Environment and Ecology 40 (4) : 2103—2108, October–December 2022
ISSN 0970-0420

A Study on Post-Harvest Losses in Grape Cultivation in Jalna District (Maharashtra)

Mayur Satish Wajge, Sanjay Kumar, Vikas Singh

Received 2 June 2022, Accepted 5 July 2022, Published 19 October 2022

ABSTRACT

Loss during harvesting and postharvest loss is common phenomena in fruits and vegetables due to their perishable nature. The Indian horticulture industry is making losses estimated at more than ` 2 tn (US$ 32.7 bn) annually due to poor post-harvest practices and facilities. Assocham's study states that 30% of India's fresh produce is rendered unfit for consumption as a result of spoilage after harvesting (Anonymous 2013). The postharvest loss in grapes has been recorded by various workers within the range of 8.23 to 16% in the country. As per present estimate of 8.23% India is losing about 223 thousand tonnes of grapes annually. If the loss is calculated as economic loss (not only visible loss), it is much higher than expected. Due to grapes' delicateness and extreme perishability, the losses suffered during the preparation, harvest, packing, storing, transport and distribution of table grapes can also be very high. Therefore, a survey was conducted in 2021-22 with 95 grape growers, supported by questionnaires in Jalna District of Maharashtra province. The purpose was to get post harvest loss factors related to grape cultivation.

Keywords Postharvest loss, Quantitative loss, Marketing loss, Delicateness, xtreme perishability.

INTRODUCTION

Grape is an important fruit crop of India. Commercial grape cultivation in India is mainly for table purpose and has reasonably high level of productivity in the world. According to an estimate area under grape cultivation was 138 thousand ha with production of 2980 thousand MT during 2017-18. Grape is mainly cultivated in Maharashtra followed by Karnataka, Tamil Nadu, Mizoram and Andhra Pradesh. Some northern states viz.; Punjab, Himachal Pradesh and Jammu and Kashmir are also producing grapes. While, 71% of grape produced is available for table purpose and nearly 27% is dried for raisin making

Mayur Satish Wajge*
Agricultural Economics, SHUATS, Prayagraj 211007, Uttar Pradesh, India

Sanjay Kumar
Assistant Professor, Dept. of Agricultural Economics, SHUATS, Prayagraj 211007, Uttar Pradesh, India

Vikas Singh
PhD Scholar, Dept. of Agricultural Economics, SHUATS, Prayagraj 211007, Uttar Pradesh, India
Email: mayurwajge8@gmail.com
*Corresponding author

(Sharma *et al*. 2017), 1.5% for winemaking and 0.5% is used for juice (Adsule *et al*. 2012). The main varieties cultivated are Thompson Seedless and its clonal selections like Tas-A-Ganesh, Sonaka, Super Sonaka, Manik Chaman and Sudhakar Seedless among white grapes. Among the colored table grape varieties Sharad Seedless, Nana Purple, Sarita Seedless, Flame Seedless, Red Globe, Crimson Seedless are mainly cultivated in the country. Raisins are made mainly from Thompson Seedless and its clonal selections like Tas-A-Ganesh, Sonaka beside colored varieties. Loss during harvesting and postharvest loss is common phenomena in fruits and vegetables.

Post-harvest losses factors affect postharvest loss in grapes: The main causes which contribute postharvest losses in grapes are as:

Varietal impact: All varieties don't express same shelf life. Each and every variety has own expression after harvesting in term of postharvest loss. Some varieties show rachis browning very fast after harvesting and result in berry shattering. Theses varieties prone to 3 postharvest loss. If some varieties are not harvested at particular TSS, shattered very fast and shoe very poor shelf life. The skin thickness and pulpiness in berries also affect shelf life of particular variety. Colored seedless varieties (Nana Purple and Crimson Seedless) are now in high demand in domestic as well as export market. But due to high temperature after version, bunches are observed with uneven colored berries or poorly developed colour. Growers, who supply Nana Purple to China or Dubai market, remove berries not having proper color one week before harvesting and loss of 8-10% is observed at this stage.

Desiccation and diseases: Table grapes are subject to two important types of deterioration after harvest-desiccation and decay. Desiccation is aggravated by high temperatures, low humidity and air movement. It affects the stems before the berries, causing them to turn brown and become brittle. Subsequent breakage of these dry stems during handling results in the market loss called shatter. As grape (*Vitis vinifera* L.) is a non-climacteric fruit with a relatively low rate of physiological activities. However, the length of storage is limited by their high susceptibility to fungal decay and the sensitivity of rachis to water loss and browning. Rachis lacks the thick epidermis with cuticular wax depositions that protect berries against dehydration and, although the rachis only represents about 4% of cluster fresh weight, such disadvantage reduces the market where the condition of rachis in terms of color and turgor is an excellent indicator of postharvest quality.

Insect-pests and diseases: Incidence of insect pests and diseases is major cause to deteriorate shelf life of grapes. The life of such grape bunches is shorter than normal bunches. Majority of diseases and insect-pests reduces shelf life and increase postharvest loss in grapes. Incidence of thrips has not impact on physical loss but appearance of berries affected badly and growers face economic loss.

Improper harvesting and handling: Improper harvesting and handling play very crucial role in postharvest loss of grapes. Delayed harvesting reduces shelf life and results in increased postharvest loss. The time of harvesting, prevailing temperature at the harvesting, presence of moisture on the berries and handling of grape bunches during harvesting are major regulating factors for loss. Harvesting in early hours of the day is found better, increased temperature results in more loss of grapes. Presences of moisture on berries due to rains or dew is crucial to make berries more congenial for fungal attack. Rough handling of bunches during harvesting like loss of bloom from berry surface, bruising, physical damage, crushing of berries due to more load in crates, remaining of bunch filled crates in direct sun light for a duration are main practices which are responsible for more post-harvest losses at the stage of harvesting.

Delay in pre-cooling: It is expected to precool the grapes within three hours of harvesting. Delay in precooling results in water loss leads to browning of rachis and reduced shelf life of grapes. The bunches which not subjected to precool within specified duration have more chances of berry shattering and postharvest losses increased.

Packaging: Packing and packaging material also influence postharvest losses in grapes. Packing of improper grape types (including ungraded, uneven ripened, uneven shape, size and color grapes),

cracked, damaged and physically bruised grapes not only responsible 4 for post-harvest economic loss, it also affect shelf life and increases the loss in physical manner also. Use of improper packaging materials also responsible for more postharvest loss. The material has good strength to bear the load and not damage during transportation. Different types of packaging materials are used for domestic market such as bamboo baskets, ordinary CFB boxes, CFB boxes with holes, punnet packing. Placing of bubble sheets along with grape guard improves the shelf life of grapes and reduces postharvest loss. The grapes supply from Sangli to Coimbatore market is made in crates only. The crates are completely filled by grapes and trucks moves through prevailed high temperature of 35-40 °C. Under such supply chain upto 5% of weight loss is observed before reaching in wholesale market. Berry shattering and rachis browning is observed very early and one day staying in market results in heavy loss of 12-15%. When the grapes are supplied from Junnar area of Pune to Amritsar and packed in thermocoal boxes, earn 8-10 rupees per kg more due to freshness and better shelf life at distant market.

Transportation: Delay in transportation from vineyards to precooling chambers increase physical loss. The frequent visits between vineyards and cooling chamber decrease water loss from berries and grapes become fresh for longer duration. Beside it transportation conditions also affect quantum of postharvest loss. Transportation of packed grapes in ordinary transport vehicle results in more loss. An air-conditioned transportation van improves the shelf life of grapes. Due to improper transportation system, post-harvest losses increase. In distant markets, consumers pay more for poor quality grapes and having no shelf life.

Storage: Improper storage conditions as well as storage for a long duration in such conditions always lead to increase water loss more rapidly. It results in rachis browning and the visible postharvest loss can be recorded. Storage conditions at the place of wholesale and retail market has own impact of shattering of berries and poor shelf life of remained barriers.

Market: The process of marketing also affects freshness of grapes. The faulty marketing process delays the supply of grapes to retailers or wholesale supplier which results in more postharvest loss. While well planned marketing process avoids the delay in the supply of grapes to consumers and results in lesser loss. Within domestic market, more postharvest loss occurs in distant market than local. Grape produced from Punjab region is very limited and supplied to local market only. The grape produced in Sangli and Solpaur supplied to south while grapes from Nashik supplied to Northern states. So the postharvest loss will also be more in much distant markets than local market.

MATERIALS AND METHODS

Nature and source of data

Primary data: For evaluating the specific objective of the study, necessary was obtained from the sample growers through personal interview method with the help of pre tested questionnaires.

Secondary data: Secondary data was obtained from joint directors of horticulture Jalna district, KVK of Jalna district and also from the records published reports, bulletins, journals and books.

Period of enquiry

The period of enquiry was to the agriculture year 2021-22.

Descriptive statistics

For the purpose of analyzing data percentage was calculated and this was shown with help of Tables and charts.

Tabular and charts presentation will be adopted to analyze the socio economic status of the grape grower and to opinion regarding the problems faced.The following statistical formula used for data analysis which is given bellow:

Tools of analysis

The tabular analysis was used for the analyses the data and interpretation of post-harvest losses occurring in banana at various stages in marketing network were

assessed by physical examination and assessment. Post-harvest loss were assessed at –

i. Physical post-harvest losses (value of percentage)
ii. Economical post-harvest level (value of Rs).

Objective of the study

To analyze the post-harvest losses (physical and economical) in different marketing channels in the study area.

RESULTS AND DISCUSSION

Table 1 shows the total post harvest losses at various levels, where the highest losses in channel 1 is at farm level with 3.25 kg/quintal, in channel 2 the highest losses is at wholesale level with 10.50 kg/quintal followed by retailer level with 4.25 kg/quintal. In channel 3 the highest losses is again at wholesale level with 7.25 kg/quintal followed by village trader level with 7.5 kg/quintal and at retailer level with 5.5 kg/quintal. So the sample average losses for channel 1, channel 2, and channel 3 at farm level, trader level, wholesaler level, and retailer level were 3.66 kg/quintal, 7.5 kg/quintal, 8.87 kg/quintal and 4.87 kg/quintal respectively.

Table 1. Detail post harvest losses in grape at physical and economical in different stages and for different channels. Losses in kg/quintal.

Sl. No.	Different Levels	Channel I	Channel II	Channel III	Sample Average	Losses at economical terms (at Rs 44.5 per kg)
1.	Farm level	3.25	4.00	3.75	3.66	Rs 162.87
2.	Village trader	-	-	7.5	7.5	Rs 333.75
3.	Wholesaler level	-	10.50	7.25	8.87	Rs 394.7
4.	Retailer level	-	4.25	5.5	4.87	Rs 178
	Total	3.25	18.75	24	15.33	Rs 682.1

Table 2. shows that the total post harvest loss in channel 1 is 3.25 kg/quintals. As channel 1 involves direct sale from farmer to the consumer so the post harvest loss was only at the farm level.

Table 2. Physical post harvest losses of grape in various marketing channels.

Channel I: Producer – Consumer
At Farm level

Sl. No.	Particulars	Losses in kg/quintal
1.	Small/ immature fruits	1.5
2.	Physiological (Sun burn)	0.75
3.	Cracks and cankers	0.5
4.	Harvesting injury	0.5
	Total losses at farm level	3.25

Table 3 shows the post harvest losses for Channel 2 where the total post harvest losses at farm level, at wholesaler level, and at retailer level were 4.00

Table 3. Physical post harvest losses of grape in various marketing channels.

Channel II: Producer–Wholesaler–Retailer - Consumer
At Farm level

Sl. No.	Particulars	Losses in kg/quintal
1.	Small/ immature fruits	2
2.	Physiological (Sun burn)	0.75
3.	Cracks and cankers	0.5
4.	Harvesting injury	0.75
	Total losses at farm level	4

At Wholesaler level

Sl. No	Particulars	Losses in kg/quintal
1.	Transit losses	
a.	Physical damage	3
b.	Pressed	2
c.	Crushed	2
d.	Physiological weight loss(dryness)	0.5
	Total Transit losses	5
2.	Ripening losses	
a.	Over ripening fruits	2
b.	Rotten fruits	1.
	Total ripening losses	3
	Total losses at wholesaler level (in kg/ uintal)	10.5

At Retailer Level

Sl. No.	Particulars	Losses in kg/quintal
1.	Physically damaged fruits	2.5

Table 3. Continued.

2.	Rotten fruits	0.75
3.	Carriage to the shop (Transportation losses)	1
4.	Total losses at retailer level	4.25

Table 4. Physical Post harvest losses of grape in various marketing channels.

Channel III: Producer –Village trader – Wholesaler – Retailer – Consumer

At Farm level

Sl. No.	Particulars	Losses in kg/ quintal
1.	Small and immature fruits	1.5
2.	Physiological (Sun burn)	0.5
3.	Cracks and cankers	0.75
4.	Harvesting injury	1
5.	Total losses at farm level	3.75

Village trader level

Sl. No.	Particulars	Losses in kg/ quintal
1.	Storage losses	2.5
2.	Crushed fruits	1.5
3.	Pressed fruits	0.75
4.	Rotten fruits	0.75
5.	Spoilage	0.5
	Total losses at village trader	7.5

At Wholesaler level

Sl. No.	Particulars	Losses in kg/ quintal
1.	Transit losses	
a.	Physical damage	1.5
b.	Pressed	0.75
c.	Crushed	0.5
d.	Physiological weight loss(dryness)	0.5
	Total transit losses	3.25
2.	Ripening losses	
a.	Over ripening fruits	2.5
b.	Rotten fruits	1.5
	Total ripening losses	4
	Total losses at wholesaler level	7.25

At Retailer level

Sl. No.	Particulars	Losses in kg/ quintal
1.	Physically damaged fruits	2.5
2.	Rotten fruits	2
3.	Carriage to the shop (Transportation losses)	1
4.	Total losses at retailer level	5.5

kg/ quintal, 10.50 kg/quintal and 4.25 kg/ quintal respectively. The involvement of middlemen increases the total Post harvest losses from as compared to Channel 1.

Table 4. shows the post harvest losses for channel 3 where the post harvest losses at farm level, at village trader level, at wholesale level and at Retailer level were 4 kg/quintal, 7.5 kg/quintal, 7.25 kg/quintal and 5.5 kg/quintal respectively. The highest losses are at the Wholesale level and a highest loss was due to physically damaged fruits at retailer level which was 2.5 kg/quintal.

CONCLUSION

The study pertains to the post-harvest losses, of grape in Jalna district. The objective of the study was to post-harvest losses in grape at physical and economical in different stages of grape. The results show that post-harvest losses in stages of the respondents. Total post-harvest physically damaged in Jalna district are very important in reducing market quality of grape and are primarily responsible for the losses that occur during shipment of the fruit, post-harvest losses in surface shipments and air shipments are not unusual. Losses due to depending on post-harvest handing, transportation and packing producers.

ACKNOWLEDGEMENT

The author is thankful to the Department of agricultural Economics, Post Graduate Institute, SHUATS Prayagraj for providing all the inputs and facilities to carry out this study.

REFERENCE

Adsule PG, Sharma AK, Upadhyay A, Sawant IS, Jogaih S , Upadhyay AK, Yadav DS (2012) Grape research in India: A review. Prog Hortic 44 (2): 180-193.

Anonymous (2013) Huge postharvest losses for India. fruitnet.com/asiafruit/article/159139/huge-post-harvest-losses-forindia

Anonymous (2017) Tech. Doc. No. 120. IV-Group Discussion of ICAR-All India Coordinated Research Project on Fruits. ICAR- Indian Institute of Horticultural Research Bengaluru, Karnataka, pp 191-192.

Jadhav V, Chinnappa B, Mahadevaiah GS (2011) An economic analysis of post-harvest losses of grapes in Karnataka. *Mysore J Agric Sci* 45(4): 905-911.

Ladania MS, Wanjari V, Mahalle B (2005) Marketing of grapes and raisins and post-harvest losses of fresh grapes in Maharashtra. *Ind J Agricl Res* 39 (3):167-176.

Murthy MRK, Reddy GP, Rao KH (2014) Retail marketing of fruits and vegetables in India: A case study on export of grapes from Andhra Pradesh, India. *Europ J Logistics Purchas Supply Chain Manag* 2 (1): 62 - 70.

Nanda SK, Vishwakarma RK, Bathla HVL, Rai A, Chandra P (2012) Estimation of quantitative harvest and post harvest losses of major agricultural produce in India.AICRP on Post Harvest Technology, CIPHET, Ludhiana (India).

Sharma AK, Sawant IS , Sawant SD, Saha S, Kadam P, Somkuwar RG (2017) Aqueous chlorine dioxide for the management of powdery mildew vis-a-vis maintaining quality of grapes and raisins. *J Eco-friendly Agric* 12 (2) : 59-64.

Sreenivas Murthy D, Gajanan TN , Sudha M (2004) Post-harvest loss and its impact on marketing cost, margin and efficiency: A study on grapes in Karnataka. I*nd J Agric Econ* 59 (4): 772-786.