



## Research Article

# MARKETING AND ESTIMATION OF POST HARVEST LOSSES OF POTATO IN BANASKANTHA DISTRICT OF GUJARAT

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**Abstract-** Potato is the most important food crop of the world. It is being cultivated in the country for the last 300 years. For vegetable purposes, it has now become one of the most popular crops in India. In India, about 85 per cent of potatoes are cultivated in Indo-gangetic plains of North India. India produced 46.39 million tonnes, with Uttar Pradesh contributed 32 per cent, followed by West Bengal 26, Bihar 14, Madhya Pradesh, Gujarat and Punjab 5 per cent, accounted for 87 per cent of the total production in 2013-14. Keeping in view the non-availability of systematic studies on post harvest loss, a study was undertaken in one of the leading potato growing state of Gujarat to assess the post harvest loss (PHL) at different level of handling. The total PHL was observed to be about 15 per cent consisting of 4.60 per cent at field level, about 3 to 4 per cent at cold storage level, 2 to 3 per cent at market level and about 5 per cent at the retail level. The diseases and pests were the major causal factors at the field level and the cold injury and the diseases at the cold storage level. At the market level, crushing and physical damages during transportation were the major reason of PHL. At retail level, diseases caused by secondary infection, over ripe and rotten tubers and injuries to tubers due to pressing were the major causes of loss. Since the marketing cost is less and the price realized by producer is more in channel-I as compared to channel-II, selling through channel-I is desirable to take advantage of higher price realization.

**Keywords-** Sampling, Data Collection, Marketing Channels

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## Introduction

Potato is the most important food crop of the world. It is being cultivated in the country for the last 300 years. For vegetable purposes, it has now become one of the most popular crops in India. Potato is an economical food, as it provides a source of low cost energy to human diet [3]. In India, potato is cultivated in almost all states and under very diverse agro climate conditions. About 85 per cent of potatoes are cultivated in Indo-gangetic plains of North India. The states of Uttar Pradesh, West Bengal, Punjab, Bihar and Gujarat normally accounts for more than 80 per cent share in total production. India produced 46.39 million tonnes, with Uttar Pradesh contributed 32 per cent, followed by West Bengal 26, Bihar 14, Madhya Pradesh, Gujarat and Punjab 5 per cent, accounted for 87 per cent of the total production in 2013-14. The major varieties of potato grown in Gujarat are Kufri Jawahar, Kufri Kuber, Kufri Alankar, Kufri Pukhraj, Kufri Chamtakar, Kufri Kissan.

Under tropical and sub-tropical conditions, the losses due to poor handling and storage are reported to be in between 40-50 per cent [2]. The post harvest losses of potatoes are defined as qualitative and quantitative losses. The qualitative losses include physiological losses and pathological losses. The physiological losses are caused by the effect of environmental conditions and pathological losses are caused by the attack of pathogens like fungi, bacteria, insects etc. The qualitative losses greatly reduce the price of potatoes. The qualitative losses include losses during harvesting, losses by traders and transportation losses.

Keeping the above in view the present study was undertaken with the following

specific objectives:

1. To identify the marketing practices for potato in terms of various marketing channels, marketing cost and price realized in different channels.
2. To assess the post harvest losses from field level to consumers.
3. To determine the factors responsible for the losses and to suggest measures to reduce the losses.

## Materials and Methods

### Sampling and Data Collection:

Multi-stage random sampling technique was used to select the study area. Gujarat is one of the important potato producing states. Gujarat accounted for about 4 per cent of the area and about 6 per cent of production in the country in 2013-14. Hence Gujarat was purposively selected for the study. Further Banaskantha district was selected based on its contribution to area production and productivity of potato in the state. Banaskantha district accounts for about 45 per cent of potato production of the Gujarat. In Banaskantha district, the largest potato producing talukas of Deesa and Tharad were selected. Deesa taluka in the Banaskantha district ranks first in India for potato production. Data on marketing and post harvest loss were collected from potato harvesting fields in the villages located in these talukas. For estimation of post harvest losses at the market level, APMC Deesa was selected. Retail level losses were also estimated. The data of year 2013-14 was collected.

### Estimation of Post Harvest Loss:

The Post Harvest Loss (PHL) in potato was estimated on weight basis. The field level loss in potato was estimated from a sample of 30 harvesting fields and the average of three lots of 50 kg each from each field was used for proper representation. At the storage level, data was collected from 5 cold storages taking three sample units of 50 kg each from each cold storage. At the market level, five wholesalers were surveyed taking three sample units of 50 kg each from each wholesaler. Retail level, losses were estimated from a sample of 5 retailers taking the average of three sample units of 20 kg each from each cold storage

#### Estimation of Marketing Cost and Price Realized:

The cost incurred by the farmers in marketing of potato (harvesting and loading, transport, packing material, loading and unloading in the market, commission etc.) on each bag of 50 kg capacity in the market was collected from them. The price realized on each bag was also collected from them. The per bag cost of marketing and price realized were later converted into per quintal basis. The net price realized by the farmers was arrived at by deducting the marketing cost from the gross price realized by them.

#### Results and Discussion

##### Marketing Channels:

In the study area, the sample farmers followed two major channels for marketing of potato as below:

1. Producer → Cold storage → Wholesaler → Retailer → Consumer
2. Producer → Wholesaler → Retailer → Consumer

It was observed that about 45 per cent of sample farmers sold their produce through channel I in Deesa market and nearly 40 per cent of the sample farmers sold their produce through channel II in Deesa and Tharad markets. Around 15 per cent of sample farmers also sold their potatoes in the field itself to the agents of the exporters of the Banaskantha district and Gujarat. Keeping the above in view, post harvest loss was estimated in channel I and channel II.

##### Post harvest Losses:

The post harvest loss in potato was estimated at farmers' field level at the time of harvesting, loss at cold storage level during storage, transit loss at the wholesale market level and at the retail level during the final handling of potatoes.

##### Post Harvest Loss at the Field Level:

It may be observed from [Table-1] that over 4.50 per cent of the harvested potatoes was lost at the field level. Disease incidents, pest attack and cuts/cracks were the most prominent causes of loss at the field level followed by over ripening and rotting (0.80 per cent), malformation (0.60 per cent) and loss due to other causes (0.30 per cent). It was observed that about 24 per cent of the losses at this level were due to disease infestation; about 22 per cent losses due to pest attack and about 17 per cent losses were due to factors like cuts/cracks and over ripening & rotting of potatoes, respectively.

**Table-1 Post Harvest Losses in Potatoes at the Field Level**

Sr. No.	Particulars	Quantity (Kg.)	Percentage (%)
1	Quantity of sample drawn	1500	100
2	Quantity of good potatoes	1431	95.40
3	Quantity of damaged potatoes		
3.1	Cuts/cracks	11.85	0.79
3.2	Diseased potatoes	16.50	1.10
3.3	Pest infested potatoes	15.15	1.01
3.4	Malformation	9.00	0.60
3.5	Overripe and rotten potatoes	12.00	0.80
3.6	Loss due to other causes	4.5	0.30
	<b>Total field level loss</b>	<b>69.00</b>	<b>4.60</b>

At this level, different level of losses occurring is presented in [Table-2]. The

losses are found to be more than 3.25 per cent consisting of loss due to extremely low temperature i.e. chilling injury (1.30 per cent), due to disease infestation during storage (0.86 per cent), due to high temperature (0.59 per cent) and storage pests' attacks (0.50 per cent). It was observed that 40 per cent of the losses at this level were due to cold injury i.e., extremely low temperature and about 26 per cent losses due to infestation of diseases like charcoal rot, late blight, wart and soft rot etc, during storage.

**Table-2 Post Harvest Losses in Potatoes at the Cold Storage Level**

Sr.No.	Particulars	Quantity (Kg.)	Percent (%)
1	Quantity of sample drawn	250	100
2	Quantity of good potatoes	241.88	95.36
3	Quantity of damaged potatoes		
4	Loss due to high temperature	1.48	0.59
5	Loss due to extremely low temperature (Cold injury)	3.25	1.30
6	Loss due to diseases during storage	2.15	0.86
7	Loss due to storage pests	1.25	0.50
	<b>Total field level loss</b>	<b>8.13</b>	<b>3.25</b>

The post harvest loss in potatoes at Market level in Deesa and Tharad markets was estimated. It was observed that the post harvest loss in potato at market level was mostly attributed to transportation loss. It may be noted from [Table-3] that the total loss at the market level was 2.44 per cent. The loss due to physical damage was 1.29 per cent followed by due to crushed tubers (1.15 per cent). Both kind of losses occurred during transportation and improper handling of potatoes in the market. Though the road facility is good in the study area but roads in the distant villages are not proper and hence transportation loss occurred. It was noticed that about 47 per cent of the losses at this level were due to crushing and about 53 per cent losses due to physical damage during transportation.

**Table-3 Post Harvest Losses in Potatoes at the Market Level**

Sr.No.	Particulars	Quantity (Kg.)	Percentage (%)
1	Quantity of sample drawn	250	100
2	Quantity of good potatoes	243.90	97.56
3	Quantity of damaged potatoes		
3.1	Crushed potatoes	2.88	1.15
3.2	Physically damaged potatoes	3.23	1.29
	<b>Total field level loss</b>	<b>6.10</b>	<b>2.44</b>

It may be observed from [Table-4] that near about 5 per cent of the harvested potatoes were lost at the retail level. Disease incidents, over ripening and rotting were the most prominent causes of loss at the field level i.e., 2.12 per cent, followed by over ripening and rotting (1.02 per cent), physical injury (0.99 per cent) and damage during processing (0.67 per cent). It was observed that about 39 per cent of the losses at this level were due to disease infestation and about 26 per cent losses due to over ripening and rotting.

**Table-4 Post Harvest Losses in Potatoes at the Retail Level**

Sr.No.	Particulars	Quantity (Kg.)	Percentage (%)
1	Quantity of sample drawn	100	100
2	Quantity of good potatoes	96.13	96.13
3	Quantity of damaged potatoes		
3.1	Diseased potatoes	2.12	2.12
3.2	Overripe and rotten potatoes	1.02	1.02
3.3	Physical injury	0.99	0.99
3.4	Damage due to processing	0.67	0.67
	<b>Total field level loss</b>	<b>4.80</b>	<b>4.80</b>

An attempt was made to study the cost of marketing of potato in different channels and price realization in these channels. The detail is presented in [Table-5].

##### Channel-I:

It may be observed from [Table-5] that the cost of marketing in channel-I worked out to Rs. 138.57 per quintal. The marketing cost consisted of 48.73 Rs./qtl of harvesting and loading cost (35.17 %), followed by 40.00 Rs./qtl of packing

material cost (28.87 %), 22.25 Rs./qtl of transportation cost (16.06 %) and 22.00 Rs./qtl of various commissions (15.88 %). The loading and unloading accounted for only 5.59 Rs./qtl i.e., 4.03 per cent of total marketing cost. The price realized by the producers in the channel-I was worked out to be Rs. 1373.58 per quintal. Thus the net price realized would be Rs. 1235.01 per quintal.

#### Channel-II:

The cost of marketing in channel-II worked out to Rs. 157.92 per quintal. The

marketing cost consisted of 61.42 Rs./qtl of harvesting and loading cost (38.89 %), followed by 42.00 Rs./qtl of packing material cost (26.60 %), 24.35 Rs./qtl of various commissions (15.42 %) and 23.65 Rs./qtl of transit cost (14.98 %). The loading and unloading accounted for only 6.50 Rs./qtl i.e., 4.12 per cent of total marketing cost. The price realized by the producers in the channel-II was worked out to be Rs. 1200.92 per quintal. Thus the net price realized would be Rs. 1043.00 per quintal.

**Table-5** Cost of Marketing of Potato and Price Realisation

Sr. No.	Particulars	Marketing Cost (Rs./qtl)			
		Channel-I		Channel-II	
		Rs./qtl	% to Total Marketing Cost	Rs./qtl	% to Total Marketing Cost
1	Harvesting and loading	48.73	35.17	61.42	38.89
2	Transportation	22.25	16.06	23.65	14.98
3	Packing Material	40.00	28.87	42.00	26.60
4	Loading and unloading	5.59	4.03	6.50	4.12
5	Commission	22.00	15.88	24.35	15.42
	Total marketing cost	138.57		157.92	
	Price realised	1373.58		1200.92	
	Net price realised	1235.01		1043.00	

#### Conclusion

The growers of potato in Sabarkantha district followed both channels for marketing i.e., channel-I and channel-II for sale of potato. The farmers are found to benefit from selling through channel-I. Since all the losses in the channel-I were lower than the channel-II and also the price realized was higher in channel-I as compare to channel-II, the practice of selling through channel-I is desirable. As the loss was found highest in harvesting and loading, the care needs to be taken in loading and harvesting to reduce physical damage and other kind of losses in this stage. This can be done by following the practice of Dehauling when the crop attains 80-90 days and when the aerial part of the plant turns yellow. The loss due to packing material was also significant and hence the quality of the packing material needs to be improved. Mostly the bags made up of jute are used for packing so bags of some good quality material should be used to reduce the packing loss.

The loss during storage occurs mainly due to cold injury and diseases. The diseases attacks during storage are mainly charcoal rot, late blight, soft rot, wart etc. In order to avoid charcoal rot, harvest early, seed treatment with fungicides like Aretan or Agallol. To avoid the late blight, give the seed treatment with fungicides and proper harvest care should be taken. Apply heat treatment to tubers to avoid wart. To avoid soft rot, wash tubers with chlorinated water before storage. Proper temperature is to be maintained during storage to avoid the loss due to cold injury. Also the proper sanitary measures should be taken to avoid the various losses during the storage.

**Conflict of Interest:** None declared

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