Pear Ripening

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What we know about pear ripening...

- European pears require ethylene for ripening – climacteric fruit
- European pears do not have the capacity for ethylene production and ripening at harvest
- Ethylene treatment and/or a period of cold storage can induce the capacity to produce ethylene and ripen
- Requirements vary cultivar to cultivar and with harvest maturity

Temperature During Cold Storage

- At -1 to 0°C (30 to 32°F):
  - Bartlett and Bosc require 1-2 weeks
  - Comice requires 4 weeks
  - Anjou requires 6 weeks
  - ...to ripen without added ethylene

Dessert quality of ‘Anjou’ pears ripened with and without ethylene after up to 8 weeks cold storage

Conditioned with either 100 ppm ethylene (A) or no ethylene (B) for 3 days at 68°F after 0, 2, 4, 6, and 8 weeks of storage in air at 30°F

Chen et al. 1996
Softening of Comice Pears after Conditioning

<table>
<thead>
<tr>
<th>Condition</th>
<th>Days</th>
<th>Firmness (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20°C</td>
<td>3d @ C2H4</td>
<td>10</td>
</tr>
<tr>
<td>10°C</td>
<td>1d @ C2H4</td>
<td>8</td>
</tr>
<tr>
<td>0°C</td>
<td>25d @ 0C</td>
<td>6</td>
</tr>
<tr>
<td>10°C</td>
<td>10 d @ 10°C</td>
<td>4</td>
</tr>
<tr>
<td>20°C (control)</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Fruit Temperature During Ethylene Exposure

Ethylene Conditioning at Lower Temperatures
Bartlett Pears

- 24 hours of ethylene at 20°C (68°F) is equivalent to:
  - 48 hours of ethylene at 10°C (50°F)
  - 72 hours of ethylene at 7.5°C (45°F)
- Need to develop similar data for other varieties

Conditioning Options for Pears

<table>
<thead>
<tr>
<th></th>
<th>Comice</th>
<th>Bartlett</th>
<th>Bosc</th>
<th>Anjou</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Storage @ 30-32°F</td>
<td>4</td>
<td>2-3</td>
<td>2</td>
<td>8 wks</td>
</tr>
<tr>
<td>Cold Storage @ 40-50°F</td>
<td>2-3</td>
<td>1</td>
<td>1</td>
<td>3-6wks</td>
</tr>
<tr>
<td>100ppm Ethylene @ 68°F</td>
<td>3</td>
<td>1-2</td>
<td>1</td>
<td>3 days</td>
</tr>
<tr>
<td>100ppm Ethylene @ 45-50°F</td>
<td>?</td>
<td>2-3</td>
<td>?</td>
<td>? days</td>
</tr>
</tbody>
</table>

Cold storage requirements may be longer when fruit are stored in CA

Effect of Fruit Temperature on Rate of Ripening
Fruit Temperature has a Tremendous Influence on Fruit Response to Ethylene During Conditioning as Well as During Ripening

It can be very Difficult to Uniformly Warm Cold Fruit for Conditioning or Ripening

Factors Affecting Development of Ripening Competence Conditioning Pears for Ripening

- Variety
- Harvest maturity
- Seasonal effects – weather
- Temperature during cold storage
- Length of cold storage
- Length of ethylene treatment
- Fruit temperature during ethylene treatment
- Interactions

Questions?

http://postharvest.ucdavis.edu
Effect of Temperature During Storage on Induction of Ripening Capacity in Bartlett Pears

Days Ripening @ 68°F (20 °C) After Temperature Conditioning

Bartlett Firmness

20C = 68F
10C = 50F
0C = 32F