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Research Update Meeting 2008 - Slides of the Impact of Flooding on Cranberry Vines

Justine Vanden Heuvel
Cornell University, jev32@cornell.edu

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The impact of flooding on cranberry vines

Justine Vanden Heuvel
Cornell University
Ithaca, NY

Methods

- Flood water measurements:
  - Depth
  - Temperature
  - Dissolved oxygen concentration
  - Light penetration to vines

Cranberry floods

Late Water (Spring)

Winter

TNSC

- Total Non-structural Carbohydrates
- Carbohydrates are the product of photosynthesis
- Carbohydrates are the energy source used by the vine for growth and fruit production

Flash Floods

<table>
<thead>
<tr>
<th>Year</th>
<th>Start</th>
<th>End</th>
<th>Temp (°C)</th>
<th>pH</th>
<th>EC (μS/cm)</th>
<th>Dissolved Oxygen</th>
<th>Light Penetration</th>
<th>Depth (cm)</th>
<th>TNSC (mg%DB)</th>
<th>ΔTNSC (%DB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>6</td>
<td>15</td>
<td>19.0</td>
<td>7.1</td>
<td>3.5</td>
<td>6.0</td>
<td>4.0</td>
<td>30</td>
<td>52</td>
<td>.07</td>
</tr>
<tr>
<td>2004</td>
<td>6</td>
<td>17</td>
<td>19.5</td>
<td>6.9</td>
<td>3.8</td>
<td>6.5</td>
<td>4.5</td>
<td>30</td>
<td>10</td>
<td>.07</td>
</tr>
</tbody>
</table>

Only a significant decrease in TNSC in 1 of 7 flash floods
Flooding effects on TNSC

- Late water floods:
  - Δ TNSC between pre- and post-flood uprights from bogs ranged from -31% to +36% (13 floods)

- Harvest floods:
  - Δ TNSC between pre- and post-flood uprights from bogs range from -42% to +4% (29 floods)

Flood water conditions

- Path co-efficient analysis indicated that actual Δ TNSC (mg/100mg) was significantly affected by:
  - Date of flood application (+0.32)
  - Maximum water temperature (-0.56)
  - Minimum water DO (-0.37)

- Light penetration and water depth had no effect on TNSC

Date of flood application

More reduction in TNSC with earlier floods

Flooding duration

Water temperature

Late water flood – uprights

Temperature differences still there in EB two weeks later, but not as much in Stevens

Late water flood – roots

Temperature differences still there in Stevens two weeks later, but not as much in EB
Cross sections of leaves

- Fungal mat on leaf surface
- Erosion of epidermis
- Blocked xylem
- Clumped chloroplasts

Roots

Darker roots are dying or dead

Photos courtesy of Martin Goffinet

Dissolved Oxygen

Simulated Late Water Flood

DO = 6.5 mg/L
DO = 9.0 mg/L

Effect of dissolved oxygen concentration during LW flood

Higher DO resulted in greater loss of TNSC!

71%
94%
### Conclusions – Flash Floods
- Good options for pest control
- Use short flood with cool water

### Conclusions – Late water floods
- The impact of LW floods is variable – generally fine to use unless water gets warm (>68°F)
- Keep water cool by maximizing volume on bog and recharging

### Conclusions – Harvest floods
- Most dangerous flood!
- Can be very detrimental to vines, although recovery is possible under optimal conditions
- Keep flood as brief as possible, particularly early in the season
- Water needs to be as cool as possible

### Conclusions – Winter floods
- Don’t worry too much

**Questions?**