Peaches

Managing the Postharvest Environment to Optimize Consumer Acceptance

Mark Ritenour
University of Florida
Indian River Research and Education Center

Percent of the combined rankings for consumers’ two most important attributes to improve in peaches.

Ripening Pattern

• Commodities that have a “ripening phase” are called “Climacteric”.

Ripening

• Optimum temperature for ripening are ~ 68 to 72°F (20 to 22°C) with RH of 90-95%.
• Temperature above 30°C inhibits ethylene biosynthesis.
• Ethylene treatments of 10 to 100 ppm can be used to accelerate ripening.

Table 22.3. Ethylene effects on stone fruit ripening as indicated by flesh firmness (means ± standard deviation)

<table>
<thead>
<tr>
<th>Days at 68°F (20°C)</th>
<th>Treatment</th>
<th>Nectarine (pound-force)</th>
<th>Peach (pound-force)</th>
<th>Plum (pound-force)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>At harvest</td>
<td>11.6 ± 2.1</td>
<td>15.3 ± 1.5</td>
<td>6.1 ± 1.9</td>
</tr>
<tr>
<td>4</td>
<td>Without added ethylene</td>
<td>2.3 ± 1.0</td>
<td>2.8 ± 1.2</td>
<td>3.7 ± 2.1</td>
</tr>
<tr>
<td>4</td>
<td>With 20 ppm</td>
<td>1.8 ± 0.4</td>
<td>2.2 ± 0.6</td>
<td>1.8 ± 1.0</td>
</tr>
</tbody>
</table>

From: Peaches, Plums, and Nectarines – Growing and Handling for Fresh Market
**Mechanical Injury**

- Stone fruit are very susceptible to mechanical injury.

**Minimizing Injury**

- Careful handling of all produce containers.
- Use bubble plastic liners and top pads in field bins.
- Minimize distance of forklift movement of field bins to loading point.
- Grade farm roads and restrict travel speed of transport vehicles relative to road quality.
- Use good (i.e., “air”) suspension systems on all trucks and reduce tire pressure.
- Keep all packing equipment clean to avoid abrasive surfaces.
- Immobilize fruit within shipping containers.

**Postharvest Handling**

- Two main ways to handle the fruit.
  - Mechanized packing
    - Requires firmer, less-mature fruit
    - Allows various postharvest treatments such as cleaning fungicide application, etc.
  - “Ranch” packing
    - Required when handling “tree ripe” fruit

**Mechanized Packing of Fruit Harvested into Bins**

- Dump bags into field bins
- Deliver to packinghouse
- Cool and hold in bins
- Load into refrigerated transport vehicles
- Distribute

**Receiving**

- Provide shade to prevent heating and sunburn.
  - Shade can also be provided within the field (e.g. cover with palm fronds or use shade cloth).
- Move into packing operation quickly.

**Cooling**

- Minimize time between harvest and cooling.
- Cooling before grading (e.g. in field containers):
  - May extend storage life (esp. slows softening).
  - Extra expense of cooling unmarketable product.
  - Energy to cool will be lost if commodity is allowed to warm during packinghouse operations.
  - Re-warming & condensation may cause additional decay.
  - In some cases, delayed cooling may reduce IB.
Hydrocooling

Forced-air Cooling

INTERNAL BREAKDOWN

Mealiness
Flesh browning
Lack of flavor
Failure to ripen

Effect of Temperature on ‘Carnival’ Peach Internal Breakdown After Storage Plus 2 Days at 68°F

Killing Temperature Range

PEACH DELAYED COOLING

Bin Dump Operation

Tote Dumping

Bucket Dump Operation

Pre-Washing

Brushing and Washing
Water Disinfection
Chlorine and Detergent

Wax, Fungicide Operation

Sorting
Sizing by Weight

Final Sorting & Packing

Packing
- By hand - place pack.

Packaging Requirements of the Commodity
- Protect the commodity.
  - Immobilize the product.
  - Protect against crushing (stacking), impacts, vibration damage, etc. Possible use of trays, cups, liners, pads, etc.
  - Withstand packages stacked at least one pallet high.
  - Maintain strength under high humidities (or free moisture in some cases).
  - Protect against contamination (fungi, insects, bacteria).
Packaging
Requirements of the Commodity

- Provide (or modify) gas exchange.
- Prevent/slow water loss.
- Allow cooling and/or insulate from heating.
  - Recommended 5% side venting (adequate air flow with good structural strength). ~3% venting in the top and bottom.
  - Vents should align even when cross stacking.
  - Internal packing should not restrict air movement.

Assembly - Unitizing in pallets, bins, etc.

- Protects the commodity (e.g. product shifting).
- Systems such as gluing, interlocking packages, wrapping pallets, bracing, etc. help maintain unit integrity during transport.

Quality Control (QC)

- One person should be responsible for an operation’s QC and given enforcement authority.
- Effective QC measures must be established throughout the entire postharvest system.

Optimal Storage Conditions:
-1 to 1°C
90 to 95% RH

Storage Duration:
2 to 6 weeks, depending on cultivar

Ranch Packing of Fruit
Harvested into Buckets

Set buckets on bucket trailers
Transfer to central cooling
Cool and hold
Load into refrigerated transport vehicles
Deliver to packing area
Sort, size, and pack from buckets
Distribute

Forced Air Cooling

Photo courtesy Dr. Carlos Crisosto – UC Davis
Bucket Operation

Transportation & Unloading

Cull Disposal

Grading, Sizing & Packing

Inspection & Labeling

Transportation

Shipped from Reedley, CA to Atlanta, GA

Air Ride Equipped

Courtesy Dr. Carlos Crisosto – UC Davis
BRUISING IN DIFFERENT BOXES
Measured at Atlanta, Distribution Center

<table>
<thead>
<tr>
<th>BOX TYPE</th>
<th>YELLOW</th>
<th>WHITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRUGATED-SHOE BOX</td>
<td>1.4%</td>
<td>2.5%</td>
</tr>
<tr>
<td>STANDARD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CORRUGATED-EURO</td>
<td>2.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td>HAMMOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPC-EURO</td>
<td>2.0%</td>
<td>0.5%</td>
</tr>
<tr>
<td>STANDARD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPC-EURO</td>
<td>0.25%</td>
<td>0.4%</td>
</tr>
<tr>
<td>HAMMOCK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Firmness from 2-8lbs

Stone fruit temperature measured upon arrival at the retail warehouse after 3 days truck shipment, 1996.

<table>
<thead>
<tr>
<th>Temperature (ºF)</th>
<th>Nectarine (n=103)</th>
<th>Peach (n=102)</th>
<th>Plum (n=87)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;35</td>
<td>14.7</td>
<td>5.9</td>
<td>4.6</td>
</tr>
<tr>
<td>35-50</td>
<td>69.6</td>
<td>79.4</td>
<td>71.4</td>
</tr>
<tr>
<td>&gt;50</td>
<td>15.7</td>
<td>24.7</td>
<td></td>
</tr>
</tbody>
</table>

Thank You