The importance of maturity at harvest in pears

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Common pear issues

- Difficult to accurately assess harvest time
- Do not ripen to optimum eating quality on the tree
- Do not fully ripen after harvest at room temp
- May need cool phase at -0.5°C to initiate proper ripening
- Become mealy if not chilled
- Williams 14 days, Forelle 15 days, Anjou > 60 days depending on harvest maturity
- Prone to scald
- Asian market prefers fruit green and crisp
The DA (Difference of Absorbance) Technology

- Based on vis/NIR spectroscopy
- Measures Chlorophyll-a content in mesocarp (difference between absorbance at 720 and 670 nm)
- Expressed as $I_{AD}$ (Index of Absorption Difference)
- Estimates fruit maturity based on loss of chlorophyll (de-greening) and ethylene production rate
Goals

• Accurate determination of pear fruit maturity classes using DA Technology

• Correlate with ethylene production, or other indicator of physiological ripening.

• Rapid and accurate determination of optimum harvest time and post harvest handling requirements

• Determine effect of harvest maturity on fruit behaviour and quality during handling and cool storage
## Maturity classes

<table>
<thead>
<tr>
<th></th>
<th>$I_{AD}$</th>
<th>Ethylene production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Williams</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immature</td>
<td>&gt; 1.70</td>
<td>No</td>
</tr>
<tr>
<td>Early pick</td>
<td>1.20 - 1.69</td>
<td>No</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.70 - 1.19</td>
<td>Very little</td>
</tr>
<tr>
<td>Ready to eat</td>
<td>&lt; 0.70</td>
<td>Substantial</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th></th>
<th>$I_{AD}$</th>
<th>Ethylene production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANP-0118 - Lanya</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immature</td>
<td>&gt; 1.50</td>
<td>No</td>
</tr>
<tr>
<td>Early pick</td>
<td>1.49 - 1.20</td>
<td>No</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.19 - 1.00</td>
<td>No</td>
</tr>
<tr>
<td>Ready to eat</td>
<td>&lt; 1.00</td>
<td>No</td>
</tr>
</tbody>
</table>
Maturity monitoring in the field 2014

Date

Max Temperature

I_{AD}

20-Dec 27-Dec 3-Jan 10-Jan 17-Jan 24-Jan 31-Jan 7-Feb 14-Feb 21-Feb 28-Feb 6-Mar 13-Mar 20-Mar

William's 13/14

Lanya 13/14

T max 13/14
Maturity monitoring in the field 2015

Graph showing the comparison of I_AD and Max Temperature for Lanya and Deliza from 20 Dec to 20 Mar.
Eating Quality Williams 2014
Sugar to acid ratio (°Brix/TA)

Day's in storage at 18°C
Sugar acid ratio (g/l)

- Immature
- Early pick
- Commercial
- Ready to eat
Correlation with Firmness Deliza 2015

- Single fruit kgf
- Fitted curve (R squared = 0.65; n=198)
Conclusions and recommendations

- The DA technology is applicable to pears in estimating and monitoring fruit maturity.

- $I_{AD}$ is a valid index to monitor postharvest fruit performance and set ripening protocols.

- Need more research to get a good correlation of the $I_{AD}$ and the maturity classes when ethylene is not produced (enzymes, volatiles, ethylene in postharvest, interaction with 1-MCP).
Thank you.

Questions?

ANP-0118 Lanya

ANP-0131 Deliza

ANP-0534