

Workflow: Packhouse Management

Toolkit 4.8

Packing Practices

target audience

Packhouse managers, and supervisors.

what it is

All the care and effort of producing, treating and selecting fruit culminates in packing the fruit for the market, whether export, local or further processing.

This toolkit deals with the final packing and palletising of fruit.

why it is important

How the fruit is packed is as important as the selection of healthy fruit, as is compliance to the standards required for the packing material, labelling, packing patterns, and palletisation. The two most important objectives are:

- Meeting the packing specifications of the target market.
- Protecting the fruit and delivering it successfully to its destination with minimal waste and rejections.

The cost of packing material constitutes the largest component of the total packing cost for a carton of export citrus, with the carton itself being the priciest component.

On this journey, it will probably be transported by truck, handled and stored in a cold store or a fruit terminal, loaded directly into the hold of a ship, or into a container and then onto a ship, transported across the sea, unloaded in the receiving port, and transported to its destination. During this journey, the packing material will be exposed to cycles of cold, heat, moisture, humidity, friction, pressure, and repeated handling. It is critical that the packing material must protect the fruit throughout this journey and play its part in ensuring that the fruit arrives at the destination in the best possible condition.

success factors

- **Packing cartons** –The first and most important packing material is the packing carton. Cartons come in many sizes, configurations and colours, but there are only two main kinds of cartons, namely telescopic and open-top display cartons:

- Telescopic cartons consist of two parts, being an inner, into which the fruit is packed, and an outer, or lid, which it is placed over the fruit when the carton is full. The outer is usually printed with branding information. The A15C telescopic carton, at 400x300x270mm, is the most commonly used carton for export citrus. Apart from the A15C, there are actually not many other telescopic carton sizes that are used; the others for which there are specifications are the A07C at 400x300x150mm, the D15C at 600x400x160mm, the E15C at 600x400x170mm, and the G15C at 600x400x215mm.
- Open-top display cartons do not have lids, and they are ready to be packed on shelves in stores without having to be re-packed. Open-top cartons come in many more sizes and configurations than telescopic cartons. Fruit is usually packed in one, two or three layers in the carton. These are the open-top display cartons that are used for export citrus.

Carton Type	Size
A06D	600x400x100mm
D64O	600x400x110mm
A10D	600x400x122mm
B10D	600x400x139mm
C15D	600x400x146mm
D15D	600x400x160mm
E15D	600x400x170mm
H15D	600x400x200mm
G15D	600x400x215mm
F15D	500x400x190mm
E10D	500x300x170mm
E06D	400x300x135mm
A02D	300x200x110mm

- **Carton design** – Cartons have ventilation holes through which cold air moves to maintain the required temperature of the whole pallet of fruit. The holes are designed to line up when cartons are stacked on pallets. This airflow is critical to maintaining fruit quality and shelf-life. The configuration that is now used for almost all A15C telescopic cartons is reasonably new. Cartons with this configuration are called super-vent cartons, and this configuration is highly recommended.
- **Carton material** – The quality of the material and structure of the carton must be according to specification:
 - Cartons are manufactured from corrugated board according to strict specifications. The corrugated board is either in three layers, being liner-fluting-liner, or five layers, being liner-fluting-liner-fluting-liner. Board with five layers is stronger, and is used for the inners of telescopic cartons, and for open-top display cartons.
 - The cardboard cannot be from recycled material because it needs to be strong enough to withstands the stresses to which the stacked cartons are subjected.
 - Printing ink must be environmentally friendly which ensures that the cartons are biodegradable and can be recycled.
- **Bulk bins** – Bulk bins are large cartons which are used for exporting processing fruit. They are usually not printed and are also delivered to the packhouse in flat packs. They are erected at the packhouse using strapping, and special corner pieces to strengthen them for stacking. Bulk bins are stacked two high on pallets

- **Carton machinery** – Cartons are delivered in flat pack format and are erected by machine. Having a reliable machine, as well as a backup machine, is an important success factor, because failure at this critical step delays the whole packhouse process.
- **Fruit labels** – Fruit labels, also called PLUs, which stands for price look-up codes, are attached to fruit and reflect the brand of the fruit. Sometimes they also display the PLU code for the fruit, hence this common name for them. The PLU code is a four or five-digit code that is used for fresh produce, to identify the product by commodity, variety and size group. Fruit labels that are biodegradable are increasingly being used.
- **Wrapping** – Fruit wrappers are used to wrap some of the fruit in a carton, according to the requirements of the market. Fruit wrappers are made from thin tissue paper and can be plain or printed with product branding. The paper usually has a thin waxy layer and feels slightly slippery to the touch. This makes the paper easier to handle while wrapping and helps to protect the fruit when it is packed. The wrappers are already cut to size and one wrapper per fruit is used. In truth, wrapping does not really add value to maintaining food quality and shelf-life of the fruit and is largely motivated by marketing and aesthetic reasons. Therefore, it is common practice now to only wrap some rows, often diagonally, in the top layer of fruit in the carton, because wrapping is detrimental to the cooling process during shipping.

IMPORTANT – Although packhouses are asked to wrap fruit with the branding on the wrapper showing at the top of the packed fruit, i.e., the hole/opening of the wrapper is at the bottom of the fruit, this often causes problems with ventilation because the air cannot escape upwards, the wrapper can balloon and sometimes even dislodges, blocking the ventilation holes on the cartons. If you do need to wrap, ensure that the wrapper hole is at the top.

- **Pallets** – Pallets must comply with the following key factors:
 - All pallets must be constructed according to specifications, and must carry the ISPM15 mark, which means that they comply with the requirements of the Guidelines for Regulating Wood Packaging Material in International Trade, which was issued by the International Plant Protection Convention (IPPC) Secretariat.
 - Pallets must also be constructed according to the correct design. For citrus exports, what is known as the 1210x1010mm pallet for export citrus, or more informally as the CRI pallet, has been designed and tested to be the strongest and most stable configuration of slats for transporting citrus cartons. Pallets that are not made according to the CRI design often have the slats in the wrong places, or are too thin, resulting in the bottom cartons falling off the slat edge, compromising the integrity of the whole stack.
- **Further materials for correct palletising** – The following are also required:
 - **Securing sheets** are used when palletising open-top display cartons. Securing sheets are placed between some layers of cartons, to keep the stacks of cartons from separating and falling off the pallet. Securing sheets also have ventilation holes in them. They are available in different configurations, to go with different open-top cartons. It is important that the right securing sheet is matched with the right carton, otherwise the ventilation holes will not line up and the airflow through the palletised fruit will be obstructed.
 - **Pallet caps** are used with open-top cartons to cover the top layer on the pallet, and to cover the top bulk bins used for processing fruit
 - **Corner pieces and strapping** are used to secure the cartons on pallets, so that the cartons remain stable and do not topple off the pallet. Corner pieces are made from laminated cardboard and must comply to manufacturing specifications.
 - **Compliance to standards** – Ensure that the material used, and the manufacturers are approved and accredited. The CRI Postharvest Technical Forum issues the Packaging

Material Specifications and Palletisation Protocols at the beginning of every year. The protocol sets out in detail the specifications for all types of cartons used for citrus export, standards and specifications for pallet construction, palletisation protocols, and other information to assist the grower and the packhouse to verify that their packaging material manufacturers and suppliers are accredited and up to standard. Additionally, the Postharvest Technical Forum also facilitates a self-regulatory accreditation system that has been established by carton manufacturers. This system involves printing a quality mark on cartons that comply with the specifications of the Forum. All cartons used for packing export citrus must have this mark.

- **Pack Planning** – The pack plan and the packing instructions are the backbone to the packhouse operations ([Toolkit 4.2 – Pack Planning](#), for more detail). The accuracy and efficiency of this plan ensures the right fruit is packed in the right way in the right box and labelled correctly for the target client. These instructions must be communicated effectively to the packing lines, and would generally include:
 - Citrus type and cultivar.
 - Fruit grade and size.
 - Target market.
 - Country of destination.
 - Carton type.
 - Brand.
 - Fruit labelling.
 - Fruit wrapping.
 - Cartons per pallet.
 - The order number and the number of pallets ordered, so that the supervisors can plan ahead for the packing run.
- **Packing Practices** – The ability to perfect your packing practices is a key success factor. This includes:
 - Preparation – Ensuring that the packer has the correct packing instructions, the correct fruit is on its way to the packer, and all the material required (cartons, wrappers, labels). Carton delivery systems are designed to ensure that delivery is efficient, whether by monorail above the packer, or by conveyor belt or chute under the packing lines.
 - Packing diagrams – Packers receive clear packing diagrams to ensure that every carton packed looks the same, the count is the same, the wrapping is consistent, the fruit is positioned the same way, and fruit labels are as specified, etc.
 - Place Packing – The packer must use the correct technique in the manner a carton is filled, how each layer nestles on the one below, and ensure that fruit is handled gently. The packer is the last point of quality control of the fruit; therefore, fruit that is not suitable should not be packed.
 - Labels – Ensure that labels are fixed to the carton correctly and in compliance with the stacking plan.
 - Jumble packing – Ensure the correct process so that the fruit is not damaged, and the correct weighing of the carton.

- Automated packing – Automated packing, whether place or jumble packing is 2-3 times faster than manual packing and can be integrated with the labelling process. As competitiveness increases, and manual labour costs and risks increase, automation is likely to become the norm and define best practice in the industry.
 - Weighing cartons – Fruit loses moisture and weight in transit, so cartons are packed to weight about 10% above the weight indicated, e.g., an A15C carton will usually weigh around 16kg right after being packed.
- **Palletisation** – Palletisation is the final, key packhouse step to ensure that your product arrives at the client in good shape and as promised. After palletising the packhouse has little or no control over the product; therefore, ensuring best practice is critical. Poor palletising practices account for most of the claims due to collapsed cartons and carton stacks. The following points are key:
- Using the correct pallets, whether the standard pallet or the high-cube pallet.
 - High-cube pallets allow for a height of 2.4 meters, which fits into a container, and is more efficient than standard pallets (used for reefer transport).
 - Using the correct stacking pattern is critical, since this ensures:
 - Compliance with the carton design.
 - Airflow and ventilation as intended.
 - Strength and stability of the loaded pallet.
 - Compliance to where the labels of the cartons must show.
- (See [CRI's Packaging Material Specifications and Palletisation Protocols](#) resource).
- Complying to best practice when stacking the cartons, employees must take care to position the cartons properly and carefully, and comply with SOPs and the use of the proper equipment, such as steps, pallet hoists etc.
 - Checking the quality of the pallet (no splinters, long nails) and that it carries the ISPM15 mark.
 - Ensuring that the batch to be palletised is correct with the identical cartons of fruit. Best practice is to scan each carton to eliminate errors.
 - Complying with the stacking pattern that ensures stability and that the ventilation holes line up properly.
 - Damaged, or compromised cartons (e.g., moist) are not stacked.
 - Carton labels face outwards.
 - If required, as in open-top cartons, securing sheets must be used according to the specification and protocol.
 - Securing the pallets:
 - Comply with the Packaging Material Specifications and Palletisation Protocols.
 - Use the corner pieces correctly.
 - Apply the strapping as prescribed.
 - Apply the pallet caps as prescribed.
 - Marking the pallets:
As per the Export Standards and Requirements, every carton must have on it a label, barcoded as required, with at least the following information:

- The type and cultivar of the fruit.
- For grapefruit, the flesh colour.
- The class of fruit.
- The size reference and count.
- The production unit code (PUC) of where the fruit was produced.
- The packhouse code (PHC) of where the fruit was packed.
- The packing date code.
- The country of origin.
- The name and address of the exporter, or owner.
- The postharvest treatments that have been used with the fruit.
- The target market.
- The cold store that the consignment is going to.
- Managing packed and half-pallets – The management of completed pallets, and the management of half-pallets is dealt with in [Toolkit 5.4 – Packed Pallet Management](#).

execution steps

See success factors above.

assessment questions

Please Note: There is no minimum / maximum number of questions you can add.

1.	Do you procure cartons from approved vendors, that supply cartons that comply to the standards set, and that carry the required certification and quality assurance marks?
2.	Does your packing plan ensure that the correct carton and packing pattern is used as specified by the target market or client?
3.	Is the construction of the cartons efficient, and correct?
4.	Do you have a backup carton making machine to ensure continuity in case of a breakdown?
5.	Is your labelling system and process up to standard?
6.	Are your packers skilled to ensure that fruit is packed correctly as per the packing instructions?
7.	Do your pallets comply to the design and manufacturing standards set?
8.	Is your palletising practice according to SOPs and rigid quality criteria?
9.	Do you employ short-interval controls efficiently to ensure that any problems in the packing process are identified and corrected quickly?

- | | |
|-----|---|
| 10. | Is your documentation, labelling, marking and tracking system effective and efficient, and ideally digitised? |
|-----|---|

resources

- | | |
|-----|--|
| 1. | New A15C Supervent cartons for EU exports (CRI - Cutting Edge 333/2021) |
| 2. | Complaints and losses as a result of packaging (CRI - Cutting Edge 297/2020) |
| 3. | Bulk bins update (CRI - Cutting Edge 275/2019) |
| 4. | Bulk bin packaging (CRI - Cutting Edge 273/2019) |
| 5. | Inferior Quality Packaging Material (CRI - Cutting Edge 267/2019) |
| 6. | Japan carton declarations (CRI - Cutting Edge 212/2016) |
| 7. | Packing Material for the 2014 Season (CRI - Cutting Edge 178/2014) |
| 8. | Accreditation of Carton Manufacturers and Testing of Cartons (CRI - Cutting Edge 173/2014) |
| 9. | Packaging Material Specifications for the 2013 Season (CRI - Cutting Edge 157/2013) |
| 10. | CRI Packaging Material Specifications and Protocols 2022 |
| 11. | Citrus Packhouse Module 7 – Packing Practices (Citrus Academy) |
| 12. | Citrus Packhouse – Packing Practices (Citrus Academy) |