Apple Research Supported by the Ontario Apple Growers - 2007

John Cline, Associate Professor
University of Guelph,
Simcoe & Vineland Campuses
Tel: 519-426-7127 Ext 331
Jcline@uoguelph.ca
Research and Technical Support

- Debbie Norton, Technician
- Research Station Support Staff
- Graduate Students - Ali Taheri, two positions available
2007 Experiments (Proposed in April 2007)

- Establish a super spindle research orchard of Honeycrisp/M.26, Aurora Golden Gala/M.26, Ambrosia/M.9, and Royal Gala/M.9
- Continue Maxcel (6-BA) thinning research, primarily for registration purposes
- Investigate the influence of thinning on mummy fruit formation in Gala and Honeycrisp (Gardner, Celetti)
- Investigate the horticultural benefits of Surround on Gala.
- Continue 1999 and 2002 rootstock experiments
Economics of Thinning

- Approximately $500/acre (based on $10/hr)
- Labour intensive practices will be more difficult in the future
- Harvest efficiency is directly related to the amount of thinning
# 6-BA Apple Thinning on Gala (2007)

Table 3. Effect of Maxcel and Carbaryl on yield, fruit number and fruit size on 10-yr-old 'Royal Gala'/Bud.9 apple trees. University of Guelph, Simcoe, Ontario, 2007.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate (mg/L)</th>
<th>TCSA fall 2007 (cm²)</th>
<th>Yield (kg.tree⁻¹)</th>
<th>Yield efficiency (kg.cm²)</th>
<th>Total number fruit per tree</th>
<th>Mean fruit weight (g)</th>
<th>Crop density (#.cm⁻²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated Control</td>
<td></td>
<td>41.2</td>
<td>25.0</td>
<td>0.61</td>
<td>187.5</td>
<td>137.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Hand thinned control (every other spur)</td>
<td></td>
<td>43.0</td>
<td>20.7</td>
<td>0.49</td>
<td>131.9</td>
<td>160.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Maxcel</td>
<td>75</td>
<td>37.4</td>
<td>23.8</td>
<td>0.65</td>
<td>186.9</td>
<td>137.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Maxcel</td>
<td>100</td>
<td>45.4</td>
<td>28.9</td>
<td>0.65</td>
<td>186.8</td>
<td>156.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Maxcel + Carbaryl</td>
<td>75,750</td>
<td>41.3</td>
<td>15.9</td>
<td>0.40</td>
<td>94.3</td>
<td>175.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Maxcel + Carbaryl</td>
<td>100,750</td>
<td>40.3</td>
<td>14.6</td>
<td>0.45</td>
<td>81.1</td>
<td>188.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Exilis</td>
<td>75</td>
<td>46.0</td>
<td>33.0</td>
<td>0.72</td>
<td>229.8</td>
<td>146.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Exilis</td>
<td>100</td>
<td>38.6</td>
<td>24.4</td>
<td>0.66</td>
<td>175.9</td>
<td>144.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Exilis + Carbaryl</td>
<td>75,1000</td>
<td>43.9</td>
<td>16.9</td>
<td>0.36</td>
<td>107.4</td>
<td>168.3</td>
<td>2.4</td>
</tr>
<tr>
<td>Exilis + Carbaryl</td>
<td>100,1000</td>
<td>41.3</td>
<td>13.6</td>
<td>0.32</td>
<td>87.9</td>
<td>174.2</td>
<td>2.1</td>
</tr>
</tbody>
</table>

**significance**²

| LSD (P=0.05)                        | 7.74        | 9.83                 | 0.25               | 75.42                    | 23.25                       | 1.98                  |
| P value                             | 0.4294      | 0.0012               | 0.0155             | 0.0004                   | <0.0001                     | 0.0030                |
Effective thinning with Maxcel alone or with Carbaryl
Table 7A. Effect of Maxcel and Carbaryl on yield, fruit number and fruit size on 5-yr-old Ambrosia apple trees. Commercial Orchard, Simcoe, Ontario 2007.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate (mg/L)</th>
<th>TCSA fall 2006 (cm²)</th>
<th>Yield (kg.tree⁻¹)</th>
<th>% of control</th>
<th>% of control</th>
<th>Total fruit per tree (kg.cm⁻²)</th>
<th>Mean fruit weight (g)</th>
<th>% of control</th>
<th>Crop density (#.cm⁻²)</th>
<th>% of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand thinned control</td>
<td></td>
<td>23.6</td>
<td>32.4</td>
<td>100</td>
<td>1.4</td>
<td>158</td>
<td>206</td>
<td>100</td>
<td>6.8</td>
<td>100</td>
</tr>
<tr>
<td>Maxcel</td>
<td>75</td>
<td>23.4</td>
<td>12.4</td>
<td>38</td>
<td>0.6</td>
<td>59</td>
<td>213</td>
<td>103</td>
<td>2.8</td>
<td>40</td>
</tr>
<tr>
<td>Maxcel</td>
<td>100</td>
<td>21.6</td>
<td>14.9</td>
<td>46</td>
<td>0.8</td>
<td>70</td>
<td>212</td>
<td>103</td>
<td>3.5</td>
<td>51</td>
</tr>
<tr>
<td>Maxcel + Carbaryl</td>
<td>75,750</td>
<td>22.3</td>
<td>2.0</td>
<td>6</td>
<td>0.1</td>
<td>9</td>
<td>217</td>
<td>105</td>
<td>0.5</td>
<td>7</td>
</tr>
<tr>
<td>Maxcel + Carbaryl</td>
<td>100,750</td>
<td>23.2</td>
<td>5.3</td>
<td>16</td>
<td>0.2</td>
<td>22</td>
<td>228</td>
<td>111</td>
<td>1.0</td>
<td>14</td>
</tr>
<tr>
<td>Maxcel + Carbaryl (at 10-12mm) followed by 750 mg/L Carbaryl 7 days after first spray</td>
<td>75,750</td>
<td>22.1</td>
<td>3.2</td>
<td>10</td>
<td>0.2</td>
<td>17</td>
<td>199</td>
<td>97</td>
<td>0.8</td>
<td>11</td>
</tr>
</tbody>
</table>

**Significance:** ns, ***, **, *, indicates non significance and statistical significance at P=0.001, P=0.01, and P=0.05, respectively.

**SD (P=0.05):** ns, 4.20, 8.88, 0.47, 40.3, ns, 31.3, 2.2

**P value:** 0.9091, <0.0001, <0.0001, <0.0001, 0.4840, <0.0001
Determining the Response of Gala and Ambrosia to Benefits Particle Film
Ontario Apple Growers Research Meeting - Feb 25, 2008
### Particle film – Royal Gala (2007)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Interval (days)</th>
<th>TCSA fall 2006 (cm²)</th>
<th>Yield (kg.tree⁻¹)</th>
<th>Yield efficiency (kg.cm²)</th>
<th>Total number fruit per tree (g)</th>
<th>Mean fruit weight (g)</th>
<th>Crop density (#.cm⁻²)</th>
<th>Mean leaf area (g)</th>
<th>Mean leaf dry weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsprayed Control</td>
<td></td>
<td>30.5</td>
<td>7.5</td>
<td>0.26</td>
<td>62.9</td>
<td>174.0</td>
<td>2.2</td>
<td>20.9</td>
<td>0.27</td>
</tr>
<tr>
<td>2 sprays full rate (2.5 % w/v)</td>
<td>21</td>
<td>39.9</td>
<td>8.8</td>
<td>0.24</td>
<td>71.1</td>
<td>172.3</td>
<td>1.9</td>
<td>21.0</td>
<td>0.28</td>
</tr>
<tr>
<td>3 sprays full rate (2.5 % w/v)</td>
<td>21</td>
<td>34.6</td>
<td>8.1</td>
<td>0.25</td>
<td>67.6</td>
<td>168.1</td>
<td>2.1</td>
<td>21.0</td>
<td>0.29</td>
</tr>
<tr>
<td>4 sprays full rate (2.5 % w/v)</td>
<td>21</td>
<td>35.1</td>
<td>8.5</td>
<td>0.26</td>
<td>72.6</td>
<td>162.8</td>
<td>2.2</td>
<td>22.1</td>
<td>0.30</td>
</tr>
<tr>
<td>2 sprays full rate (5.0 % w/v)</td>
<td>21</td>
<td>37.1</td>
<td>12.5</td>
<td>0.33</td>
<td>92.9</td>
<td>164.9</td>
<td>2.5</td>
<td>24.1</td>
<td>0.34</td>
</tr>
<tr>
<td>3 sprays full rate (5.0 % w/v)</td>
<td>21</td>
<td>32.9</td>
<td>9.7</td>
<td>0.29</td>
<td>78.3</td>
<td>165.6</td>
<td>2.4</td>
<td>22.9</td>
<td>0.31</td>
</tr>
<tr>
<td>4 sprays full rate (5.0 % w/v)</td>
<td>21</td>
<td>33.1</td>
<td>12.3</td>
<td>0.39</td>
<td>90.2</td>
<td>174.4</td>
<td>2.9</td>
<td>23.9</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**Significance**

<table>
<thead>
<tr>
<th>LSD (P=0.05)</th>
<th>ns</th>
<th>7.2</th>
<th>3.52</th>
<th>0.10</th>
<th>19.67</th>
<th>10.34</th>
<th>0.66</th>
<th>4.5</th>
<th>0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>P value</td>
<td>0.1991</td>
<td>0.0239</td>
<td>0.0375</td>
<td>0.0239</td>
<td>0.1371</td>
<td>0.0869</td>
<td>0.5756</td>
<td>0.1515</td>
<td></td>
</tr>
</tbody>
</table>

* ns, ***, **, *, indicates non significance and statistical significance at P=0.001, P=0.01, and P=0.05,
Rootstock Research
Rootstock differences can be subtle but significant

Precocity, productivity, size control, disease resistance, cold hardiness, replant tolerance
Tree Size of Honeycrisp in Relation to Rootstock

- Pl.80
- M.26EMLA
- V.1
- Pajam2
- M.9NIC29
- M.9T337
- M.9EMLA
- Bud9

Trunk cross-section area (cm²)


Ontario Apple Growers Research Meeting - Feb 25, 2008
Honeycrisp Cumulative Yield (bin/acre)
2.0 x 5.0 m Vertical Axis

Ontario Apple Growers Research Meeting - Feb 25, 2008
Research Challenges and Future

Since tree fruit crops are perennial, and by nature require long-term investment and support

Long-term support today = 3 years

(this is the time it takes to reach fruiting in a new orchard)
Future Research

- Apogee – multi-year and carry-over effects, carry-over effects. Reduction in fruit size
- Irrigation – new technology to conserve water and assist with scheduling
- Thinning – non chemical approaches
- Nutrition – cultivar specific problems such as low Ca in Honeycrisp
- Rootstocks – development of V.5 and V.6
- Other PGRs – Abscisic acid being commercialized
- Horticultural methods to reduce labour costs
Ontario Apple Acreage by Cultivar and Age
(Source: Ontario Apple Growers, 2007)

Plantings 1-5 Years, % by Cultivars
Gala (21%), Ambrosia (15%), Honeycrisp (13%), McIntosh (13%), N. Spy (6%), Crispin (4%), Empire (4%), Aurora Golden Gala (2%)

16, 35, 19% of trees are > 31, 21, 16 years old respectively
30% of trees are less than 16 years old
Orchard Profitability

Cultivar, training system, rootstocks are most critical (fixed at planting)
Crimson Crisp (Coop 39)

❤ The tree is moderately vigorous, grows upright and has good precocity.

❤ It blooms mid to late season.

❤ The strengths of ‘Crimson Crisp’ are its immunity to scab and resistant to leaf rust

❤ Weaknesses include susceptibility to mildew and fire blight
Crimson Crisp (Coop 39)

- Glossy rosy red, close to 100% fruit surface colour, yellow ground colour
- The fruit is quite large: 64–76 mm (2½ - 3")
- Flavour: sweet, moderately acid and spicy
- Fruit are not prone to russet.
- Flesh: cream in colour, has an extremely crisp texture
- Matures early October in Simcoe
http://www.plant.uoguelph.ca/treefruit