Table Grape Postharvest Handling

**Three Main Problems**
- Bleaching/Hairline
- Botrytis Decay
- Stem Browning

**Use of SO₂ to Control Decay**

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>700 – 1,250 ppm</td>
</tr>
<tr>
<td>Forced air cooling</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>1,250 – 2,000 ppm</td>
</tr>
<tr>
<td>Not scrubbed</td>
<td>(2 – 5 ppm)</td>
</tr>
</tbody>
</table>


Concentration x Time

- At least 100 CT
  - 100 ppm per hour
  - 200 ppm per 30 min
  - 400 ppm per 15 min
Stem Browning

0.2-1.5% Water Loss During Harvest and Packing

2.0% Critical Threshold
Table Grape Cultivars & Maturity

- Summer Royal
- Fantasy Seedless
- Maroo Seedless
- Autumn Royal
- Flame Seedless
- Scarlett Royal
- Sweet Scarlet
- Crimson Seedless
- Red Globe
- Sugraone
- Princess
- Thompson Seedless
- Autumn King
- Summer Royal
- Fantasy Seedless
- Maroo Seedless
- Autumn Royal
- Flame Seedless
- Scarlett Royal
- Sweet Scarlet
- Crimson Seedless
- Red Globe
- Sugraone
- Princess
- Thompson Seedless
- Autumn King

Postharvest Handling of Table Grapes

**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)
7. Periodic Re-fumigation
   
   Inspection by buyers or 3rd party
8. Loading Pallets into Refrigerated Truck
9. Unloading at Terminal
10. Re-cooling & Holding
11. Retail Distribution
Harvest Preparation

- Treat avenues to prevent dust
- Withhold irrigation
- Level soil
- Remove high cover crops
- Prune some long canes; remove some leaves

Avenue Pack
Field Pickers

- Selecting
- Harvesting

Avenue Pack
Field Pickers

- Trimming
• Carrying lugs, Totes

• Field Pickers

Filed Packing table grapes in styrofoam boxes

• Trimming
• Inspecting
• Packing
• Lidding

Avenue Pack Field Pickers

Avenue Packaging

Stacking and Loading the Truck
Table Grape Containers/Packaging

- New corrugated types
- EPS or Foam Corrugated
- TKV
- RPC

Pallets arriving for cooling, SO2 fumigation and cold storage

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

More information:
http://postharvest.ucdavis.edu
Physical and Compositional Changes during Development

- Total Sugar
- Soluble Solids
- Starch
- Total Acids
- Fruit Weight
- Fleshy Firmness

Beever and Hopkirk, 1990
Kiwi

<table>
<thead>
<tr>
<th>Harvest</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature</td>
<td>Ripe</td>
</tr>
<tr>
<td>Starch</td>
<td></td>
</tr>
<tr>
<td>Sugars</td>
<td></td>
</tr>
<tr>
<td>SSC = 6.5%</td>
<td>SSC = 15%</td>
</tr>
</tbody>
</table>

Storage Potential
Pericarp translucency
or
Internal breakdown

Kiwifruit internal breakdown after 3 months cold storage

Sacramento Valley, 1998
San Joaquin Valley, 1998
San Joaquin Valley, 1999
Sacramento Valley, 2000
San Joaquin Valley, 2000
How to assure Consumer Quality

- Minimum Maturity (6.2% SSC)
- Maximum Maturity (≤14 pounds)
- Consumer Quality (≥12.5% RSCC)
- Fruit Handler Quality (≥15.1% DW)
Holding or Curing

Packinghouse Operations

Bin Dumping
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)
- WAIT... I'm not "READY TO EAT" yet!!
- Hard
- Starchy
- Sour
- Odorless
- 6.5 - 7.0% HSSC
- 13.5 - 14% RSSC
- 17% DW

**Ripe** (Consumption)
- EAT ME... I'm "READY TO EAT"!!
- Soft, Juicy
- No starch
- Sweet
- Aromatic
- Tasty
- 13.5 - 14.0% RSSC
- 17% DW

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**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