Managing Cold Damaged Fruit Trees

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Talk outline

• Anticipation and assessment of damage
• Tree structure and cold damage
• Effect of cold and tree reserves
• Pruning practices affects cold damage
• What to do in 2014?
Anticipation of damage

Low temperatures for the winter of 2014
1-1-14 to 3-5-14

<table>
<thead>
<tr>
<th>Weather station</th>
<th>Number of times below -13° F</th>
<th>Coldest temperature °F (date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commerce Township</td>
<td>6</td>
<td>-17.0 (2/28)</td>
</tr>
<tr>
<td>Emmett</td>
<td>7</td>
<td>-18.0 (2/28)</td>
</tr>
<tr>
<td>Flint</td>
<td>3</td>
<td>-14.5 (1/7)</td>
</tr>
<tr>
<td>Freeland</td>
<td>5</td>
<td>-18.3 (3/3)</td>
</tr>
<tr>
<td>Lapeer</td>
<td>15</td>
<td>-22.5 (1/9)</td>
</tr>
<tr>
<td>Petersburg</td>
<td>8</td>
<td>-22.3 (2/12)</td>
</tr>
<tr>
<td>Pigeon</td>
<td>4</td>
<td>-17.2 (2/17)</td>
</tr>
<tr>
<td>Romeo</td>
<td>3</td>
<td>-16.1 (2/28)</td>
</tr>
</tbody>
</table>

Bill’s table of mid winter temperatures and effects on peaches

-11 F start of fruit bud damage
-13 F 50% fruit buds damaged
-15 F 80% fruit buds damaged, some cambium discoloration
-17 F most fruit buds damaged, some significant cambium discoloration
-19 F no fruit buds left, some tree mortality expected
Mid-winter hardiness levels of flower buds

<table>
<thead>
<tr>
<th>Fruit type</th>
<th>Critical temp. (F) for flower injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>-30</td>
</tr>
<tr>
<td>Apricot, Pear, Concors</td>
<td>-25</td>
</tr>
<tr>
<td>Blueberries</td>
<td>-25</td>
</tr>
<tr>
<td>Tart Cherry</td>
<td>-20</td>
</tr>
<tr>
<td>Raspberry</td>
<td>-17</td>
</tr>
<tr>
<td>Blackberry</td>
<td>-15</td>
</tr>
<tr>
<td>Plum, Sweet Cherry</td>
<td>-15</td>
</tr>
<tr>
<td>Peach and Nectarine</td>
<td>-13</td>
</tr>
<tr>
<td>European Grapes</td>
<td>-8 to -15</td>
</tr>
</tbody>
</table>
Freeze damage to peach fruit buds

Cross-section cut on left fruit bud to see if it is damaged

Brown pistil in peach fruit bud
Peach twigs

Exposed to @ -15 F

Exposed to @ -13 F
Peach twigs

Exposed to @ -15 F

Exposed to @ -13 F
Constriction canker (Phomopsis) fungal disease sometimes worse following stressful winter on some varieties

- Pruning to remove affected wood
- Post harvest chlorothanil used in NJ
Brown cambial layer under bark
Freeze damage to peach cambium

Brown cambium following -19 F low temperatures in 1994
Peach trunk splitting

Use of small nails to close opening if detected soon (within 2 days)
Tree wraps

White wraps reduce damage due to rodents and from rapid temperature fluctuations in trunks due to sunlight in mid winter.

Remove tree wraps in summer to avoid disease & insect problems.

Borer damage under wrap
Tree paint

• White latex paint reduce damage due to rapid temperature fluctuations in trunks due to sunlight in mid winter.

• White latex paint provides protection against damage by contact herbicides like gramoxone
Peach peach trunk cross-section

Heartwood – support, little water movement, no disease suppression

Sapwood – water conduction, active disease defense, protection of heartwood.
Brown sapwood revealed in x-section of peach. Trees were exposed to -17 F or lower.
Peach peach trunk cross-section

Undamaged

Damaged but generally healed
Peach peach trunk cross-section

Heartwood poorly protected
Peach tree decline due to Leucostoma (Cytospora) canker

Scaffolds missing
Talk outline

• Anticipation and assessment of damage
• Tree structure and cold damage
Observations on cold injury to apple trees in Pennsylvania - 1936

- Apple tree injury following a very rapid decline in temperatures in mid-January 1936.
- Trees that were most injured were those that lacked adequate vigor, those that were too vigorous, and those that had been pruned before the cold event.
- Trunk injury was greater than expected considering that the lowest temperature was only \(-15^\circ F\), but this low was accompanied by a rapid drop of 40 to 50\(^\circ\).
Observations on cold injury to apple trees in Indiana – 1936

• Students at Purdue pruned trees in November as part of their pruning lab exercises. The first half of January was fairly mild followed by a ten-day stretch of temperatures below zero with a minimum temperature of -20°F.

• By the following September all 43 heavily pruned ‘Jonathan’ trees were dead or nearly dead, the 8 trees that were lightly pruned had slight trunk injury, and none of the non-pruned trees were injured.

Burkholder (1936)
Effect of time of pruning on peach growth and canker problems

- Late dormant to green tip:
  - Vigor response: ++++
  - Cut healing: +
  - Pathogen active: +++

- Pre pink to bloom:
  - Vigor response: ++
  - Cut healing: +++
  - Pathogen active: ++

- Post bloom:
  - Vigor response: +
  - Cut healing: ++
  - Pathogen active: +

Best time: Late dormant to green tip.
Weak fruiting wood is danger sign
Train for wide crotch angle limbs

Bark inclusions in narrow angle crotches weaken limb
Clothespins to insure wide crotch angles from new growth

- Use clothespins to flatten growth
- Remove clothespins about 2 to 3 weeks later once growth has ‘locked’ into place
Benign neglect training

- pinching, breaking limbs on inside of tree to direct growth outward & avoiding big cuts
Avoiding Problem Cuts
Canker associated with upright crotch angles
Problems arise when scaffold ends are not pruned
Strong limb growth following scaffold end heading cut

- Cuts to remove large limbs will leave big, slow healing wounds
Single & debud

Remove all but one or two buds at tip

Clear 3 – 4 “
Results of singling and debud
What to do in 2014?

• Prune at bud swell to pink (normal time)
• Prune with normal intensity, strong pruning not advised while trees are recovering from cold damage.
• Consider nitrogen program closely...split applications in order to tailor the program according to rainfall and crop situation
• Adopt practices that minimize big cuts on the lower part of the scaffolds.
Questions?

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