Horticultural Assessment of Eight Cold-Hardy Wine Grape Cultivars in Vermont

TERENCE L. BRADSHAW, UNIVERSITY OF VERMONT
NEW ENGLAND VEGETABLE & FRUIT MEETINGS
MANCHESTER, NH
DECEMBER 17, 2015
VT NE-1020 Research Vineyard

- 2007: NE-1020 research vineyard planted
- Eight cold-climate cultivars, RCB design, six replications
  - Corot Noir, Frontenac, La Crescent, Marquette, Prairie Star, St. Croix, Traminette, Vignoles
- Trellis: 1.5 m high-wire cordon
- Crop removed 2007-2008, small crop left 2009
- Data presented 2009-2015
Data Collected

- Winter bud survival (visual assessment for incidence of oxidative browning)
- Established cordon length and number of established cordons per vine
- Weight of removed wood after dormant pruning.
- Shoot growth from retained nodes
- Set fruit clusters prior to crop thinning in early July
- Harvest data:
  - Number of clusters, total kg harvest, mean cluster weight
- Juice analysis: soluble solids (°Brix), pH, and titratable acidity
- Vine phenology and harvest dates
- Data analyzed for mean separation by treatment (cultivar) using Tukey's HSD adjustment and $\alpha=0.05$
UVM HREC, South Burlington, VT
Cold weather events and GDD, 2009 - 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Last Frost</th>
<th>First Frost</th>
<th>Frost Free Days</th>
<th>Winter Low Temp</th>
<th>Date</th>
<th>GDD (B50BE)</th>
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<tbody>
<tr>
<td>2009</td>
<td>4/20</td>
<td>10/15</td>
<td>275</td>
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<td>2203*</td>
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<td>-18.7</td>
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Seasonal grape bud hardiness curve

Zabadal et.al. 2007, “Winter Injury to Grapevines and Methods of Protection”
# Cold Weather Events and GDD, 2009 - 2015

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Soil Drainage
Disease management
Data
Traminette: 1996 Cornell release

- Greatest winter injury in two of three years
- Lowest cordon length 2010
- Among lowest pre-thinning cluster count each year
- Among lowest crop yield each year: mean 1.7 tons/ac (3.8 MT/ha)
- Lowest juice pH in two of three years
- Disease resistance relatively good under low pressure/good coverage
- Removed from planting after 2011
Vignoles: 1949 French-hybrid release

- Cold hardiness questionable: among lowest % live buds that pushed shoots in each year
- Lowest pruning weight in each year
- Lowest pre-thinning cluster count in one of two years
- Crop yield among lowest in all years: mean 0.8 tons/ ac (1.8 MT/ha)
- Very susceptible to Downy Mildew
- Removed from planting after 2011
Foliar Disease Incidence 2009-2012
‘Typical’ 4-5 Fungicide Program

Powdery Mildew

<table>
<thead>
<tr>
<th>Variety</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
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</thead>
<tbody>
<tr>
<td>Corot Noir</td>
<td>20</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Frontenac</td>
<td>30</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>LaCrescent</td>
<td>50</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>Marquette</td>
<td>40</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Prairie Star</td>
<td>60</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>St. Croix</td>
<td>30</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Traminette</td>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Vignoles</td>
<td>20</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

Foliar Disease Incidence 2014-2015
‘Typical’ 4-5 Fungicide Program

Powdery Mildew: % Foliar incidence

0 10 20 30 40 50 60 70 80 90 100

Corot Noir  Frontenac  La Crescent  Marquette  Prairie Star  St. Croix

2014  2015

Unpublished data
Fruit Disease Incidence 2014-2015
‘Typical’ 4-5 Fungicide Program

Powdery Mildew: % Fruit incidence

- Corot Noir
- Frontenac
- La Crescent
- Marquette
- Prairie Star
- St. Croix

Unpublished data
‘Typical’ 4-5 Fungicide Program

Downy Mildew: % Foliar incidence

Unpublished data
Disease Incidence
‘Typical’ 4-5 Fungicide Program

Downy Mildew: % Fruit incidence

Consistent with 2009-2012

Unpublished data
Foliar Disease Incidence: 2009-2012
‘Typical’ 4-5 Fungicide Program

‘Typical’ 4-5 Fungicide Program

Black Rot: % Foliar incidence

- Corot Noir
- Frontenac
- La Crescent
- Marquette
- Prairie Star
- St. Croix

2014 | 2015
---|---
Corot Noir | 4
Frontenac | 7
La Crescent | 4
Marquette | 4
Prairie Star | 7
St. Croix | 3

Data unpublished
‘Typical’ 4-5 Fungicide Program

Black Rot: % Fruit incidence

Data unpublished
‘Typical’ 4-5 Fungicide Program

Anthracnose: % Foliar incidence

Corot Noir  Frontenac  La Crescent  Marquette  Prairie Star  St. Croix

Data unpublished
Fruit Disease Incidence: 2014-2015
‘Typical’ 4-5 Fungicide Program

Anthracnose: % Fruit incidence

Corot Noir  Frontenac  La Crescent  Marquette  Prairie Star  St. Croix

Data unpublished
Cultivar Yields of Six Winegrapes
UVM Horticulture Research Center, South Burlington, VT

Tons/Acre

2012 2013 2014 2015

Corot Noir
Frontenac
LaCrescent
Marquette
St. Croix
Praire Star
Cumulative Yield, 2009-2015
UVM Horticulture Research Ctr, S. Burlington, VT

<table>
<thead>
<tr>
<th>Variety</th>
<th>Tons/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corot Noir</td>
<td>28.9</td>
</tr>
<tr>
<td>Frontenac</td>
<td>30.0</td>
</tr>
<tr>
<td>La Crescent</td>
<td>24.9</td>
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<tr>
<td>Marquette</td>
<td>26.9</td>
</tr>
<tr>
<td>Prairie Star</td>
<td>21.1</td>
</tr>
<tr>
<td>St Croix</td>
<td>29.4</td>
</tr>
</tbody>
</table>

UVM Horticulture Research Ctr, S. Burlington, VT
Corot Noir  |  77b  |  80b  |  50c  |  35b  
Frontenac  |  95a  |  88ab |  92a  |  90a  
La Crescent |  86ab |  97a  |  90ab |  84a  
Marquette   |  91a  |  93a  |  87ab |  83a  
Prairie Star|  92a  |  87ab |  77b  |  45b  
St Croix    |  93a  |  95a  |  90ab |  78a  

Percent primary bud survival
UVM NE1020 Vineyard, S. Burlington, VT
Corot Noir: 2006 Cornell release

Brix, pH, TA and Yield for Corot Noir
UVM Horticulture Center, South Burlington, Vermont

- Brix (%SS)
- pH
- TA (g/100ml)
- Yield (Ton/Acre)
Brix, pH, TA, and Yield for Frontenac
UVM Horticulture Center, South Burlington, Vermont

Brix (%SS)

pH

TA (g/100ml)

Yield (Ton/Acre)


0 0.5 1 1.5 2 2.5 3 3.5 4

0 5 10 15 20 25 30

Frontenac: 1996 University of Minnesota release
LaCrescent: 2002 University of Minnesota release

Brix, pH, TA, and Yield for LaCrescent
UVM Horticulture Center, South Burlington, Vermont

Brix, Yield

25
20
15
10
5
0


pH, TA

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0

Brix (%SS)
pH
TA (g/100ml)
Yield (Ton/Acre)
Marquette: 2006 University of Minnesota release

Brix, pH, TA, and Yield for Marquette
UVM Horticulture Center, South Burlington, Vermont

Brix (%SS)

pH

TA (g/100ml)

Yield (Ton/Acre)
Prairie Star: 2000 Elmer Swenson release

Brix, pH, TA, Ravaz Index, and Yield for Prairie Star
UVM Horticulture Center, South Burlington, Vermont

Brix, yield


Yield (Tons/Acre)

Brix (%SS)
pH
TA (g/100ml)
St Croix

Brix, pH, TA, Ravaz Index, and Yield for Marquette
UVM Horticulture Center, South Burlington, Vermont

Brix (%SS)

pH

TA (g/100 ml)

Yield (Ton/Acre)

Future Plans & Acknowledgements

CULTIVAR & TRAINING SURVEY, MARCH 2016!!!!

VT Specialty Crops Block Grant (?)
- Cultivar trial:
  - Crimson Pearl
  - Verona
  - Petite Pearl
  - MN 1285
  - St Pepin
- Cordon renewal & cane/spur pruning systems

Foundation plantings:
- Brianna
- Lousie Swenson
- Marechal Foch
- Marquette

Northern Grapes Project
- USDA NIFA Specialty Crops Research Initiative

USDA NE-1020 Multi-State Evaluation of Winegrape Clones and Cultivars
Vermont Agriculture Experiment Station
USDA EIPM Support