Pear Ripening

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What we know about pear ripening...

- Pears are climacteric fruit and ripen in response to internal or external ethylene
- 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 (conditioning)
- Requirements vary cultivar to cultivar and with harvest maturity

ETHYLENE CONDITIONING

Bartlett Pears
Harvested July 27 and Ripened

8d air 68°F
1d C2H4
7d air 68°F
Dessert quality of ‘Anjou’ pears ripened with and without ethylene after up to 8 weeks cold storage

Conditioned with either 100ppm 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

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

Low Temperature Conditioning

- At -1 to 0°C (30 to 32°F):
  - Bartlett and Bosc require 1-2 weeks
  - Comice requires 4 weeks
  - Anjou requires >8 weeks

...to ripen without added ethylene
To Condition Pear Fruit
- The more mature the fruit, the less time it takes at low temperatures
- 10°C (50°F) works faster than 0°C (32°F) or 5°C (41°F)

Conditioning Options for Freshly Harvested Pears

<table>
<thead>
<tr>
<th>Condition Type</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 @ 50°F</td>
<td>2-3</td>
<td>1</td>
<td>1</td>
<td>3-6 wks</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 @ 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

Where Should Pears be Conditioned or Ripened?

1. Shipper conditions pears with cold or ethylene before shipping – ripen at room temperature upon arrival without ethylene
   a) Especially early season fruit
2. Receive non-conditioned, early season pears at processor/wholesale/retail – ripen with ethylene at room temperature
3. Receive non-conditioned pears later in the season at processor/wholesale/retail – ripen at room temperature without ethylene

Pear Ripening

- At Harvest (conditioning or ripening)
  Warm temperatures (≥ 55°F)
  Ethylene exposure is usually needed
- After Cold Storage
  - Warm temperatures (≥ 55°F)
  - If sufficient cold storage, no ethylene needed
- At Wholesale Warehouse or Processor
  - Warm temperatures (≥55°F)
  - If conditioned by shipper or late season, no ethylene needed
  - Never hurts to add ethylene
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
Rate of Cooling within Pallet

<table>
<thead>
<tr>
<th>Pallet Level</th>
<th>Outside</th>
<th>Inside</th>
<th>Outside</th>
<th>Inside</th>
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</thead>
<tbody>
<tr>
<td>1 Bottom</td>
<td>2.1</td>
<td>3.3</td>
<td>1.8</td>
<td>2.1</td>
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<tr>
<td>2</td>
<td>4.9</td>
<td>8.7</td>
<td>3.2</td>
<td>5.5</td>
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<td>4.9</td>
<td>12.4</td>
<td>4.3</td>
<td>7.2</td>
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<td>7.0</td>
<td>15.0</td>
<td>4.6</td>
<td>7.2</td>
</tr>
<tr>
<td>5</td>
<td>6.4</td>
<td>15.7</td>
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<td>7.3</td>
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<td>7.0</td>
<td>13.0</td>
<td>4.1</td>
<td>7.4</td>
</tr>
<tr>
<td>7 Top</td>
<td>2.0</td>
<td>4.9</td>
<td>1.7</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Factors Affecting Successful Conditioning of Pears

- 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