Evaluation of Compost Teas for Disease Management of Wild Blueberries in Nova Scotia

Dr. Kathleen Glover, PhD., PAg.
Azar Agriculture Inc.

Bringing Innovation to the Farm
Background

In Nova Scotia wild blueberries are the #1 fruit crop in terms of acreage, export sales and total value to the economy.

Organically produced berries garner a premium price in a currently under-supplied market.
Background

- Disease can significantly impact crop yield and quality.
  - *Monilinia*
  - *Powdery mildew*
  - *Septoria leaf spot*
  - *Leaf rust*
Compost Teas

- Compost teas are the aqueous solutions obtained from compost that has been mixed with water and allowed to ferment.
- Compost teas contain bacteria, fungi, protozoa, nematodes and soluble nutrients from the compost.
- Exact composition varies.
While results are often conflicting, aqueous spray application of compost teas have been demonstrated to reduce severity of foliar leaf disease in a variety of fruit crops. *Alternaria, Botrytis,* powdery mildew, downy mildew, in tomato, strawberry, apple and grape.
Compost Teas

- Disease suppression has been postulated to be the result of:
  - competition between the beneficial microbes applied to the leaf surface and the pathogens
  - secretion of secondary metabolites
    - antibiotic properties
    - stimulation of natural plant defense
  - parasitizing pathogens
Objective

- To evaluate compost tea application as an alternative management tool for control of foliar disease in organic blueberry.
  - *Monilinia*
  - *Powdery mildew*
  - *Septoria leaf spot*
  - *Leaf rust*

![Septoria on stem](image-url)  
Hildebrand (AAFC)
Methods

- Four commercial organic wild blueberry fields in Nova Scotia
- Two compost teas:
  - certified organic compost of animal manure
  - certified organic compost of plant material
Methods continued

- Two controls: conventional management and water application
- Six replications at each site
- Plots were 1.5 m X 6 m
- Soil drench of compost tea was applied in the fall and spring
- Foliar applications of compost tea were applied every two weeks beginning at the time of leaf bud opening
Soil samples were taken prior to initiation of the experiment and microbial content of the soil was determined by Soil Foodweb lab.

Samples of compost tea were also analyzed by Soil Foodweb lab to determine microbial content.
Plots were monitored for disease incidence and severity:
- Monilinia: 40 stems per plot were collected and the total number of buds and total number of infected buds were counted
- Septoria and leaf spot: 40 stems were collected from the control plots and the infection rate determined by microscopic analysis
- Powdery mildew: was not present in any of the fields
Results: Monilinia

- During the two years of this study weather and plant growth favored the blueberry plant and incidence of Monilinia infection was limited.
- Only 2-3% of vegetative buds were infected and 1-2% of flowering buds when considered over all sites.
### Results – Monilinia continued

<table>
<thead>
<tr>
<th>Percent of vegetative buds damaged by Monilinia</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment</strong></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Plant compost</strong></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Manure compost</strong></td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Results – Leaf Rust

- In both 2006 and 2007 leaf rust was observed but only on a limited number of leaves.

<table>
<thead>
<tr>
<th>Date</th>
<th>Visual Rating Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 11 / July 18</td>
<td>0</td>
</tr>
<tr>
<td>July 25 / Aug. 8</td>
<td>.1</td>
</tr>
<tr>
<td>Aug. 9 / Aug. 25</td>
<td>.35</td>
</tr>
</tbody>
</table>

*0 = 0% leaf area infected; 1 = 1% leaf area infected.
In 2006 and 2007 Septoria was present in all fields.

<table>
<thead>
<tr>
<th>Date</th>
<th>Visual Rating Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 / 2008</td>
<td>2006: 2.0</td>
</tr>
<tr>
<td></td>
<td>2007: 1.8</td>
</tr>
<tr>
<td>July 11 / July 18</td>
<td>2.0</td>
</tr>
<tr>
<td>July 25 / Aug. 8</td>
<td>2.7</td>
</tr>
<tr>
<td>Aug. 9 / Aug. 25</td>
<td>2.8</td>
</tr>
</tbody>
</table>

*0 = 0 spots; 1 = 1-30 spots; 2 = 31-60 spots; 3 = > 60 spots
### Results – Defoliation in 2006

<table>
<thead>
<tr>
<th>Treatment</th>
<th>July 11</th>
<th>July 25</th>
<th>August 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Water</td>
<td>4</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Plant Compost</td>
<td>4</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Manure Compost</td>
<td>3</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>
## Results – Defoliation in 2007

<table>
<thead>
<tr>
<th>Treatment</th>
<th>July 8</th>
<th>August 2</th>
<th>August 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>18</td>
<td>21</td>
<td>36</td>
</tr>
<tr>
<td>Water</td>
<td>16</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Plant Compost</td>
<td>17</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>Manure Compost</td>
<td>16</td>
<td>21</td>
<td>37</td>
</tr>
</tbody>
</table>

Percent leaf loss during the 2007 growing season (%)
Conclusions

- There was no observable powdery mildew at the four sites used for this study.
- The level of infestation for Monilinia and leaf rust were too low for proper assessment of the compost tea spray as a potential disease control mechanism.
Conclusions

- Septoria was present at significant levels in both years.
- More defoliation was observed when measured later in the season in 2007.
- The defoliation is thought to be due to Septoria as it was the only disease present in significant amounts.
- There was no apparent effect of the compost tea sprays on level of defoliation.
- Additional research is required to confirm this result.
Special Thank You to our Cooperators

- ACORN
- Maritime Organic Blueberry Growers Coop
- Soil Foodweb Canada East
- Rick Delbridge, Delbridge Disease Management
- Av Singh, AgraPoint International
- Organic blueberry producers (Alan Bonnyman, Geoff Crinean & Nan Newhall)
Funding

- Technology Development Program, Nova Scotia Department of Agriculture
- Agri-Futures, Nova Scotia’s Adaptation Council