Factsheet 03/06

Cut flowers

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Guidelines for the post-harvest handling of cut lilies

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Effective handling of cut flowers from harvest through to despatch is a critical part of maintaining the quality of the product grown and supplied to customers, and ultimately the end consumer. This factsheet contains information on key areas of good practice for the post-harvest handling of cut lilies.

Background

Flower quality is at its optimum at harvest and will quickly deteriorate thereafter unless the flowers are correctly handled. It is therefore important to manage the rate of deterioration and preserve quality for as long as possible after harvesting.

As end consumer demands are increasing, the majority of retailers are now giving their customers guarantees for the life of the purchased product. Also, in an increasingly competitive industry, being able to purchase consistently good quality cut lilies is a key factor for retailers when deciding which suppliers to procure product from each season.

1 Lily flowers will require specific methods of handling to minimise the risk of damage

The production of UK grown cut lilies provides growers with the principle advantage over their competitors of being able to deliver product in a relatively short lead time without the additional transport costs associated with imported products.

In the UK cut lilies are grown both indoors and outdoors, under protective tunnels and in open ground. The flowers grown outdoors in open ground are, in particular, subject to changeable weather conditions; they therefore require a high level of post-harvest handling to maintain the quality throughout the supply chain.

In the process of post-harvest handling it is therefore important to be aware of all factors that can lead to loss of product quality and how to minimise these.

For detailed guidelines on general post-harvest handling of cut flowers please refer to HDC Factsheet 24/05. The key action points from Factsheet 24/05 are listed below, together with guidelines for effective post-harvest handling of cut lilies. Please note that although both factsheets address post-harvest handling issues, it is important that varieties grown and the methods of growing are taken into consideration as these factors can also affect the end vase life of the cut lilies.

Post-harvest handling process

There are four clear steps involved in the post-harvest process:

1 The process flow chart
2 Identifying the potential hazards and risks
3 Identifying the Critical Control Points
4 Controlling the Critical Control Points

At all stages remember to keep it simple and the principles and tools of HACCP (Hazard Analysis Critical Control Point) will help you through the process. Please refer to HDC Factsheet 24/05 for more detailed information on each step.

- Begin by drawing up a clear post-harvest process flow chart (Diagrams 1 and 2). Keep it simple but consider each step in the process, capturing the main activities. Please note the process flow charts shown for the cut lilies are examples only of what is possible. Different growers will have different requirements in order to meet customer demands and therefore the process flow examples should be used as a guide for the grower to create there own bespoke document.

- The next step is to identify the potential hazards and risks throughout all the post-harvest activities. Remember to consider physical, microbial and/or chemical risks that may affect the cut lily quality after harvesting and throughout the post-harvest handling process.

- Using the process flow chart, decide which of the identified hazards/risks are critical to the quality of the cut lilies, this will establish the Critical Control Points (CCP).

- Once identified, decide on what control or preventative measures can be put in place to eliminate or reduce occurrence to an acceptable level at each CCP. For each CCP decide on the critical limits, control or preventative measures, monitoring procedures, corrective actions and verification requirements.

Diagram 1 Example of a process flow chart for cut lilies
This process flow chart shows the simpler process for handling cut lilies, where a grower is simply harvesting, grading and supplying the raw material to a packer.

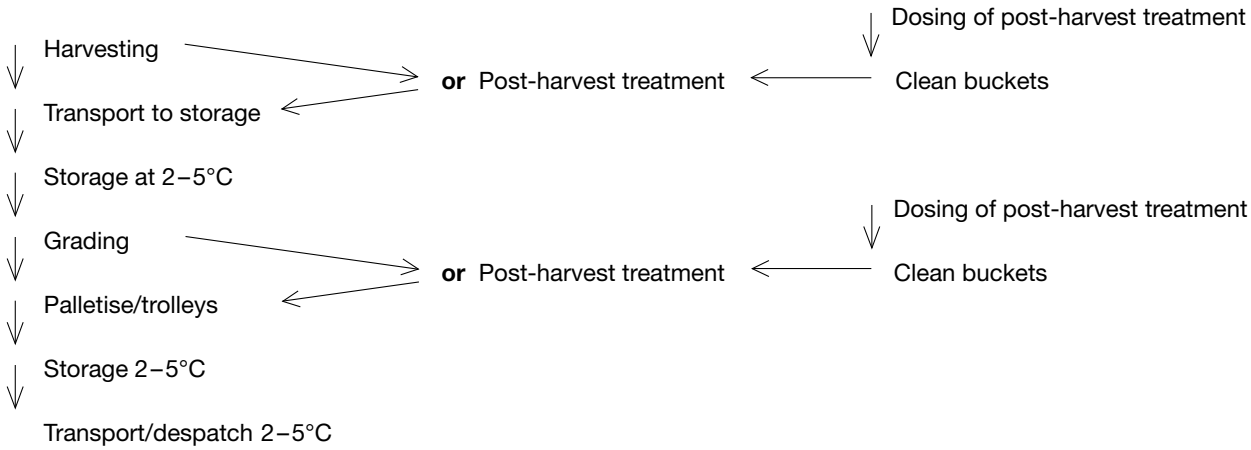
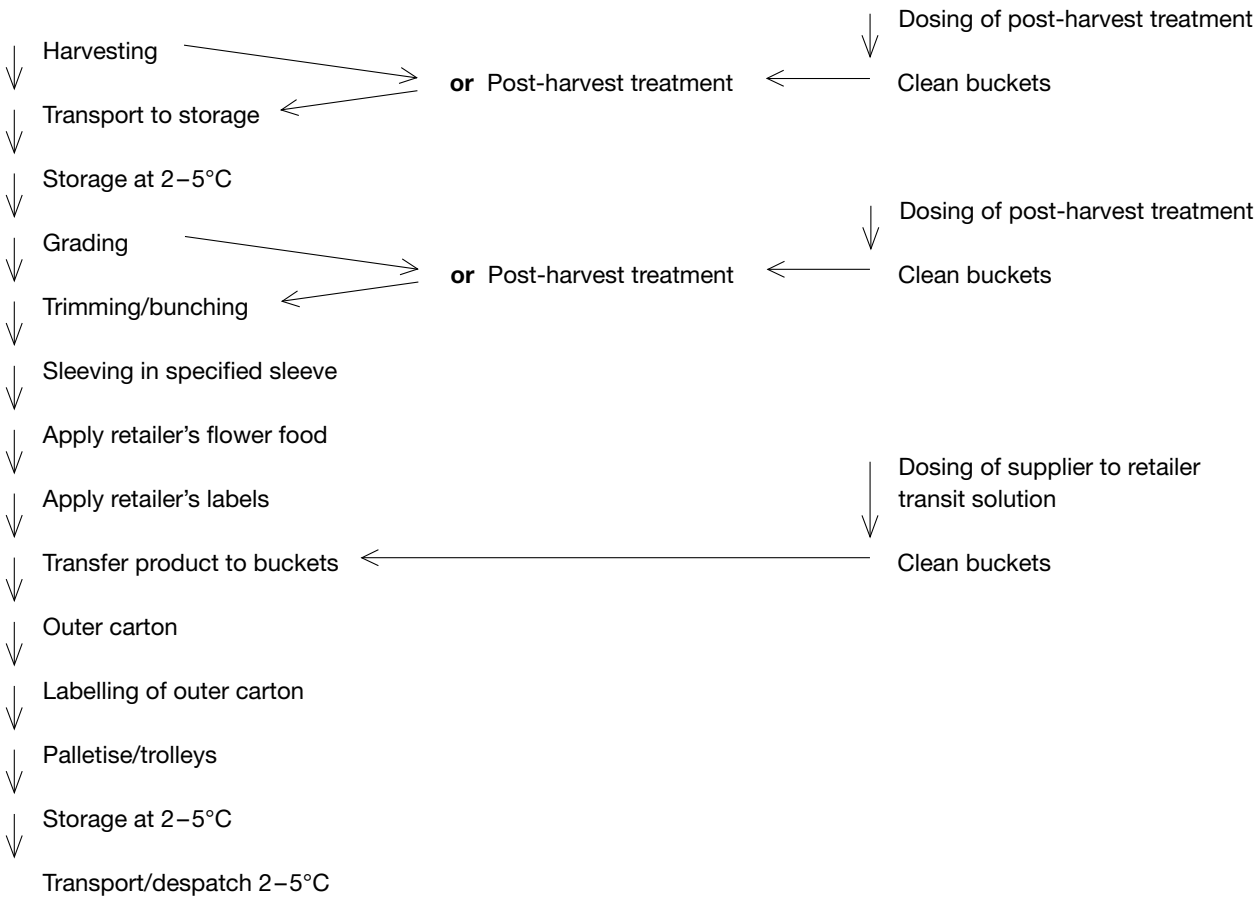


Diagram 2 Example of a process flow chart for cut lilies
This process flow chart shows the more detailed process for handling cut lilies where the grower is also sleeving and packing the product.



CCPs during the post-harvest handling of cut lilies

Physical handling

It is important to consider how the cut lilies are being harvested and steps should be taken to minimise any potential physical damage.

- Cut lily foliage and buds are delicate and are therefore very susceptible to damage. The harvesting process should therefore try to involve the minimum amount of double handling as possible.

- The best, most appropriate, container should be used for harvested product, particularly to transport the cut stems from the growing location (ie greenhouse, tunnel or field) to the grading and cold storage area.

2 Containers should not be overfilled

- Containers used should be clean and free of plant debris and soil.
- The method of harvesting should ensure that the process is efficient whilst at the same time not causing damage.
- The harvested product needs to be protected from the elements during the transport process.
- The method of packing and transport from the grower to the customer should also be considered to prevent damage.

Temperature control and management

Good temperature management is fundamental in the post-harvest handling of cut lilies, and is one of the most important CCPs. The following guidelines should be considered:

- Cool the cut lilies as rapidly as possible, but not too quickly as 'chilling injury' may result.
- Temperatures from ambient to chill need to be managed carefully.
- Consider pre-cooling to take the field heat out of a product before exposing it to final cold store temperatures of 2–5°C, particularly product that has been harvested in higher than normal temperatures (for both indoor and outdoor grown product).
- If pre-cooling is not feasible consider other methods of taking field heat out of the cut lilies. For example, using shading to protect the cropped stems, or using a chiller unit in the fields, if appropriate, to place cropped stems in immediately after harvesting prior to transit back to the storage areas.
- Try and combine the pre-cooling period with the application of any post-harvest treatments. Some growers will leave the cut lilies dry prior to despatch to the packer; however, some crops may require a post-harvest treatment prior to packing.
- Where possible, harvest in the coolest part of the day.
- Store the cut lilies away from other external sources of ethylene (eg bulbs and vegetables).
- Identify the product post-harvest using traceability tickets, which include the harvest date, this will help to ensure good stock rotation in the cold stores.
- Handle the chilled cut lilies as little as possible in and out of the cold

3 Inappropriate containers should not be used

4 Harvesting containers should be suitable for the product and product should be packed to prevent damage

store. Alternating warm and cold temperatures may cause condensation and can lead to deterioration of quality.

Water loss

Water loss is a major cause of deterioration of cut lilies post-harvest and should be managed.

- Minimise the water loss from the harvested stems. Rapid water loss will lead to stress and wilting.

- Breezy harvesting conditions will increase water loss, take this in to account when handling outdoor grown cut lilies. Take precautions to protect the harvested stems from particularly breezy conditions.

- Refrigeration units in cold stores remove moisture from the air. The ideal relative humidity for cut lilies in storage is 85%–95%.

Post-harvest handling treatments

The correct usage of post-harvest treatments prolongs the life of the lilies. Cut lilies will benefit from a post-harvest treatment.

- The best treatment should be used to maximise the cut lily's post-harvest life. Table 1 lists available post-harvest treatments for cut lilies.

- There are different lily types grown in the UK for example: Oriental, Longiflorum, Asiatic and LA's. One type of lily may gain greater benefit from one type of post-harvest treatment over another. It is therefore important to trial the different treatments available with the different lily types being grown, and to consult the post-harvest treatment manufacturers for more detailed product information, where available.

- Any post-harvest treatment used must be registered for use in the country of application and any destination country.

- Containers used for treating the cut stems with the post-harvest treatments must be cleaned regularly and free from old plant debris to prevent unnecessary microbial infection.

untreated

untreated

treated

treated

5 The photographs show examples of untreated and treated oriental lilies. The treated lilies show the benefits of better flower retention, water uptake and greener, fresher foliage

- Post-harvest treatments must be dosed correctly.
- The most common method of dosing liquid products is a dosatron, but other products come in the form of tablets, labels and T-bags. Table 2 lists post-harvest treatment measurement devices.
- Dosatrons must be regularly calibrated and maintained to prevent clogging.
- Do not mix old solution with freshly prepared solution.
- Health and safety issues must be considered when handling and storing the products being used.
- Always follow the manufacturer's guidelines.
- Any unused post-harvest treatments must be disposed of correctly, and the manufacturer's guidelines followed.

Hygiene

Good hygiene control throughout the post-harvest handling process is very important. Each stage in the process should be considered, and a hygiene management plan will help to maintain good hygiene practices. The following areas should be considered and are covered in more detail in HDC Factsheet 24/05:

- Harvesting debris
- Containers and harvesting equipment
- Water quality
- Cold stores
- Vermin control
- Staff protection

Table 1 Post-harvest treatments for cut lilies

Post-harvest treatments available		Action of post-harvest treatment required
Floralife	PAL	Prevents leaf yellowing and inhibits bacterial growth
Pokon & Chrysal	Lily and Alstroemeria T-bag or BVB	Leaves remain fresh and green
	Pre-treatment AVB Transfer to RVB Clear or CVBn*	Pre-treatment to prevent ethylene damage and aids flower retention followed by rehydration
Vitabric	Vitabric IPT	Prevents leaf yellowing and inhibits bacterial growth

*** Note from manufacturer: Where a pre-treatment of AVB T-bag followed by RVB Clear or CVBn is recommended then choose RVB Clear if water uptake problems are expected and/or the treatment/transport time is longer than 1 day**

- **The treatments suggested are those recommended by the post-harvest treatment manufacturers.**
- **Where products have been suggested that result in different post-harvest actions it is advised that the grower trial the different solutions in order to obtain the best resulting post-harvest performance**
- **All post-harvest treatments must be handled and dosed in line with the manufacturer's recommendations**
- **Old solution should not be mixed with fresh solution**
- **Solutions should not be placed in metal containers**
- **The product examples listed are not exhaustive and no criticism is implied of products not included**

Table 2 Measuring the dose of post-harvest treatments

Product being dosed	Measurement device
Floralife PAL	None currently available
Pokon & Chrysal AVB	• For solution TracyFlor FS01 Machine • Indicator solution for confirmation of presence not concentration
Pokon & Chrysal CVBn	Chlorine indicator solution confirms presence not concentration
Pokon & Chrysal Lily and Alstroemeria T-Bag	Visual check to confirm presence
Pokon & Chrysal BVB	For solution TracyFlor FS01 Machine
Vitabric IPT	Detected using Vitabric tracer detection system

Further information

On how to HACCP
Codex Alimentarius Commission
www.fao.org/es/ESN/food/quality_haccp_en.stm

Codex Alimentarius – Food Hygiene – Basic Texts. 2nd Edition. 2001. ISBN 92-5-104619-0

How to HACCP.
A Management Guide.
Mike Dillon and Chris Griffith. 3rd Edition. 2001

Post-harvest treatments
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