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

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The impact of flooding on cranberry vines

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Methods

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

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>
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<tr>
<th>Event</th>
<th>Date</th>
<th>Depth (cm)</th>
<th>Min. temp. (°C)</th>
<th>Max. temp. (°C)</th>
<th>Min. conc. (mg/L)</th>
<th>Max. conc. (mg/L)</th>
<th>Depth change (mg/L)</th>
<th>TNSC change (mg/L)</th>
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</thead>
<tbody>
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<td>F: Winter</td>
<td>5/03</td>
<td>15.0</td>
<td>10.0</td>
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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

Flood duration

Water temperature

Late water flood – uprights
Arrows indicate end of flood
Temperature differences still there in EB two weeks later, but not as much in Stevens

Late water flood – roots
Arrows indicate end of flood
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

Roots

- Blocked xylem
- Clumped chloroplasts
- Blocked xylem

Photo courtesy of Martin Goffinet

Roots

- Early black before flooding
- Early Black after harvest flood at 70°F

Darker roots are dying or dead

Photo 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!
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?