)	1.75 (2.12)	1.75 (2.11)
7.	Other	0.62 (0.75)	0.56 (0.68)	0.61 (0.75)	0.59 (0.71)
	Total	83.03 (100.00)	82.73 (100.00)	82.22 (100.00)	82.65 (100.00)

Figures in parentheses are the percentages to the total marketing cost

Consumer) and it was due to higher marketing cost and commission of intermediaries, 40.52 per cent and more number of intermediaries. The lowest consumer's price was observed in Channel-V. This was due to less demand and low sells of the onion produce as compared to the other markets. The highest total marketing cost and commission of intermediaries was observed in Channel-III (Rs. 183.63), while the lowest was Rs. 25.48 per quintal in Channel-V.

From the above discussion, it can be concluded that upto 40 per cent share of consumer's rupee was galloped by the market intermediaries in the marketing of onion. Because the producer's share in consumer's rupee was upto 60 per cent only.

Per quintal net price realized for stored and un stored onion in different markets :

The per quintal net prices realized for stored as well

Table 3 : Marketing cost, marketing margin and price spread in different marketing channels						(Rs. /q)
Sr. No.	Item of marketing cost	Marketing channel				
		Producer	I	II	III	IV
1.	Gross price received	286.20 (66.97)	274.40 (73.05)	378.02 (73.78)	240.91 (77.63)	230.20 (100.00)
	Cost incurred	32.03 (7.49)	30.45 (8.10)	35.42 (6.91)	28.74 (9.26)	25.48 (11.07)
	Net price received	254.17 (59.48)	243.95(64.95)	342.60 (66.85)	212.17 (68.37)	204.72 (88.93)
2.	Co-operative Sangh					
	Price received	-	-	436.02 (85.08)	-	-
	Cost incurred	-	-	23.21 (4.52)	-	-
	Margin	-	-	34.79 (6.78)	-	-
3.	Commission agent					
	Price received	311.24 (72.83)	-	-	-	-
	Cost incurred	2.83 (0.66)	-	-	-	-
	Margin	22.21	-	-	-	-
4.	Wholesaler					
	Price received	368.57 (86.24)	327.97 (87.32)	-	-	-
	Cost incurred	25.14 (5.8)	22.50 (6.00)	-	-	-
	Margin	32.19 (7.53)	31.07 (8.27)	-	-	-
5.	Retailer					
	Price received	427.36 (100.00)	375.60 (100.00)	-	310.35 (100.00)	-
	Cost incurred	26.12 (6.11)	18.41 (4.90)	-	26.70 (8.60)	-
	Margin	32.67 (7.64)	29.22 (7.78)	-	42.74 (13.77)	-
6.	Consumers price	427.36 (100.00)	375.60 (100.00)	512.50 (100.00)	310.35 (100.00)	230.20 (100.00)
7.	TMC+ Commission of intermediaries	173.19 (40.52)	131.65 (33.05)	169.90 (33.15)	98.18 (31.63)	25.48 (11.07)
8.	Producer's share in consumer's rupee (%)	59.48	64.94	66.85	68.37	88.93

Table 4 : Per quintal net price realized for stored and un stored onion in different markets							(Rs.)
Sr. No.	Particulars	Ahmednagar market		Rahuri market		Local market	
		Stored onion	Unstored onion	Stored onion	Unstored onion	Stored onion	Unstored onion
1.	Gross price received	1200.40	920.30	1120.10	855.41	810.41	610.33
2.	Marketing cost	68.35	66.10	84.70	80.60	30.21	29.78
3.	Storage cost	95.52	-	95.52	-	95.52	-
4.	Net price realized	1036.53	854.20	939.88	774.81	684.68	580.55
5.	Difference between net price gain from stored and un stored onion		182.33		165.07		104.13

as an stored onion sold in different markets have been worked out and the results are depicted in Table 4. It can be revealed from the table that in Ahmednagar market, the per quintal net price realized for stored and un stored onion was Rs. 1036.53 and Rs. 854.20, respectively.

For Rahuri market, the per quintal net price realized for stored an unstored onion was Rs. 939.88 and Rs. 774.81, while for the local market it was Rs. 684.68 and Rs.580.55, respectively. The difference between per quintal net price realized for stored and unstored onion was Rs. 182.33, Rs. 165.07 and Rs. 104.13 for, Ahmednagar, Rahuri and Local market, respectively which indicates comparative profitability of onion storage. It can be inferred from the above discussion that net price realized for stored onion was higher as compared to unstored onion which indicates the importance of storage of onion during the period of glut in the market for reaping the benefit of higher prices during off season.

Economics of storage :

Onion being semi perishable in nature, its storage has great significance for obtaining higher net returns. It is expected that the surpluses of onion during the post harvest period are to be stored and sold when there is demand in the market. An attempt has been made to study different types of storage structures, storage losses, per quintal storage cost, prices realized and relative profitability of onion storage.

Types of storage structures :

Various types of onion storage structures are used for storage of onion in the study area. Most of these are traditional type, constructed by the farmers as per their requirements and availability of material. Some growers have constructed the storage structures recommended by various agencies. Thus, they either sale their produce immediately after harvest at prevailing prices or store onion in traditional structures.

Stone type :

This type of storage structure is locally called as 'chawl', it consists of four walls, rectangular structure, constructed with the help of stones. The roof of rectangular structure is thatched by grass or sugarcane trash and polythene sheet to cover the top. This type of storage structure is cheap and easy to construct.

Wooden type :

This type of storage structure is constructed with the help of raw material like wooden logs for frame work, plastic sheet is used for covering the top made of sugarcane trash and bajara stalks. Its life is from 2 to 4 years. As such, most of onion growers have preferred wooden type storage structure due to locally available construction material.

Mixed type :

This type of storage structures is made up of materials viz., cement or steel sheets, steel angles, supporting wood logs and walls are constructed by using the red gram straw etc. The steel angles are used as pillars of structure. It is fixed in the ground firmly in concrete. The wooden strips or bamboo strips or some times, red gram straw are fastened on all four sides of the steel frame. The side walls of wooden or bamboo or red gram trash increase aeration. The structure is costly to build but its life is 5 to 7 years.

Improved type :

This type of storage structure is developed in wooden framework, shelves prepared by wooden bottom plates and roof hatched by Mangalore brick tiles. The waterproof plinth or base is built in cement slab over ground level. The roof from both sides is extended to give enough protection against rains. In such improved storage structure, the onion bulbs can be stored for six months with the least storage losses *i.e.* 30-32 per cent. It has been noticed that, only 12.96 per cent sample onion growers were using improved type storage structures. This might be due to high construction cost of the structure.

Storage losses :

Onion is a bulbous vegetable crop containing 80-85 per cent moisture and, therefore, during long term (*i.e.* six month) storage of onions, about 30-35 per cent storage loss is a common phenomenon. However, due to unavailability of proper storage structure and non-use of pre and post-harvest technology, the storage losses are generally further extended to 10 to 15 per cent. The information of storage losses in different types of storage structures is given in Table 5.

It can be revealed from Table 5 that physiological loss in weight of onion was one of the major and

unavoidable parts of storage loss. It accounted for 18.65 per cent in wooden type storage structure, followed by stone type 18.36 per cent, mixed type 17.23 per cent and in improved or bottom ventilated storage structure it was 16.65 per cent. In addition to this, occurrence of rains during storage, high humidity etc. leads to excessive rotting losses. It was noticed that sprouting losses are high in traditional type storage structures *i.e.* 8.18, 7.19 and 6.95 per cent in stone type, wooden type and mixed type storage structures, respectively. Rotting losses were to the extent of 4.50 per cent in improved type storage structures. Losses due to sprouting were 4.89, 4.13 and 3.90 per cent in stone type, wooden type and mixed type storage structures, respectively. However, it was only 2.37 per cent in improved type storage structure. Other storage losses included black mould, scale etc., which accounted for 2.14 per cent in stone type, 1.87 per cent in wooden type, 1.82 per cent in mixed type and 1.08 per cent in improved type storage structure. At the overall level, the storage losses were as high as 33.57 per cent in stone type storage structure followed by 31.84 per cent in wooden type and 29.90 per cent in mixed type structure. In bottom ventilated storage structures, the losses were only 24.60 per cent, which indicates the importance of improved storage

structure.

Storage cost :

Table 6 the quantity of onion stored by the sample farmers varied with production level, family requirements, economic condition of the farmers etc. It would be revealed from table that average per quintal storage cost of onion was Rs. 95.52. The share of fixed cost and variable cost was 7.15 and 92.85 per cent of the total storage cost, respectively. The loss in monetary value on account of storage losses and interest on value of stored onion under variable cost and depreciation of storage structure under fixed cost were the major items of total storage cost constituting 86.14, 4.77 and 4.46 per cent of the total storage cost, respectively. Expenses on operations during storage period include sorting of inferior quality bulbs, cleaning of site etc. which accounted for 1.97 per cent of the total storage cost.

As regards the structure wise storage cost, it was highest in stone type storage structure *i.e.* Rs. 107.22 per quintal, followed by wooden type (Rs. 99.08 per quintal) and mixed type storage structures (Rs. 93.01 per quintal). The total per quintal storage cost of onion was the lowest *i.e.* Rs. 79.00 in improved or bottom ventilated storage structure. Loss in monetary value on account of storage losses was the major item of total

Sr.No.	Type of onion storage structure	Storage loss in percentage				Overall
		Loss in weight	Rotting	Sprouting	Other	
1.	Stone type	18.36	8.18	4.89	2.14	33.57
2.	Wooden type	18.65	7.19	4.13	1.87	31.84
3.	Mixed type	17.23	6.95	3.90	1.82	29.90
4.	Improved type	16.65	4.50	2.37	1.08	24.60

Sr. No.	Type of storage structure	Fixed cost			Total fixed cost	Variable cost			Total variable cost	Total storage cost
		Depreciation of storage structure	Interest on structure cost	Rental value of land		Expenses on operations during storage	Interest on value of stored onion	Loss in monetary value		
1.	Stone type	2.81	0.20	1.67	4.68	1.58	4.18	96.78	102.54	107.22
2.	Wooden type	3.60	0.42	1.67	5.69	1.82	4.21	87.36	93.39	99.08
3.	Mixed type	4.36	0.86	1.67	6.89	1.89	4.87	79.36	86.12	93.01
4.	Improved type	6.28	2.10	1.67	10.0	2.12	4.98	65.64	72.74	79.00
	Overall	4.26	0.90	1.67	6.83	1.85	4.56	82.28	88.69	95.52
		(4.46)	(0.95)	(1.74)	(7.15)	(1.97)	(4.77)	(86.14)	(92.85)	(100.00)

Figures in parentheses are the percentage to the total storage cost

storage cost in all the types of storage structures. Hile *et al.* (2008); Lokhande and Barakade (2011) and Barakade (2012) have also worked on storage cost of onion problems of onion storage and price spread in marketing of onion, respectively.

Conclusion :

The per quintal marketing cost of onion in Ahmednagar market was worked out to Rs. 67.55, Rs. 67.44 and Rs. 66.50 for small, medium and large size groups, respectively, while for Rahuri market, it worked out to Rs. 83.03, Rs. 82.73 and Rs. 82.22 for small, medium and large size groups, respectively. Transportation, commission charges, packaging material costs were the major items accounting for more than 90 per cent of the total marketing cost. Onion growers from the study area were mainly using four different types of storage structures for onion storage *viz.*, stone type, wooden type, mixed type and improved or bottom ventilated type storage structures. These structures differed in raw material used for construction, expected life of storage structure, storage losses etc.

Storage losses incurred in different types of storage structures during the period of May to October ranged from 25 per cent to 34 per cent. It was highest in the traditionally built stone type storage structure 33.57 per cent and lowest in the improved or bottom ventilated storage structure 24.60 per cent. At the overall level, average per quintal storage cost of onion was Rs. 95.52. It was highest in stone type storage structure *i.e.* Rs. 107.22 per quintal due to high storage losses and lowest in improved or bottom ventilated storage structure *i.e.* Rs. 82.79 per quintal. Per quintal net price realized

for stored onion was higher than the unstored onion in different markets, which indicates the comparative profitability of storage of onion.

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