Table Grape Postharvest Handling

Three Main Problems

- Bleaching
- Hairline
- Botrytis Decay
- Stem Browning

Use of SO₂ to Control Decay


Stem Browning

0 hr 3 hr 6 hr 9 hr

0.2-1.5% Water Loss During Harvest and Packing

2.0% Critical Threshold

Table Grape Cultivars & Maturity

- Summer Royal
- Fantasy Seedless
- Marroo Seedless
- Autumn Royal
- Flame Seedless
- Scarlet Royal
- Sweet Scarlet
- Crimson Seedless
- Red Globe
- Sugraone
- Princess
- Thompson Seedless
- Autumn King
Avenue Pack
1. Carrying Lugs to Avenue Packer
2. Trimming, Cleaning, and Sorting Fruit
3. Packing Fruit into Shipping Lugs
i) Packer Inspection
4. Field Lidding and Stacking
5. Initial SO₂ Fumigation FAC/SO₂ Pads
6. Forced Air Cooling (FAC)

Periodic Refumigation
Inspection by buyers or 3rd party

Storage
Slow-Release SO₂ Pad

Loading Pallets into Refrigerated Truck
Unloading at Terminal
Recooling & Holding

Retail Distribution

Harvest Preparation
• Treat avenues to prevent dust
• Withhold irrigation
• Level soil
• Remove high cover crops
• Prune some long canes; remove some leaves
Pallets arriving for cooling, SO2 fumigation and cold storage.

Stacked Boxes of Table Grapes Awaiting Transport for Cooling and SO2 Fumigation.
- Palletization (pallet squeeze)
- Unitization (netting or strapping)

Temperature Management Requirements:
- Delayed cooling ≤ 4-6 hours
- Fast Cooling Temperature ≤ 6 - 8 hours
Temperature Management Requirements

- **Storage Temperature**: –0.5 – 0°C
- **Relative Humidity**: 90 – 95%
- **Air Flow**: 20-40 cfm/ton

Postharvest Biology and Technology of Kiwifruits

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31% Butte Yuba Sutter
4% San Joaquin Stanislaus
65% Tulare Kings Fresno
Physical and Compositional Changes during Development

Storage Potential

Kiwifruit internal breakdown after 3 months cold storage
Kiwi

<table>
<thead>
<tr>
<th>Harvest</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature</td>
<td>Ripe</td>
</tr>
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</table>

Starch

Sugars

SSC = 6.5%  
SSC = 15%

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Consumer Acceptance (‘in-store’)  

15.1-16.1 % DW

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How to assure Consumer Quality

- Minimum Maturity (6.2% SSC)
- Maximum Maturity (<14 pounds)
- Consumer Quality (>12.5% RSSC)
- Fruit Handler Quality (>15.1% DW)
Dry matter (DM) distribution of ‘Hayward’ kiwifruit

A) Chilean kiwifruit for 46 samples (2009-2010)

Kiwifruit Harvesting & Packaging
### Tray packing

**Volume Filled**

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>TRAYS</td>
<td>1.55%</td>
<td>2.50%</td>
<td>2.27%</td>
<td>2.32%</td>
<td>4.50%</td>
<td>3.30%</td>
</tr>
<tr>
<td>3 LAYERS</td>
<td>5.77%</td>
<td>7.20%</td>
<td>3.39%</td>
<td>2.38%</td>
<td>1.34%</td>
<td>2.94%</td>
</tr>
<tr>
<td>BAGS/CUP</td>
<td>8.23%</td>
<td>8.50%</td>
<td>14.23%</td>
<td>16.33%</td>
<td>23.22%</td>
<td>5.08%</td>
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<tr>
<td>VF (19.8# - 9k)</td>
<td>83.70%</td>
<td>78.70%</td>
<td>77.70%</td>
<td>75.65%</td>
<td>80.74%</td>
<td>70.08%</td>
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<tr>
<td>BINS</td>
<td>1.99%</td>
<td>3.00%</td>
<td>2.41%</td>
<td>2.31%</td>
<td>2.19%</td>
<td>4.06%</td>
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</table>
Containers

The type of kiwifruit container with box liners do not interfere with the ethylene application.
Kiwifruit ripening

Storage 4-12 months
Preconditioning (4-21 days)

Mature (Harvest)  
- Hard
- Starchy
- Sour
- Odorless
- 6.5 - 7.0% HSSC
- 13.5 - 14% RSSC
- 17% DW

Ripe (Consumption)  
- Soft, Juicy
- No starch
- Sweet
- Aromatic
- Tasty
- 13.5 - 14.0% RSSC
- 17% DW

WAIT… I'm not “READY TO EAT” yet!!

EAT ME… I’m “READY TO EAT”!!

Kiwifruit Postharvest Handling Tips

- Minimum Maturity (6.5% SSC)
- Maximum Maturity (<14 pounds)
- Consumer Quality (>12.5% RSSC)
- Disease Management (gray mold)
- Ethylene (5-10ppB)
- Temperature Management (32°F & 90% RH)
- Controlled Atmosphere

More information:
http://www.uckac.edu/postharv/ and
http://postharvest.ucdavis.edu
### Avenue Pack

**Cold Storage**

- Storage
- \( \text{SO}_2 \) fumigation (7-10 days)
- Inspection

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### Shed Pack

- Selecting
- Packing
- Trimming

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**Postharvest Handling of Table Grapes**

1. Fruit is Placed in Picking Lug
2. Lugs Placed in Shade of Vine
3. Transportation to Packinghouse
4. Lugs are Delivered to Packer
5. Trimming, Cleaning, and Stacking
6. Packing into Shipping Lugs
7. Packer Inspection
8. Lidding
9. Initial \( \text{SO}_2 \) Fumigation FAC/\( \text{SO}_2 \) Pads

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**Forced Air Cooling (FAC)**

- Storage
- Slow Release \( \text{SO}_2 \) Pad
- Loading Pallets into Refrigerated Truck/Van
- Unloading at Terminal

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**Retail Distribution**
Shed Pack

- Lidding
- Staking
- Unitization
- Cooling

SO₂ Generating Pads

One and Two phases

The Box Liner System

- COMPONENTS
  - SO₂ pad
  - Box Liner
  - Bottom pad
  - Cluster bag
  - Box type
  - Inner packaging
  - Season/country
  - Cultivar
Containers

The type of kiwifruit container with box liners do not interfere with the ethylene application.

Avenue Pack
Cold Storage

Pallets arriving for cooling, SO2 fumigation and cold storage