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Estimation of post harvest losses of soybean in Sehore district of M.P

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Abstract

India is an agricultural country from immemorial time, which is endowed with abundant natural resources. In soybean production system, the post-harvest losses occur at all stages of operations. The Sehore district purposively selected for present study because, this district is one of the important soybean growing tract in the state. Multi stage stratified random sampling technique was used for drawing a sample for the study with the objective to assess the extent of post harvest losses of soybean at different stages of post harvest operations in different size of farm. Study revealed that as the size of farm increases, the harvest losses, threshing and winnowing losses, handling losses, physical losses, storage losses marketing processing losses, Mandi losses and transportation losses also increase. On an average size of farm in the study area average harvest losses were observed 52.31 kg/ha., average threshing and winnowing losses were 4.60 kg/ha., average handling losses were 2.35 kg/ha., average physical losses were 8.78 kg/ha., average storage losses were 11.57 kg/ha., average marketing & processing losses were 4.75 kg/ha., average transportation losses were 1.13 kg/ha., average Mandi losses were 6.55 kg/ha. The total post harvest losses of soybean per hectare in physical quantity and monetary terms were also estimated. The data shows that on an average, per hectare post harvest losses were found to 95.33 kg per hectare which amounting Rs.2669. On the other hand, the data shows that on an average, per quintal post harvest losses was found to 6.76 kg per quintal which is amounting Rs.189. It is suggested that reduction in harvest and post harvest losses should be checked by farmers in every stage of marketing and efforts should be made to popularize post harvest technology amongst the farmers so that they could able to take advantage of time, place, form and possession utility of the product and earn more by reducing the post harvest losses occurred in soybean. Study revealed that the maximum post harvest losses were occurred during harvesting of soybean. Hence, the farmers should be advised through training and demonstration for utilizing soybean seed which are not shattering during harvesting and their proper harvested method. To obtain good quality and quantity of soybean grains, it is necessary that the threshing and winnowing should be done properly so that the grain should not be broken, spelled and mixed with foreign materials. In regions, the threshing and winnowing of soybean is done by manual on small scale. However, on large scale threshing and winnowing is done by machine. The suitable machinery viz. thresher and winnower etc should be used for threshing and winnowing. Hence, farmers should be given proper knowledge about protective process, practices and use of proper post harvest machineries at farm level.

Keywords: post-harvest loss, soyabean, mandi, storage

Introduction

India is an agricultural country from immemorial time, which is endowed with abundant natural resources. If agriculture blooms, the country prospers. In Indian situation agricultural development is necessary for the exploiting population of India. Now the farmer's expectations have increased to get maximum returns from their produce. In soybean production system, the post-production losses occur at all stages of operations. The post harvest losses began from right in the field with standing crops at harvest time upto threshing, winnowing, handling, physical (drying), storage, market processing, transportation and mandi losses. These losses can be avoided by adopting improved post-harvest practices and post harvest management technique. The post harvest losses reduce the quantity of marketable surplus and quality destruction causes low market price. In general, the soybean producer in study area operates limited size of farms, with limited access to resources and technology and

reaping low productivity. On the other hand, poor quality produce and high levels of post harvest losses occur primarily due to non adoption of post harvest management practices at the production level. The non adoption of post harvest management practices might be due to lack of knowledge and skill in post harvest handling, inadequacies in basic and post harvest specific infrastructure, transport, storage and marketing.

Public awareness campaigns must be implemented in order to increase awareness of the costs and implication of losses after harvest/production. Fixed targets must also be established to curb post harvest losses. To support the above activities the planners and extension personnel needs to be feedback information in respect of economic impact of post harvest management practices. In this context the present study would be an attempt to provide feedback information to the farmers, planners, extension personnel and agricultural scientist. To assess the extent of post harvest losses of soybean at different stages of post harvest operations in different size of farm.

Research methodology

The present study was confined to Sehore district of Madhya Pradesh. The Sehore district purposively selected for study because, this district is one of the important soybean growing tracts in the state. Multi stage stratified random sampling technique was used for drawing a sample for the present study. At first stage of sampling, the block in the district was selected. At the second stage of sampling, the villages in the block were selected. At the third stage of sampling, the soybean growers were selected as respondents. The Sehore district is comprises of 5 blocks, namely Astha, Budni, Ichhwar, Nasurallaganj and Sehore. Sehore block in Sehore district have been selected purposively due to higher area under soybean and well known by researcher. At the second stage of selection, a list of major soybean growing villages has been prepared and among these 4 villages was selected purposively which are having highest area under soybean. At the third stage for the selection of respondents (soybean growers), a list of important soybean growing cultivators in each village have been prepared and divided into three groups i.e. small farmers (0.1 to 2 ha.), medium farmer (2.01 to 4 ha.) and large farmers (above 4 ha.). From this list 20 farmers from each size group have been selected randomly. Hence, total of 60 soybean growers have been considered for detail investigation.

In present study, both primary and secondary data were used to find out the findings of study. The data were collected using survey method.

Analytical procedure

The data was tabulated in light of objectives of the study and analyzed by using mean, percentages etc.

Computation of post harvest losses

To estimate the level of losses of soybean grain during post harvest period at different stages, following plan of work and statistical tools were used. Following observations and calculation was done in the study:

1. Estimation of harvesting losses: The losses of soybean at the time of harvesting found during cutting, gathering the stock, bundling and transporting material upto the threshing floor. This fallen and shattering grain was collected from the filed and weighted i.e. Wf. On the

other hand, the harvested yield is the sum of threshed grain (Ww) + grain fallen and rejected during threshing and winnowing (Wn), determine as Wh.

$$\text{Harvesting losses (\%)} = \frac{Wf}{Wh} \times 100$$

2. Estimation of threshing, winnowing losses: The grain after threshing and winnowing was weighted i.e. Ww. After this the grain fallen and rejected during threshing and winnowing was also weighed as samples of grain fallen and rejection (Wn).

$$\text{Threshing and winnowing loss (\%)} = \frac{Wn}{Ww} \times 100$$

3. Estimation of handling losses: For determining handling losses from threshing yard upto farm house, the soybean grains fallen at threshing yard during loading and uploading of grain was collected and weighted as Wt and W was measured at net quantity of grain threshed.

$$\text{Handling loss (\%)} = \frac{Wt}{W} \times 100$$

4. Estimation of physical losses: The physical loss was determined as different between the net quantity of grain which was brought upto farm house (W) and the quantity found to reduce at the time of storing (Ws). This loss is also determined as dried loss.

$$\text{Physical loss (\%)} = \frac{Ws}{W} \times 100$$

5. Estimation of storage losses: Losses during storage were assessed at farm level. The difference in weight between storing time (i.e. Wd) and the quantity found to reduce at the time of marketed surplus treated as Wr.

$$\text{Storage loss (\%)} = \frac{Wr}{Wd} \times 100$$

6. Estimation of market processing losses: The losses during market processing were mainly broken, rough and spoilage grains, which was cleaned or separated before marketed. The weight of fresh grain (Wh) and broken and spoilage grain was Wx respectively. This loss is also determined at the time of grading.

$$\text{Market processing loss (\%)} = \frac{Wx}{Wh} \times 100$$

7. Estimation of transportation losses: For assessing the losses due to transportation at marketing level, jute bags of grain was weighed before loading on the tractor trailer (Wd). The jute bags of grain were randomly selected for weighing during unloading at the market point (Wm). The difference in first and second weighing was give the transportation losses (Wd-Wm=Wp).

$$\text{Transportation loss (\%)} = \frac{Wp}{Wd} \times 100$$

8. Estimation of mandi losses: The mandi losses were

calculated accordingly, suppose actual W_m weight of soybean grain is to be sold. However it may be difference at the time mandi weight due to some losses. The difference between actual grain arrival at mandi (i.e. W_m) and mandi weight was represent W_a then,

$$\text{Mandi loss (\%)} = \frac{W_a}{W_m} \times 100$$

Results and discussion

Agriculture production is a biological and time log process. A large amount of time and efforts is required to produce a crop until it is harvested. Generally post harvest loses occur between harvest and the moment of its disposal. They include on farm losses such as when grains is harvested, threshed, winnowed, dried and grading, as well as losses along the chain during transportation, storage and at the time of marketing (mandi losses) etc. This part of study deals with assessment of proportion losses of soybean crop during various stages of post harvest practices.

To increase the marketable surplus of soybean the post harvest losses should be avoid through post harvest management. Post harvest losses during these stages of post harvest operations reduces the quantity and quality of marketable surplus and it can be say that post harvest management process added the value in the product. The details of post harvest losses at different stages of post harvest operations has been estimated and presented in different tables. Timely harvesting of soybean is the most essential to avoid the shattering losses. The extent of harvesting losses depends on the time of harvest and the method of harvesting. Soybean should be harvested when most of the pods are brown and the leaves turn yellow. The harvesting is usually done by manually hand with sickles or trough use of combine harvester on rental bases. The extent of harvesting losses has been presented in table 1.

Table 1: Extent of harvest losses of soybean as per different size group of farmers.

S. No.	Harvest loss	Small	Medium	Large	Average
1.	Per farm (Kg)	47.00	132.00	336.00	171.67
2.	Per hectare (Kg)	43.07	49.28	64.59	52.31
3.	Kg/q	3.00	3.45	4.60	3.68
4.	% losses	2.91	3.33	4.38	3.54

Table 2: Extent of threshing and winnowing losses of soybean as per different size group of farmers.

S. No.	Threshing and winnowing loss	Small	Medium	Large	Average
1.	Per farm (Kg)	4.00	12.00	29.00	15.00
2.	Per hectare (Kg)	3.85	4.31	5.65	4.60
3.	Kg/q	0.27	0.30	0.40	0.32
4.	% losses	0.27	0.30	0.40	0.32

From the study it is estimated that on an average total threshing and winnowing losses of soybean found to 15.00 kg per farm (0.32%). The total threshing and winnowing losses was found to minimum 4.00 kg per farm (0.27%) on small size of holding followed by 12.00 kg per farm (0.30%) on medium size of holding and 29.00 kg per farm (0.40%) on large size of holding respectively. The trend of threshing and winnowing losses clearly depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 4.60 kg/ha threshing and winnowing losses were occurred on an average size of farm. As the size of farm increases the

The harvesting losses of soybean are including in cutting, gathering, curing, bundling, transportation of soybean stock upto threshing floor and moisture losses. From the study it is estimated that on an average total harvest losses of soybean found to 171.67 kg per farm (3.54%). The total harvest losses was found to minimum 47.00 kg per farm (2.91%) on small size of holding followed by 132.00 kg per farm (3.33%) on medium size of holding and 336.00 kg per farm (4.38%) on large size of holding respectively. The trend of harvest losses clearly depicted that the harvest losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 52.31 kg/ha. harvest losses were occurred on an average size of farm. As the size of farm increases the harvest losses increases accounting 43.07 kg/ha on small size followed by 44.28 kg per hectare on medium size and 64.59 kg/ha on large size of farm.

The harvest losses also estimated that it was found to on an average 3.68 kg/q of soybean. As the size of farm increases the harvest losses increases accounting 3.00 kg/q on small size followed by 3.45 kg/q on medium size and 4.60 kg/q on large size of farm.

The soybean growers confronted that harvesting before maturity means a low yield and also a higher proportion of immature seed, poor quality and more chances of disease attack during storage of grain. On the other hand, delay in harvesting results in grain shattering and cracking of grains in the pods and exposure to insect, rodents, birds and pest attack. Hence, soybean should be harvested when leaves start following and pods look dry.

2. Production loss during threshing and winnowing

Threshing and winnowing are the common practice which refers to the separation of grains soybean from straw. Traditional method of threshing and winnowing practice was not prevalent in study area. As per the farmers, to minimize the drudgery of tedious time consuming and laborious work, it was felt necessary to use mechanical device coupled with engines to do threshing and winnowing operations. The extent of threshing and winnowing losses has been presented in table 2.

threshing and winnowing losses increases accounting 3.85 kg/ha on small size followed by 4.31 kg/ha on medium size and 5.65 kg/ha on large size of farm. The threshing and winnowing losses also estimated that it was found to on an average 0.32 kg/q of soybean. As the size of farm increases the threshing and winnowing losses were also increases and accounting 0.27 kg/q on small size followed by 0.30 kg/q on medium size and 0.40 kg/q on large size of farm. In threshing process precaution must be taken to avoid severe beating as it may decrease the germination of seed. Hence, to avoid the losses due to threshing and winnowing adoption of better mechanical method is recommended.

3. Production loss during handling

The handling means loading, unloading and shifting of produce from threshing floor to storage house. The process of handling of grain from threshing yard upto storage house are performed by tractor trolley or bullock cart. In the process of handling of grain there might be some chances to fallen the grain at threshing floor. The soybean grain fallen at threshing yard was collected and determine the quantity of loss due to handling. The extent of handling losses has been presented in table 3.

Table 3: Extent of handling losses of soybean as per different size group of farmers.

S. No.	Handling loss	Small	Medium	Large	Average
1.	Per farm (Kg)	2.00	6.00	15.00	7.67
2.	Per hectare (Kg)	1.93	2.28	2.83	2.35
3.	Kg/q	0.13	0.16	0.20	0.16
4.	% losses	0.13	0.16	0.20	0.16

From the study it is estimated that on an average total handling losses of soybean found to 7.67 kg per farm (0.16%). The total handling losses was found to minimum 2.00 kg per farm (0.13%) on small size of holding followed by 6.00 kg per farm (0.16%) on medium size of holding and 15.00 kg per farm (0.20%) on large size of holding respectively. The trend of handling losses clearly depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 2.35 kg/ha handling losses were occurred on an average size of farm. As the size of farm increases the handling losses increases accounting 1.93 kg/ha on small size followed by 2.28 kg/ha on medium size and 2.83 kg/ha on large size of farm.

The handling losses also estimated that it was found to on an average 0.16 kg/q of soybean. As the size of farm increases the handling losses were also increases and accounting 0.13 kg/q on small size followed by 0.16 kg/q on medium size and 0.20 kg/q on large size of farm.

Proper handling (loading and unloading) of soybean with good shifting facilities help in reduction in losses at farm level.

4. Production loss during dried (Physical losses)

Physical losses occur during cleaning, drying and moisture losses during dumping of soybean grain. In study area farmers generally, un-cleaned soybean is placed at farm house for some period. After some time the bold and small grains of soybean and the dirt is removed from the grain. The dried losses also found due to storage of soybean for a longer period. The extent of physical losses has been presented in table 4.

Table 4: Extent of physical losses of soybean as per different size group of farmers.

S. No.	Physical loss	Small	Medium	Large	Average
1.	Per farm (Kg)	8.00	26.00	51.00	28.33
2.	Per hectare (Kg)	7.11	9.51	9.72	8.78
3.	Kg/q	0.50	0.67	0.69	0.62
4.	% losses	0.50	0.67	0.69	0.62

From the study it is estimated that on an average total physical losses of soybean found to 28.33 kg per farm (0.62%). The total physical losses was found to minimum

8.00 kg per farm (0.50%) on small size of holding followed by 26.00 kg per farm (0.67%) on medium size of holding and 51.00 kg per farm (0.69%) on large size of holding respectively. The trend of physical losses clearly depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 8.78 kg/ha physical losses were occurred on an average size of farm. As the size of farm increases the physical losses increases accounting 7.11 kg/ha on small size followed by 9.51 kg/ha on medium size and 9.72 kg/ha on large size of farm.

The physical losses also estimated that it was found to on an average 0.62 kg/q of soybean. As the size of farm increases the physical losses were also increases and accounting 0.50 kg/q on small size followed by 0.67 kg/q on medium size and 0.69 kg/q on large size of farm.

Dry harvested crop for 8 to 10 days at the harvesting floor. Avoid direct sun light and excessive drying, which leads to an increase in breakage of the grains. The clean grain should be stored.

5. Production loss during storage

Storage of soybean is one of the major problems and improper storage caused heavy losses. Sample farmers stored their soybean grain in jute bags; few farmers also stored the soybean in bulk. To avoid the storage loss proper method of storage is necessary for quality and quantity loss of soybean. On the other hand, bulk storage is not found suitable it may be damaged through insect-pest, rodent etc. The extent of storage losses has been presented in table 5.

Table 5: Extent of storage losses of soybean as per different size group of farmers.

S. No.	Storage loss	Small	Medium	Large	Average
1.	Per farm (Kg)	10.00	30.00	71.00	37.00
2.	Per hectare (Kg)	9.59	11.38	13.75	11.57
3.	Kg/q	0.67	0.80	0.98	0.82
4.	% losses	0.67	0.80	0.99	0.82

From the study it is estimated that on an average total storage losses of soybean found to 37.00 kg per farm (0.82%). The total storage losses was found to minimum 10.00 kg per farm (0.67%) on small size of holding followed by 30.00 kg per farm (0.80%) on medium size of holding and 71.00 kg per farm (0.99%) on large size of holding respectively. The trend of storage losses clearly depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 11.57 kg/ha storage losses were occurred on an average size of farm. As the size of farm increases the storage losses increases accounting 9.59 kg/ha on small size followed by 11.38 kg/ha on medium size and 13.75 kg/ha on large size of farm.

The storage losses also estimated that it was found to on an average 0.82 kg/q of soybean. As the size of farm increases the storage losses were also increases and accounting 0.67 kg/q on small size followed by 0.80 kg/q on medium size and 0.98 kg/q on large size of farm.

All the farmers store soybean in their own house. They usually store in gunny bags but they also prefer store in bulk. The field bags are stacked above wooden planks or paddy straw is spread over the floor to avoid dampness. The large farmers normally have pacca floored house where the soybean

is stored. The farmers are advised use proper scientific technique in storage for maintaining optimum moisture content less than 9 per cent.

6. Production loss during market processing

The clean, bold and graded soybean grain reap highest market

price than mixture with few foreign material. For this purpose farmers are performing some process before the marketing of grain. The losses were also determined during market process which was in the form of broken, rough and spoilage grains. The extent of marketing processing losses has been presented in table 6.

Table 6: Extent of marketing processing losses of soybean as per different size group of farmers.

S. No.	Marketing processing loss	Small	Medium	Large	Average
1.	Per farm (Kg)	4.00	12.00	31.00	15.67
2.	Per hectare (Kg)	3.82	4.53	5.91	4.75
3.	Kg/q	0.27	0.32	0.42	0.34
4.	% losses	0.27	0.32	0.43	0.34

From the study it is estimated that on an average total marketing processing losses of soybean found to 15.67 kg per farm (0.34%). The total marketing processing losses was found to minimum 4.00 kg per farm (0.27%) on small size of holding followed by 12.00 kg per farm (0.32%) on medium size of holding and 31.00 kg per farm (0.43%) on large size of holding respectively. The trend of marketing processing losses clearly depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 4.75 kg/ha marketing processing losses were occurred on an average size of farm. As the size of farm increases the marketing processing losses increases accounting 3.82 kg/ha on small size followed by 4.53 kg/ha on medium size and 5.91 kg/ha on large size of farm.

The marketing processing losses also estimated that it was found to on an average 0.34 kg/q of soybean. As the size of farm increases the marketing processing losses were also increases and accounting 0.27 kg/q on small size followed by 0.32 kg/q on medium size and 0.42 kg/q on large size of farm. Marketing is a disposal process where the consumer demanded good quality of grain and accordingly they paying remunerative market price. Hence, processing of grain before the marketing is the better way to reap highest marketing price.

7. Production loss during transportation

Transportation of soybean from farmer's house to mandi is a major problem in rural area. Previously, the major means of transport for agricultural produce was the bullock cart. But now farmers used tractor trolley for transportation of soybean from storage to mandi. The loss of soybean grains during transportation was found a minor problem. The extent of transportation losses has been presented in table 7.

Table 7: Extent of transportation processing losses of soybean as per different size group of farmers.

S. No.	Transportation loss	Small	Medium	Large	Average
1.	Per farm (Kg)	1.00	3.00	7.00	3.67
2.	Per hectare (Kg)	0.98	1.13	1.29	1.13
3.	Kg/q	0.07	0.08	0.09	0.08
4.	% losses	0.07	0.08	0.09	0.08

From the study it is estimated that on an average total transportation losses of soybean found to 3.67 kg per farm (0.08%). The total transportation losses was found to minimum 1.00 kg per farm (0.07%) on small size of holding followed by 3.00 kg per farm (0.08%) on medium size of holding and 7.00 kg per farm (0.09%) on large size of holding respectively. The trend of transportation losses clearly

depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 1.13 kg/ha transportation losses were occurred on an average size of farm. As the size of farm increases the transportation losses increases accounting 0.98 kg/ha on small size followed by 1.13 kg/ha on medium size and 1.29 kg/ha on large size of farm.

The transportation losses also estimated that it was found to on an average 0.08 kg/q of soybean. As the size of farm increases the transportation losses were also increases and accounting 0.07 kg/q on small size followed by 0.08 kg/q on medium size and 0.09 kg/q on large size of farm.

During transport of soybean from house to assembling market tractor trolley is used. The transport losses occur on account of pilferage, leakage of gunny bags and rough handling.

8. Production loss during mandi

Agricultural marketing now has widening of the size of the market in which the chain of intermediaries is involved during the marketing. The functionaries who render service during marketing earn a margin and some deduction from the produce. There are found some extra losses which have to bear by producer. The extent of mandi losses has been presented in table 8.

Table 8: Extent of mandi processing losses of soybean as per different size group of farmers.

S. No.	Mandi loss	Small	Medium	Large	Average
1.	Per farm (Kg)	6.00	18.00	38.00	20.67
2.	Per hectare (Kg)	5.71	6.66	7.29	6.55
3.	Kg/q	0.40	0.47	0.52	0.46
4.	% losses	0.40	0.48	0.53	0.47

From the study it is estimated that on an average total mandi losses of soybean found to 20.67 kg per farm (0.47%). The total mandi losses was found to minimum 6.00 kg per farm (0.40%) on small size of holding followed by 18.00 kg per farm (0.48%) on medium size of holding and 38.00 kg per farm (0.53%) on large size of holding respectively. The trend of mandi losses clearly depicted that this losses was found to increase in increasing size of holding per farm.

It is observed from the data that there was on an average 6.55 kg/ha mandi losses were occurred on an average size of farm. As the size of farm increases the mandi losses increases accounting 5.71 kg/ha on small size followed by 6.66 kg/ha on medium size and 7.29 kg/ha on large size of farm.

The mandi losses also estimated that it was found to on an average 0.46 kg/q of soybean. As the size of farm increases the mandi losses were also increases and accounting 0.40 kg/q

on small size followed by 0.47 kg/q on medium size and 0.53 kg/q on large size of farm.

In the process of marketing the number of facilitate middlemen are deducting some part of produce in illegal way. This is also one part of production losses. Hence, during the marketing farmers should taken care for avoid this type of losses.

Table 9: Extent of post harvest losses of soybean at different post harvest stages as per size group of farmers.

S. No.	Post harvest losses	Small	Medium	Large	Average
1.	Losses Kg. per farm	82.00	239.00	577.00	299.33
2.	Losses Rs. per farm	2296	6692	16156	8381
3.	Losses Kg. per hectare	76.00	90.00	120.00	95.33
4.	Losses Rs. per hectare	2128	2520	3360	2669
5.	Losses Kg. per quintal	5.31	6.41	8.57	6.76
6.	Losses Rs. per quintal	149	179	240	189

The post harvest losses on an average during different stages were found to 299.33 kg per farm. In terms of money the average soybean growers suffers due to post harvest losses amounting Rs.8381 per farm which show necessary to protect the post harvest losses by which an additional income can be gain by soybean growers.

The total post harvest losses of soybean per hectare in physical quantity and monetary terms were also estimated. The data shows that on an average, per hectare post harvest losses were found to 95.33 kg per hectare which amounting Rs.2669. On the other hand, the data shows that on an average, per quintal post harvest losses was found to 6.76 kg per quintal which is amounting Rs.189.

Conclusion

We can conclude here that as the size of farm increases, the harvest losses, threshing and winnowing losses, handling losses, physical losses, storage losses marketing processing losses, Mandi losses and transportation losses also increase. The harvest losses accounting 43.07 kg/ha and 3.00 kg/q on small size, 44.28 kg/ha and 3.45 kg/q on medium size and 64.59 kg/ha and 4.60 kg/q on large size of farm. The threshing and winnowing losses accounting 3.85 kg/ha and 0.27 kg/q on small size followed by 4.31 kg/ha and 0.30 kg/q on medium size and 5.65 kg/ha and 0.40 kg/q on large size of farm. The handling losses accounting 1.93 kg/ha and 0.13 kg/q on small size of farm, 2.28 kg/ha and 0.16 kg/q on medium size of farm and 2.83 kg/ha and 0.20 kg/q on large size of farm. As the size of farm increases the physical losses also increases accounting 7.11 kg/ha and 0.50 kg/q on small size, 9.51 kg/ha and 0.67 kg/q on medium size and 9.72 kg/ha and 0.69 kg/q on large size of farm. The storage losses accounting 9.59 kg/ha and 0.67 kg/q on small size, 11.38 kg/ha and 0.80 kg/q on medium size and 13.75 kg/ha and 0.98 kg/q on large size of farm. As the size of farm increases the marketing processing losses increases accounting 3.82 kg/ha on small size followed by 4.53 kg/ha on medium size and 5.91 kg/ha on large size of farm. On the other hand, As the size of farm increases the marketing processing losses were also increases and accounting 0.27 kg/q on small size followed by 0.32 kg/q on medium size and 0.42 kg/q on large size of farm. As the size of farm increases the transportation losses increases accounting 0.98 kg/ha on small size followed by 1.13 kg/ha on medium size and 1.29 kg/ha on large size of farm. As the size of farm increases the transportation losses were also increases and accounting 0.07 kg/q on small size followed by 0.08 kg/q on medium size and 0.09 kg/q on large size of farm. As the size of farm increases the mandi losses increases

9. Estimates of total physical and monetary losses of soybean

On the basis of data pertaining from sample household, an average total post harvest losses in term of quantity kg per hectare and kg per quintal with monetary term were also estimated and the data on the same are presented in table 9.

accounting 5.71 kg/ha on small size followed by 6.66 kg/ha on medium size and 7.29 kg/ha on large size of farm. As the size of farm increases the mandi losses were also increases and accounting 0.40 kg/q on small size followed by 0.47 kg/q on medium size and 0.53 kg/q on large size of farm. The total post harvest losses of soybean per hectare in physical quantity and monetary terms were also estimated. The data shows that on an average, per hectare post harvest losses were found to 95.33 kg per hectare which amounting Rs.2669. On the other hand, the data shows that on an average, per quintal post harvest losses was found to 6.76 kg per quintal which is amounting Rs.189.

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