Postharvest Handling Systems: Tropical Fruits (Banana, Pineapple & Papaya)

Banana Maturity Stages

Delaying harvest until the full mature-green stage results in higher yield and better eating quality when ripe.

Preparing a banana bunch for harvest
Transport of Bananas to Markets

Marine Transport of Bananas

Exposure of mature-green bananas to ethylene to initiate ripening can be done during transport or at destination.

<table>
<thead>
<tr>
<th>Ripening Conditions for Bananas</th>
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<tbody>
<tr>
<td>Fruit temperature: 14 to 18°C (5 to 65°F)</td>
</tr>
<tr>
<td>Relative humidity: 90-95%</td>
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<tr>
<td>Ethylene concentration: 100-150ppm</td>
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<tr>
<td>Duration of exposure to ethylene: 36-48 hours</td>
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<tr>
<td>Carbon dioxide:</td>
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<tr>
<td>Adequate air exchange to prevent accumulation of CO₂; never 1%</td>
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</tbody>
</table>
Extending the Yellow-life of Bananas (MA)

Extending the Yellow-life of Bananas (1-MCP)

Surface abrasions

Internal bruising due to drops
Chilling Injury

Symptoms of Chilling Injury on Bananas
- Skin discoloration (all colors)
- Browning of the inner side of the peel
- Failure to ripen
- Browning of the flesh (in severe cases)

Development of Chilling Injury Symptoms

Crown Rot

Postharvest Diseases of Bananas

Crown Rot
Maturity and Ripeness Stages

Intercultivar Differences in Composition of Pineapples

<table>
<thead>
<tr>
<th>Constituent (unit)</th>
<th>Changka</th>
<th>Premium Select</th>
</tr>
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<tbody>
<tr>
<td>Total solids (%)</td>
<td>16.9 ± 0.9</td>
<td>22.2 ± 1.8</td>
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<tr>
<td>Soluble solids (%)</td>
<td>12.7 ± 1.2</td>
<td>16.0 ± 0.5</td>
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<tr>
<td>pH</td>
<td>6.67 ± 0.1</td>
<td>6.64 ± 0.1</td>
</tr>
<tr>
<td>Total ascorbic acid (mg/100g FW)</td>
<td>0.60 ± 0.1</td>
<td>0.62 ± 0.0</td>
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<tr>
<td>Beta carotene (µg/100g FW)</td>
<td>8.0 ± 0.7</td>
<td>30.8 ± 1.2</td>
</tr>
<tr>
<td>Total phenolics (mg/100g FW)</td>
<td>323.3 ± 94.2</td>
<td>1108.9 ± 194.2</td>
</tr>
<tr>
<td>Antioxidant activity (DPPH) (µM/100g FW)</td>
<td>31.4 ± 0.9</td>
<td>63.5 ± 4.7</td>
</tr>
<tr>
<td>Ascorbic acid equivalent</td>
<td>620 ± 9.8</td>
<td>2170 ± 22.2</td>
</tr>
<tr>
<td>Tocopherol equivalent</td>
<td>594 ± 9.8</td>
<td>2066 ± 22.2</td>
</tr>
</tbody>
</table>

Premium Select = Tropical Gold

Harvesting Pineapples in Hawaii

- Intact by hand
- Place on cooler shelf
- Aseptically load into goodbox
- Transport to coolship or processing plant
- Cool
- Fire out to 1% by 0°C by 2.2°C
- Wash only if with chernosatrd treatment
- Soft for quality
- Sort
- Size
- Keep fruit in refrigerator to hold cond
- Cool
- Load into treat goodbox
- Air or water transport to market
Transporting harvested pineapples to packinghouse

Initial Quality Evaluation of Pineapples at the Packinghouse

Water dumping and washing pineapples
Singulating and orienting pineapples before wax application

Wax application to reduce internal browning

Packing Pineapples
Loaded pineapple ballets into a marine container

Endogenous Brown Spot

7.2°C (45°F) 7.2°C (45°F) 5.5°C (42°F) 5.5°C (42°F) 3°C (38°F) 3°C (38°F)
Papaya

Maturity and Ripeness Stages of Papaya

Flavor Quality of Papayas Improves with Ripeness Stage at Harvest

Papaya Maturity and Ripeness Stages
Hot water treatment followed by hydrocooling

Quality Sorting of Papayas

Packing Papayas
Packaging to reduce surface abrasions of papayas

**Scoring System for Severity of Surface Abrasions on Papayas**

**Papaya Defects**

- Coletotrichum gloeosporioides
  - Anthracnose Rot
- Phomopsis Rot
- Phomopsis caricae-papaya