

BLM 31013 – Post Harvest Technology (Lecture 08)

Packages for horticultural crops

At the end of this lesson you will be able to;

- ✓ See how packages protect horticultural crops from injuries and water loss.
- ✓ Identify how packages facilitate temperature management and special treatments like fumigation and ethylene treatment.
- ✓ Get an understanding on compatibility of packages to handling.

Introduction

- Packages are important units in marketing and distribution of horticultural crops.
- Packages protect the contents against the damage during distribution.
- These facilitate rapid cooling of the content from warm field temperature to low storage and transport temperatures.
- Packages must allow continual removal of heat produced by the contents.
- They must be attractive to the consumer.



Corrugated cartons



Wooden boxes



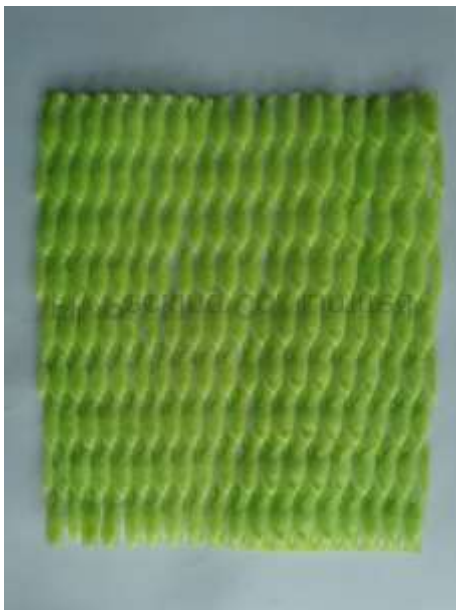
Different packages of fruits at retail market

Packages protect contents against injuries

- Physical injuries impact bruises, compression bruises and vibration/abrasion bruises accumulate throughout all stages of handling including packaging and distribution.

Impact bruises	<p>Result from dropping the product on to a hard surface.</p> <p>May not be visible from the surface.</p> <p>Dropping the product into package is the common cause of impact bruises during packing.</p>
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	Careful padding at drop points, cushion pads in the bottom of packages, and unit handling are some ways to reduce impact bruises during packaging.
Compression bruises	<p>Results from improper packing and from inadequate package performance.</p> <p>Compression bruises occur due to intentional overpacking or if the package is not strong enough to support packages stacked on top of it.</p> <p>To reduce compression bruises select packages according to product size and avoid overstacking packages beyond the design limit.</p>
Vibration bruises	<p>Occurs when products move within the package during transit.</p> <p>Restricted to product surface and reduce saleability.</p> <p>To avoid vibration bruises the product must be immobilized within the package.</p> <p>The package must resist bulging throughout distribution, high humidity storage and transport.</p> <p>(Bulging increases the volume of the package)</p>



EPE foam cushion for fruits to minimize impact bruises



Careful unit handling to minimize impact bruises



Trays are used to immobilize the product in the package to minimize vibration bruises

Packages must facilitate temperature management

- Horticultural packages must meet the special temperature requirements of the product.
- The success of the temperature management depends upon the good contact between the product in the package and the external environment.
- Ventilation holes make airflow pass the package surfaces and remove heat rapidly.



Ventilation holes facilitate temperature management

- Increasing the size of ventilation openings speeds the heat exchange.
- A few large vents perform better than many small vents.

- Package vents should not be obstructed by internal packaging material such as liners, wraps, trays and pads.
- Certain fruits require ripening before retail marketing. They must be uniformly warmed to ripening temperatures and often need ethylene treatment. Therefore, a package must be properly vented for both warming and gassing.

Packages must provide protection from water loss

- Many horticultural products suffer from wilting, shriveling or drying as a result of water loss during handling and marketing.
- Water loss occur as a result of water vapour pressure gradient between the product and the surrounding.
- During storage most products are hold at high relative humidity conditions to reduce water loss.
- During transport and marketing, package acts as the partial barrier to movement of water vapour from the product.
- Different types of moistures barriers are available in packages such as plastic (poly) liners, poly curtains and various coatings.



Plastic liners to protect against water loss

- Plastic liners with small perforations maintain a saturated atmosphere within the package and at the same time allow some gas exchange.

- Poly curtains provide a partial moisture barrier and are successful compromise for some fruits.
- Because most packaging materials (corrugated boards) absorb moisture, surface coatings like poly wax are applied to reduce the moisture uptake by the package and to delay deterioration.

Packages must facilitate special treatments

- Certain products require special treatments so that, the packages must be selected and designed to facilitate them.

Eg. Sulfur dioxide fumigation of grapes for disease control and methyl bromide fumigation of various products for insect control.

- In such cases, the package must be well-vented to allow readily flow of the fumigant.
- Packages should be vented enough to maintain uniform warming and ethylene treatment during fruit ripening.
- Some commodities must be protected from ethylene. In such cases, in-package ethylene scrubbing procedures are used.
- Modified atmosphere packaging (MAP) which accumulates 2-3% CO₂ improves product storage life (discussed in detail in the document 'Fruits and vegetables packing').
- Gladiolus and asparagus must be packed upright to avoid curvature. Asparagus must also be packed with some headspace above the spear tips for the growth and elongation.
- Orchids must be packed with a moisture supply to maintain freshness.

Adaptability to handling requirements

- Package weight should be compatible enough with hand lifting as most handling systems still require some hand lifting.
- Most horticultural packages must tolerate exposure to high relative humidity often for long periods.

- Packages should provide temperature protection to the product – light coloured, insulated packages.
- Packages must withstand environmental conditions and handling abuses during storage, distribution and marketing.
- It should facilitate easy inspection of the products.
- It must securely close and protect the product during the distribution period.
- Packages must be designed in a way which promotes its reuse and recyclability.