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Economic analysis of post harvest losses in onion in Jaipur 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 Jaipur district which is major onion district of Rajasthan. A total sample size of 75 onion growers, 20 wholesalers and 25 retailers was taken from Jaipur district. Maximum aggregate post-harvest losses (23.96 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 28.99 kg/q (82.65%) 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 Jaipur district was estimated to be 5185.20q for the year 2009-10.

KEY WORDS : Post-harvest losses, Onion, Supply chain, Storage

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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 7th position in 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 up to 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.

RESEARCH METHODS

The study was carried out in the Jaipur 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 were analyzed through tabular analysis including appropriate statistical tools.

RESEARCH FINDINGS 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 Jaipur 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.

From Table 1 it was found that total 16314.87q onion bulbs was produced by all the 75 respondents (onion growers) from the 48.07 ha area. Out of this produce, unmarketable bulbs was recorded 1775.77q at the time of harvesting due to various losses at field levels (doubles, bolters, rotted bulbs, drying, bulbs injuries, de-topping, packing, transportations, marketing etc.) and total marketable yield was recorded 14539.1q. Out of the total marketable bulb yield (14539.1q) 717.1q of onion bulbs were kept by the sample onion growers for own use and for onion seed production programme in the next crop season at own farms and remaining 13822q bulbs was available for marketing of onion.

Results further showed that out of total available marketable produce (13822.00q), 7003.36q (50.67%) was sold by farmers within one month and rest 6818.64 q (49.33%) was put for storage by farmers, respectively.

The losses in onion produce from farms till it reaches to consumers is presented below:

Post harvest losses at farm level:

The post harvest loss in onion at the field level was estimated to be 10.88 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 at farm level was the highest (13.08 kg/q) followed by improper transportation, which resulted in a loss of 2.15 kg/q. The drying loss was 1.80kg/q (Table 2). 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. The

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

Total onion production by selected farmers (q)	Losses in total production at farm level (q)	Total marketable bulbs (q)	Onion kept for own use (q)	Total marketed surplus (q)	Quantity of produce sold within one month (q)	Share of farmer's sold produce within one month period (%)	Total quantity for storage (q)	Share of farmer's stored produce in onion storage (%)
16314.87	1775.77	14539.1	717.10	13822.00	7003.36	50.67	6818.64	49.33

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

losses due to injuries at the time of harvest in onion resulted in a loss of 0.85 kg/q. Further, in addition to injuries at the time of harvesting some produce is left in

the field and this also contributed to the loss. Improper packaging and rough handling of the produce during marketing resulted in post harvest losses and these losses

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

Sr. No	Different stages	Jaipur	
		Loss (kg/q)	Per cent loss
Farm level losses due to			
1.	Harvesting injuries	0.85	2.93
2.	De-topping	0.65	2.24
3.	Drying	1.80	6.21
4.	Doubles and bolters and rotted	1.35	4.66
5.	Rotted and undersized bulbs	1.30	4.48
6.	Packing	1.25	4.31
7.	Transportation	2.15	7.41
8.	Marketing	1.53	5.28
	Total losses at farm level	10.88	37.53
	Losses during storage	13.08	45.12
	Overall total losses at farm level	23.96	82.65
Wholesaler level losses due to			
1.	Storage	0.95	3.27
2.	Transit	1.77	6.11
	Total loss at wholesale level	2.72	9.38
Retailer level losses due to			
1.	Transit and storage	0.83	2.86
2.	Bad weather and foreign matter content	0.76	2.62
3.	spoilage and multiple handling loss	0.72	2.48
	Total loss at retailer level	2.31	7.97
	Total loss	28.99	100.00

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

Table 3 : Average per hectare post harvest loss at farm level in the Jaipur 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)
16314.87	48.07	339.40	10.88	36.93

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

Table 4 : Average per farm post harvest loss in the Jaipur District

Sr. No.	Name of 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)
1.	Jaipur	16314.87	75	217.53	10.88	23.67

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

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

Total onion cultivated area (ha)	Total onion production (q)	Average onion productivity (q/ha)	Post harvest losses at farm level in district (kg/q)	Per hectare Post harvest losses (q/ha)	Quantity of spoilage produce due to post harvest losses (q)
1192	47680	40.00	10.88	4.35	5185.20

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

were estimated to be, respectively 1.25 kg/q and 1.53 kg/q for onion. The total loss at farm level was reported 23.96 kg/q in Jaipur district.

Post harvest losses at wholesale marketing and retailing level:

The total post harvest losses at wholesale marketing level were 2.72 kg per quintal of produce traded by different intermediaries working at wholesale level. The storage losses in onion at the wholesale marketing level were 0.95 kg/q. The other component loss at this stage was transit loss that resulted in a loss of 1.77 kg/q. Transportation loss in onion crop was higher because of the use of unsuitable transport containers, negligent driving and rough roads. The crude packing method coupled with long distance travel facilitated the accumulation of heat with in the lots which lead to spoilage (Table 2). Part of the loss was also due to loss of moisture during sales period, which mostly depends on the moisture contents of the produce and temperature.

Post harvest losses at retailing level:

The post harvest losses at the retailing level were estimated at 2.31kg/q for onion. The transit and storage loss was observed 0.83 kg/q. The post harvest losses due to bad weather and distant matter content was observed 0.76 kg/q. And the losses due to spoilage and multiple handling of produce during retailing was reported 0.72 kg/q (Table 2).

Total post harvest losses:

As according to Table 2 the total post harvest losses occurring at field and during marketing of the onion were added up to 28.99 kg/q. Maximum post harvest losses were observed at the farm level (23.96 kg/q) accounting for 82.65 per cent of the total post harvest losses. Across different levels, it was found that the losses were maximum at the farm level in onion. Similar results were obtained by Gajanana et al. (2006) and Kumar et al. (2006). On the contrary, Hazarika (2008) has reported maximum post-harvest loss at the middleman level in Assam. This was understandable in the sense that the tender texture and high moisture content of onion led to deterioration of quality of onion and in turn the quantity loss occurred at different post harvest stages like drying, storage, packing and transportations at field level. Results of the study further revealed that the wholesaler in the process of marketing retained the produce for a longer

period than that of the retailer. As a result the post harvest losses at the wholesale level were relatively more as compared to the retailer level (Table 2). Hence, proper storage arrangements at wholesaler level are needed in the F and V market. Further 2.72 kg/q of the output losses were observed at the wholesale level, accounting for 9.38 per cent. The losses at retail level were to the tune of 2.31 kg/q.

From the Table 3 it could be revealed that on an average per hectare farmer produced 16314.87 q of onion bulbs on 48.07 ha land on an average. The average per ha onion yield produced by the each sample farmer was found to be thus 339.40 q/ha. The post harvest losses at farm was found to be 10.88 kg/q and the per hectare post harvest losses were noted as 36.93 q/ha at farm level excluding storage at farm.

The average per farm onion output was 217.53q. The per farm post harvest loss was estimated to be 23.67q in onion (Table 4).

The post harvest loss at farm level for the Jaipur district thus works out (4.35q/ha) to be 5185.20q during 2009-10 (Table 5).

Conclusion :

The study has estimated post-harvest losses in onion in Jaipur district of Rajasthan. At producer level, the post-harvest losses have been found maximum (23.96 kg/q). The total post-harvest losses in onion at wholesale level were found to be 2.72 kg/q and at retailer level it was 2.31 kg/q. And overall loss was reported as 28.99 kg/q. A large amount of losses (13.08 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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