Harvest and Postharvest Handling of Sweet Cherries

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Harvest Maturity

- Based on color and soluble solids
- Fruit can increase in size 40% from the earliest they might be picked until fully ripe
- Quality does not improve after harvest, although color will change during storage
Bing Cherry Color Categories

Sweet Cherry Maturity Index

Developed by Michigan State University Agricultural Engineering Department. Manufactured by Colorcurve Systems, Inc.

Farrall Hall, Michigan State University E. Lansing, MI 48824 (517) 353-4517
Harvest Maturity

• Harvest too early
  – Small size
  – Poor color
  – Poor flavor

• Harvest too late
  – Soft fruit
  – Increased decay susceptibility
  – More shrivel, stem browning and pitting

• If marketing is close and quick, can harvest more mature
Minimum Maturity Standards

• U.S. Standard
  – Mature
  – Fairly well colored
    • 95% representing typical color for variety

• California Standard
  – Entire surface of cherry minimum of light red color
  – Minimum 14 to 16% soluble solids, depending on variety
Changes in Firmness and Sugars at Each Color Stage and Effect of Gibberellic Acid Treatment

At Harvest

Firmness (g)

Soluble Solids (%)

Salmon

Red

Mahogany

Dark Mahogany

Untreated

GA
For Bing, Cherry Color is Closely Related to Sensory Cherry Flavor and Soluble Solids Content.
Less Pitting and Shrivel in GA-Treated Fruit after Storage

The bar chart shows a comparison of pitting and shrivel in different varieties of fruit after storage. The chart indicates that GA-treated fruit has less pitting and shrivel compared to untreated fruit. The chart includes data for Salmon, Red, Mahogany, and Dark Mahogany varieties.
Less Decay and More Stem Browning in GA-Treated Fruit after Storage

![Graph showing less decay and more stem browning in GA-treated fruit compared to untreated fruit. The graph includes bars for different types of fruit, with Mahogany showing significantly more decay and stem browning compared to other treatments.]
• Harvest early in the day when cool
• Harvest cherries by their stems, lifting the cluster to remove from the spur
• Avoid impact injury during harvest operations (pads)
• Keep fruit in the shade and transport to cooler or packing as soon as possible
Harvest Time Effects on Fruit Firmness

- **At Harvest**
- **3 days at 36°F**
- **3 days at 36°F + 1 day at 68°F**

Firmness levels are shown for different harvest times and temperatures.
### Effect of Sun Exposure on Cherry Fruit Quality

<table>
<thead>
<tr>
<th>Time in Field</th>
<th>Evaluation Time</th>
<th>Fruit Temp. °F</th>
<th>Stem Browning</th>
<th>Firmness g/mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sun</td>
<td>Shade</td>
<td>Sun</td>
</tr>
<tr>
<td>2</td>
<td>Before Storage</td>
<td>97.5</td>
<td>66.5</td>
<td>2.2</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>114.1</td>
<td>71.3</td>
<td>4.4</td>
</tr>
<tr>
<td>2</td>
<td>After Storage</td>
<td>-</td>
<td>-</td>
<td>3.2</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>-</td>
<td>-</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Stem browning scale: 0 to 5

Kupferman 1998
Packinghouse Operations

• Cluster Cutter
  – Singulates fruit to allow for sizing

• Sorting
  – Labor intensive
  – Removes under-ripe, damaged and decayed fruit
  – Adequate lighting is important

• Hydro-cooling

• Sizing
Packaging

- **Box with liner or bag**
  - Loosely closed, solid polybag

- **Consumer bags**
  - Various sizes
  - Clamshell
  - Semi-automatic system

- **Modified atmospheres**
  - Perforated, Lifespan, Freshbag
  - Beneficial for > 15 days storage
Modified Atmosphere Packaging

• Breathable plastic bag
• Introduce gas or fruit modifies atmosphere
  – Produce CO$_2$ and consume O$_2$
  – Final concentration depends on amount of fruit and bag permeability

• Benefits
  – Slows fruit ripening and senescence
  – Maintains green stem color
  – Reduces growth of disease organisms
**Modified Atmosphere Packaging**

23 days at 41°F

Air

0.5% O\(_2\)

0.5% O\(_2\) + 15% CO\(_2\)
Modified Atmosphere Packaging

- Injection of gas not required
- Twist-tie or zip-closing bags works fine
Cherry Pitting
Cherry Bruising
<table>
<thead>
<tr>
<th>Damage Symptom</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitting</td>
<td>Pedicel, packinghouse.</td>
</tr>
<tr>
<td>Surface marking</td>
<td>Picking container, lug side, compression damage.</td>
</tr>
<tr>
<td>Bruising</td>
<td>Pickers, buckets w/out padding, long hauling, high drop on the packingline.</td>
</tr>
</tbody>
</table>
**Picking Bucket**

![Bar Chart]

- **Sampling Point**
  - Tree
  - Bucket 1
  - Bucket 2

<table>
<thead>
<tr>
<th>Damage (%)</th>
<th>Pitted</th>
<th>Bruised</th>
<th>Marked</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- Green: Pitted
- Purple: Bruised
- Yellow: Marked
Decay Control Strategies
for Cherry
### Efficacy of selected fungicides for control of three postharvest decays of sweet cherry

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Common Name</th>
<th>Brown Rot</th>
<th>Gray Mold</th>
<th>Rhizopus Rot</th>
<th>Registered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rovral 50WP</td>
<td>Iprodione</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Cancelled</td>
</tr>
<tr>
<td>Scholar 50WP</td>
<td>Fludioxonil</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Yes</td>
</tr>
<tr>
<td>Allisan</td>
<td>Dichloran</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>Yes</td>
</tr>
<tr>
<td>Elite 45WP*</td>
<td>Tebuconazole</td>
<td>+++</td>
<td>+</td>
<td>++</td>
<td>Yes</td>
</tr>
<tr>
<td>Elevate 50WDG</td>
<td>Fenhexamid</td>
<td>++</td>
<td>+++</td>
<td>-</td>
<td>Soon</td>
</tr>
<tr>
<td>Pristine</td>
<td>Mixture</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>Soon</td>
</tr>
<tr>
<td>PH-066</td>
<td>Pyrimethanil</td>
<td>++</td>
<td>+++</td>
<td>-</td>
<td>Soon?</td>
</tr>
</tbody>
</table>

* - Efficacy of Elite 45WP is rate dependent.
Cooling

• Room cooling
• Hydrocooling (before packing)
  – Packingline
  – Manual immersion
  – Sanitizer in water essential (25ppm chlorine)
• Forced-air cooling
  – Do not overcool
  – High RH
PORTABLE FORCED AIR COOLER
Storage

• Only until fruit can be marketed
• Temperature 32°F; 90 to 95% RH
• Flavor quality usually deteriorates before appearance quality
  – Loss of acidity in storage
• Do not store more than 2 weeks
Overview

- Maturity
- Educate/supervise picking crew
- Evaluate your equipment
- Handle gently and fast
- Short transportation
- Fast cooling to 32°F
- Keep them cool
- Establish a quality control system!