

## RESEARCH PAPER

# Economic analysis of post harvest losses in onion in Ajmer district of Rajasthan

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## ABSTRACT

A study was undertaken to examine the nature and extent of post-harvest losses in onion supply chain in the Ajmer district which is major onion district of Rajasthan. A total sample size of 75 onion growers, 20 wholesalers and 25 retailers were taken from Ajmer district. Maximum aggregate post-harvest losses (22.76 kg/q) have been found at producer level due to faulty storage, lack of adequate transportation, drying, improper handling of the produce at the time of marketing, rotted bulbs, doubles, bolters, poor packing facilities, injury at the time of harvesting and de-topping. Total losses in the supply chain were estimated to be 28.95 kg/q and (78.62%) losses were observed at farm level and rest were contributed at wholesale and retail level. The farm level post harvest losses excluding the losses at farm level storage for Ajmer district was estimated to be 747.82q for the year 2009-10.

**KEY WORDS :** Post-harvest losses, Onion

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An onion, today being compared with diamonds indicates its value for a normal household budget. Global review states that China is the first in area and production of onion while India occupies second position in the production and exports to Dubai, Kuwait, Saudi Arabia, Middle East, Malaysia, Singapore,

Bangladesh, Sri Lanka etc. Onion is an important commercial vegetable crop. About 82.02 million tonnes onion is produced in the world from 8217 thousand hectares of area. India is one of the major onions producing country with a production of 14.84 million tonnes from an area of 1.01 million hectares.

Onion is one of the most important commercial vegetable crops grown in Rajasthan. It occupies about 25 -30 per cent area of the total vegetable crops in the state. It is predominantly a *Rabi* season crop but in *Kharif* season it accounts for about 10 -15 per cent of the total production. Rajasthan has a comparative advantage in onion production. In the total area and production in the country, Rajasthan stands 7<sup>th</sup> position in

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area and production and productivity in India and contributes about 57.46 ('000 ha) in area and 704.96 (in '000 MT) in production (NHB, 2013-14).

In India post harvest losses has been accounted as one of the major problem in most of the vegetables including onion. Verma and Singh (2004) reported overall losses in vegetables upto 25 per cent of total production. Severe losses occur because of poor transportation facilities, lack of know-how, poor management and improper market facilities or due to careless handling of the produce by farmers, market intermediaries and consumers (Gauraha and Thakur, 2008 and Singh *et al.*, 2008). The study by Karim and Wee (1996) had revealed that well managed post-harvest activities for vegetables led to higher yields and profits to producers. It is, therefore, important that the post-harvest practices be given as much attention as production practices.

Therefore, a study on post-harvest losses of onion was undertaken. The study aimed at assessing the extent of losses, which in turn will facilitate development of proper measures to reduce post-harvest losses at farm and trade level.

## METHODOLOGY

The study was carried out in the Ajmer district of Rajasthan. The methodology for collection of primary data involved structured interview schedule using personal interview method. A structured schedule was prepared for collection of data from 75 onion farmers from district for the fulfillment of objectives.

### Multistage stage sampling was adopted:

At first stage, only highest onion producing 3 tehsils were selected in district. At second stage 3-4 villages were randomly selected for the purpose of primary data collection in district. At third stage the list of the onion growers along with their operational holdings in each of the randomly selected village was prepared with the help of villagers. From this prepared list of onion growers, 7-

8 onion growers were randomly selected from each village for the present study. A total sample of seventy five onion growers from ten villages was drawn from district. Also a sample of 20 wholesalers and 25 retailers dealing in onion were selected randomly for obtaining the information pertaining to the postharvest losses. Data obtained from the survey was analyzed through tabular analysis including appropriate statistical tools.

## ANALYSIS AND DISCUSSION

The post-harvest losses were estimated at producer level to trader level. Yet the losses at producer level have been estimated at different stages like; harvesting, grading and packing, handling and transportation and marketing; whereas the losses at trader level have been estimated at loading-unloading, transportation, grading and selling stages. The findings of whole post – harvest losses of onion were analyzed at farm level first and then it was worked out on per hectare basis and finally it was estimated on per quintal of output produce and the findings are depicted in the Tables 1 to 5.

### Analysis of post harvest losses in Ajmer district :

The post-harvest losses have been assessed at different stages of supply chain of onion from produce to consumer *viz.*, at the farm level, during storage, wholesale marketing level and retailing level.

Total onion bulbs produce by all the 75 onion growers were 8490.02q from the 33.91 ha area. Total marketable yield was recorded 7708.10q and qualitative losses (unmarketable bulb yield) were recorded 781.92q at the time of harvesting due to various losses at field levels like doubles, bolters, rotted bulbs, drying, bulbs injuries, de-topping, packing, transportations, marketing etc. Out of the total marketable bulb yield (7708.10q) 375.00q of onion bulbs were kept by the sample onion growers for own use basically for onion seed production programme in the next crop season at own farms and remaining 7333.10q bulbs was available for marketing of onion in

**Table 1: Overall average quantity of onion bulbs produce, marketable quantity, marketed surplus and stored quantity of onion in the Ajmer district**

Total onion production by selected farmers (q)	Losses in total production at farm level (q)	Total marketable bulbs (q)	Onion kept for own used (q)	Total marketed surplus (q)	Quantity of produce sold within one month (q)	Share of farmer's sold produce with in one month period (%)	Total quantity stored for storage (q)	Share of farmer's stored produce in onion storage (%)
8490.02	781.92	7708.10	375.50	7333.10	3910.74	53.33	3422.36	46.67

Total number of respondents= 75 farmers, 20 wholesalers, 25 retailers

Ajmer district (Table 1). Results further showed that out of total available marketable produce (7333.10q), 3910.74q was sold and 3422.36q was stored by 53.33 per cent and 46.67 per cent of the onion growers, respectively. It was also evident from the study that among the total farmers involved for selling of onion after harvesting of crop, 42.50 per cent sold their produce immediately in the market within seven days and 57.50 per cent sold their produce in the market within one month period. It could be inferred from the Table 1 that out of the total selected farmers in the sample size groups' farm, 46.67 per cent farmers stored onion (3422.36q) at farm level in Ajmer. The analysis of stored onion further revealed that 13.56 per cent (460.55q) post harvest losses occurred in the storage during six months storage period (May-October).

The losses after harvesting of onion till it reaches consumers were assessed and presented below:

#### Post harvest losses at farm level:

The post harvest loss in onion at the field level was

estimated to be 9.20 kg/q. The resultant loss at farm level were due to injury at the time of harvesting, de-topping, doubles, bolters, rotted bulbs, drying, under sized unmarketable bulbs, faulty storage and transportation and improper handling of the produce at the time of marketing. Among these, loss to faulty storage was the highest (13.56 kg/q) followed improper transportation, which resulted in a loss of 1.74 kg/q of produce (Table 2). This loss due to faulty storage appeared to be rather high because most of the respondents stored the produce for more than 8-10 days by adopting traditional on-farm heap method of storage. The crude packaging while moving the produce from home to market (bullock carts/ tractor trolley) also contributed to the loss of produce. The drying loss was 1.31kg/q. The loss of output due to faulty de-topping in onion resulted in a loss of 0.65 kg/q because of improper cutting of the top by the laboures. The losses due to injuries at the time of harvest in onion resulted in a loss of 0.74 kg/q. Improper packaging and rough handling of the produce during marketing resulted in post harvest losses and these losses were estimated

**Table 2 : Post harvest losses in onion at different stages in the Ajmer district**

Sr. No.	Different stages	Loss (kg/q)	Per cent loss
<b>Farm level losses due to</b>			
1.	Harvesting injuries	0.74	2.56
2.	De-topping	0.65	2.25
3.	Drying	1.37	4.73
4.	Doubles and bolters	1.17	4.04
5.	Rotted and under sized bulbs	1.08	3.73
6.	Packing	1.05	3.63
7.	Transportation	1.74	6.01
8.	Marketing	1.40	4.84
	Total losses at farm level	9.20	31.78
	<b>Losses during storage</b>	13.56	46.84
	Overall total losses at farm level	22.76	78.62
<b>Wholesaler level losses due to</b>			
1.	Storage	1.28	4.42
2.	Transit	2.04	7.05
	Total loss at wholesale level	3.32	11.47
<b>Retailer level losses due to</b>			
1.	Transit and storage	1.22	4.21
2.	Bad weather and foreign matter content	0.86	2.97
3.	spoilage and multiple handling loss	0.79	2.73
	Loss at retailer level	2.87	9.91
	Total loss	28.95	100.00

\*Total number of respondents= 75 farmers, 20 wholesalers, 25 retailers

to be, respectively 1.05 kg/q and 1.40 kg/q for onion.

#### Post harvest losses at wholesaler and retailer level:

At the wholesale marketing level, the total post harvest losses worked out at 3.32 kg/q of produce traded. The losses during storage in onion at the wholesale level were 1.28 kg/q. The other component losses at this stage was losses in transit resulted in a loss of 2.04 kg/q of onion traded. Transportation loss in onion crop was higher because of the use of unsuitable transport means, negligent driving, rough roads and improper stacking. The post harvest losses of onion at the retailing level were estimated 2.87 kg/q for onion. The transit and storage losses at retail level were 1.22 kg/q of the produce traded. The loss due to spoilage and multiple handling of produce during retailing was 0.79 kg/q. The post harvest loss at the retailer level due to bad weather and foreign matter content was recorded 0.86 kg/q in the purchased produce (Table 2).

#### Total post harvest loss:

The post harvest loss occurring at field and market was added upto 28.95 kg/q. Maximum post harvest loss was observed at the farm level (22.76 kg/q) accounting for 78.62 per cent of the total post harvest loss (Table 2). This loss was obtained due to high moisture content of onion led to deterioration of quality in onion and in turn the quantity loss occurred at different post harvest

stages viz., drying, storage, packing and transportations at field level. Further 3.32 kg/q of the output losses were observed at the wholesale level, accounting for 11.47 per cent. The loss at retail level was to the tune of 2.87 kg/q (9.91%).

The per hectare post harvest loss at farm level was estimated to be 23.00 (Table 3). The average yield for the sample farmers was 250.04/ha for onion. This means that farmers in the process of post harvest operations lost about 9.20 per cent of onion output produce by the farmers. The post harvest losses in Ajmer district in onion crop would be much higher (15.39%), if the post harvest at the market level were also added to the above values.

The average per farm onion output was 113.20q (Table 4). The per farm post harvest loss was estimated to be 10.41 in onion.

The post harvest loss at farm level (1.39q/ha) for the Ajmer district works out to be 747.82q during 2009-10 (Table 5). Similar work related to the present investigation was also carried out by Gajanana *et al.* (2006); Hazarika (2006 and 2008) and Kumar *et al.* (2006).

#### Conclusion:

The study has estimated post-harvest losses in onion in Ajmer district of Rajasthan. At producer level, the post-harvest losses have been found maximum (22.76 kg/q). The total post-harvest losses in onion at wholesale level

**Table 3: Average per hectare post harvest loss at farm level in the Ajmer district**

Produce quantity of onion bulbs by the total sample farmers (q)	Total average area under onion cultivation with the total sample farmers (ha)	Average per ha onion yield produce by the each sample farmers (q/ha)	Post harvest losses at farm level (kg/q)	Per ha Post harvest losses (q/ha)
8490.02	33.91	250.04	9.20	23.00

\*Total number of respondents = 75 in the selected sample size farms

**Table 4 : Average per farm post harvest loss in the Ajmer district**

Produce quantity of onion by the total sample farmers (q)	Total number of sample farmers in each district	Average per farm onion bulb yield production by the each sample farmer (q/farm)	Post harvest losses at farm level (kg/q)	Per farm Post harvest losses (q/farm)
8490.02	75	113.20	9.20	10.41

\*Total number of respondents = 75 in the selected sample size farms.

**Table 5: Post harvest loss at farm level (per hectare) in the Ajmer district**

Total onion cultivated area in each district (ha)	Total onion production in each district (q)	Average onion productivity in each district (q/ha)	Post harvest losses at farm level in district (kg/q)	Per hectare Post harvest losses in each district (q /ha)	Quantity of spoilage produce due to post harvest losses (q)
538	8130	15.11	9.20	1.39	747.82

\*Total number of respondents= 75 farmers, 20 wholesalers, 25 retailers

were found to be 3.32 kg/q and at retailer level it was 2.87 kg/q. And overall loss was reported as 28.95 kg/q. A large amount of losses (13.56 kg/q) also takes place during storage at farm. Across different stages, the losses have been found maximum at the grower level in onion. The spoilage/loss of onion at the grower level results from lack of his knowledge about proper post-harvest management loss at farm level were due to injury at the time of harvesting, de-topping, doubles, bolters, rotted bulbs, drying, under sized unmarketable bulbs, faulty storage and transportation and improper handling of the produce at the time of marketing contributes more to the problem. This results from farmer's lack of knowledge about post harvest management. Therefore, there is an urgent need of training the vegetable growers on scientific post-harvest techniques, if the vegetable production is to be sustained on a profitable basis in the region. Appropriate farm level storage also needs to be given due attention for reducing post harvest losses.

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