

Insight Article

"Know your onions" - The carriage of onions

Onions originally came from Asia, specifically from China and India, and have been transported around the world for centuries. There are several issues one should consider when carrying onions. Perhaps the most important is to be aware of the fact that onions have a long shelf life, hence if they are stored properly no damage should occur.

The intention of this article is to review some aspects of the carriage of onions, with emphasis on a variety of onions known as 'sweet onions'. Sweet onions have a milder taste than the onions grown in China and India, or in any of the other main producers such as Russia, United States, Japan and Turkey. Some of the producers of sweet onions in South America are Peru, Uruguay and Chile.

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Onions must be carried as refrigerated cargo at a temperature between 0°C and 3°C. Since onions have a very high moisture content it is very important that they are properly cured before being stuffed into a reefer container or a reefer hold in a vessel. The curing process consists in removing the moisture from the outermost layers of the onions. The purpose of curing is to reduce the likelihood of fungal or bacterial infection. 1 The curing process is carried out at the fields in the case of countries with a hot dry season, such as Peru.

If the onions are cured properly they can be stored for up to 10 months. This will also depend on the temperature at which they are stored, which should range between 0°C and 4°C. Ten months is the maximum storage period, so it should not be a problem to store onions successfully for about seven to eight months. Onions can be stored up to 50 days if kept between 12°C and 20°C, whereas at a temperature between 0°C and 4°C they can be stored up to 200 days. 2

With regard to ventilation, the shippers normally recommend that reefer containers have their vents open for approximately 70 to 100 per cent of the time. If the conditions above are not followed during the carriage, it is likely that sprouting and/or decaying of the onions will occur. Sprouting is caused by high temperatures and lack of ventilation.

However, it is important to keep in mind that a slight variation in temperature (of 1°C to 3°C) in a shipment of onions can not be considered sufficient to cause decay or sprouting. In some instances the onions are not cooled off after the curing process at the field and the storage prior to shipment may not be adequate. The result is that at the beginning of the voyage the temperature of the onions has not been reduced to that required for their carriage and the onions are stuffed inside the reefer containers with temperatures above 20°C, which will reduce their shelf life considerably.

Due to the lack of facilities in some areas the shippers try to store the onions within the reefer units in which they are going to be carried. The effect is that the cargo is loaded hot and notwithstanding that the reefer containers function properly throughout the voyage, the final result is some sprouting and/or decaying due to the high temperature.

A key factor in the carriage of onions, other than the temperature, is ventilation of the onions. It is important to ensure that there is air circulation between and beneath the bags of onions, especially if the onions are packed in meshed bags. In the event that the onions are packed in cardboard cartons, if properly stowed these cartons facilitate the air circulation.

Ventilation is also important to avoid the build up of carbon dioxide (CO) within the reefer unit, which can be dangerous for human health at the time the container is opened.

Practical cases

During the month of December of 1994 a consignment of 12,720 cartons of sweet onions stuffed within eight reefer containers was shipped from Montevideo, Uruguay to Philadelphia, USA. According to the shippers' instructions the reefer units were to be kept at 3°C and ventilation opened at 70 per cent.

The vessel left Montevideo on 5th December 1994 and arrived at Philadelphia on 31st December 1994. When the cargo was discharged allegations that it was partially damaged were made. The cargo was surveyed and decay of the onions ranging between two and 18 per cent was ascertained. In the inspection conducted by the USDA 3 authorities the decay varied from two to 24 per cent. The cause of the damage was said to be the inadequate refrigeration/ventilation of the cargo. The receivers claimed against their cargo underwriters who in turn filed a claim against the carrier for over USD 200,000.

In this particular case, although the cause of the damage was said to be the inadequate refrigeration/ventilation of the cargo, discussions during negotiations were limited to ventilation issues, as the different partlow charts showed that the temperature was properly kept during the voyage. Cargo underwriters alleged that the vents were closed during the sea voyage despite the instructions from the shippers that the same should be opened at 70 per cent to allow the respiration of the onions.

After lengthy negotiations the claim was successfully settled for one third of the total amount claimed, because the extent of the decay was not really indicative of the vents being completely closed. However, whether the vents were completely closed or opened at 70 per cent during the voyage was never demonstrated. It was argued that the vents were partially opened because the concentration of CO inside the reefer units at the time they were opened for inspection was normal, not representing any risk for human health.

Apparently what really happened in this case was that the onions were not properly pre-cooled before they were loaded into the reefer containers. It might also have been possible that the vents were not opened at 70 per cent, but at 50 or 25 per cent, creating the perfect conditions to damage the cargo's high temperatures and lack of ventilation.

In another case 10,322 cartons of sweet onions were shipped in 16 reefer containers from Callao, Peru to New York. The Peruvian onion is harvested in October and shipped from November to January.

In this case the shippers had instructed that the vents should be opened 100 per cent and the temperature kept between 0°C and 4°C. The cargo was shipped from Callao on 30th January 1996, arriving at New York on 21st February 1996. The cargo had been transhipped at the port of Cartagena, Colombia, where the containers were taken ashore and stored for four days before being loaded on board the vessel that carried them to New York.

When the cargo arrived at New York a claim was filed by the cargo receivers alleging sprouting to five per cent of the onions. The total amount claimed was around USD 80,000. In this case the allegations were limited to failure to supply the correct delivery air temperature to the cargo. The relevant partlow charts were provided and although the temperatures had gone up to 6°C in most of the reefer units, this was not considered enough to cause any damage to the cargo.

After it was demonstrated to the claimants that onions could be stored even between 12°C and 20°C for a period of 50 days they dropped the claim. Again, in this case there were some indications that the sprouting of the onions had been caused by the

lack of pre-cooling of the onions before they were stuffed into the reefer containers.

Conclusion

Onions can be stored for long periods of time if certain conditions are met. It is a cargo which will not be affected easily even if the carrying conditions are not ideal. More important than the carrying temperature, which can vary between 0°C and 4°C, is the ventilation, which requires that the vents on the reefer containers be opened at least 70 per cent. A slight temperature variation during the carriage should not cause any damage to the cargo if it is properly ventilated.

1. Colour Atlas of Post Harvest Diseases & Disorders of Fruits and Vegetables, Volume 2, Vegetables, by Professor Anna L. Snowdon Ph.D., page 236.
2. According to the table published in page 175 of the Guide to Food Transport □ Fruit and Vegetables (Mercantila Publishers).
3. United States Food and Drug Administration.

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