The Northern Grapes Project is funded by the USDA’s Specialty Crops Research Initiative Program of the National Institute for Food and Agriculture, Project #2011-51181-30850

Northern Grapes: Integrating viticulture, winemaking, and marketing of new cold hardy cultivars supporting new and growing rural wineries

- 5 Year Coordinated Ag Project
- 12 Institutions
- 34 Research/Extension Scientists
- 18 Industry Associations
- $2.5M Funded (2 yr) USDA ($6.1M 5 yr budget)
- Matched > 25 Organizations and Individuals
“...To develop grape production, winemaking, and marketing practices suited to the unique characteristics of V. riparia-based [Northern Grape] cultivars marketed through retail tasting rooms and their niche in the US wine market.”
Vision for a Successful Cold-Climate Wine Industry

Inputs and Activities

- Soil Health/Quality
- Plant Quality
- Optimized Vineyard Practices
- Optimized Winemaking Practices

Outputs

- Community Vitality
- Business Success
- Customers Buy Wine Repeatedly

Intermediate Steps

- Fruit Quality
- Wine Quality
- Marketing & Sales
- Business Practices
- Quality Product and Consumer Experience
Multi-Disciplinary Studies

Address

- **Varietal performance** and resulting fruit and wine flavor attributes in different climates
- Applying appropriate **viticultural practices** to achieve consistent fruit characteristics for ripening
- Applying **winemaking practices** to their unique fruit composition to produce distinctive wines that consumers will like and purchase
- Understanding consumer preferences, individual/regional **marketing strategies** to increase sales and sustained profitability of wineries and vineyards.
The Model

Viticulture
Growing Quality Grapes

Enology
Producing High Quality Wines

Consumers
Understanding Marketing, Sales

= Profitable, Vibrant Industry
Northern Grapes Webinars

- 6 (November-April)
  - 40+ states
  - 1400 unique e-mail addresses in pre-registrations
  - almost twice as many view recordings

- ‘Pesticide Drift Workshop’
  - Nov. 3, 2012: Co-sponsored with Nebraska Winery and Grape Growers Assn.

- Archived at: www.northerngrapesproject.org
Northern Grapes Publications

- Cold Climate-targeted information and practices
- “Northern Grapes News” Electronic Newsletter
- www.eViticulture.org

www.northerngrapesproject.org

Introducing the Northern Grapes Project

By Tim Martinson, Cornell University

A collaborative effort involving twelve universities, with the support of 19 producer groups ranging from Nebraska to New Hampshire has resulted in a new research and extension project that we are calling the Northern Grapes Project.

Starting point. The basic premise behind the project is that new grape varieties – both from the University of Minnesota and private breeders – have made it possible to produce grapes in regions previously considered too cold to support grape production. Since the late 90s, these cultivars have spawned a new industry. Based on our survey of producer organizations, over 3,000 acres of cold-hardy grapes are spread across the upper Midwest and New England, most under 10 years old. Conservatively, the cold-climate cultivars support over 330 small wineries in twelve northern states.

Participants in a Cornell University Wine Analysis Workshop are learning to measure sulfur dioxide in wines. Similar workshops will be held during the course of the Northern Grapes Project.

‘Fumetem’ released in 1994, was the first of the cold-hardy cultivars from Minnesota in 2010 with representation from regional grower organizations and university researchers to bear about industry needs and were in which they can be addressed.
Objective 1

Document cold climate varietal performance in variable climates and understanding the resulting sensory characteristics of the fruit and wines.

**Obj. 1a.** Evaluate cold climate cultivar performance under a wide range of climates throughout the Upper Midwest and Northeast to match cultivar with site.

- A collaboration with the NE-1020 project “Multi-state evaluation of winegrape cultivars and clones”.
- **Viticulture Team:**
  - Field performance of northern hybrid cultivars (Frontenac, Marquette, St. Croix, Frontenac gris, La Crescent)
  - Collect climatic data at the sites.
- **Enology Team:**
  - Fruit chemistry
  - Winemaking
  - Sensory profile analysis
Yield and Retained Nodes

<table>
<thead>
<tr>
<th>Yield per Vine (Lb)</th>
<th>Nodes per vine</th>
<th>Shoots/Vine</th>
<th>Shoots Per Node</th>
<th>Crop Per Node (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- **10 lb/vine**
  - = 4 T/acre
  - 6ft x 9ft spacing

- **30 nodes/vine**
  - = 5 per Ft
  - at 6 Ft
  - In-row spacing

- **30 shoots/vine**

- **1 shoot/node**

- **150 g/node**
  - = 4.5 KG/vine
  - = 9.9lb/vine
  - 30 shoots/vine
Fruit Composition at Harvest
(Brix, pH, TA)
How does environment affect Flavors?

Climate and standard maturity indices

Vine performance and climate

- Eval: Yield and quality vs. climate indices
- Data from 3-9 sites/variety
Acid Composition

Murli Dharmadhikari
Iowa State University
i. Identify training systems suited to cold climate grape cultivars.

- Will compare vine performance, yield, light interception, disease incidence, and fruit composition in replicated trials.

<table>
<thead>
<tr>
<th>State</th>
<th>CT</th>
<th>NY</th>
<th>IA</th>
<th>NE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperator</td>
<td>Bill Nail</td>
<td>Tim Martinson</td>
<td>Gail Nonnecke Paul Domoto</td>
<td>Paul Read</td>
</tr>
<tr>
<td>Training systems</td>
<td>HWC</td>
<td>HWC</td>
<td>HWC</td>
<td>HWC MWC/VSP GDC</td>
</tr>
<tr>
<td></td>
<td>MWC/VSP GDC Umbrella Kniffin</td>
<td>GDC Scott Henry</td>
<td></td>
<td>GDC Smart-Dyson Scott Henry</td>
</tr>
<tr>
<td>Cultivars</td>
<td>St. Croix</td>
<td>Frontenac Marquette La Crescent</td>
<td>Frontenac Marquette La Crescent</td>
<td>Frontenac St. Croix</td>
</tr>
</tbody>
</table>

Abbreviations: HWC= high wire cordon; MWC=mid-wire cordon; GDC= Geneva double curtain
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (T/A)</th>
<th>Yield (lb/vine)</th>
<th>Clusters Per Vine</th>
<th>Cluster wt. (g)</th>
<th>Berries per cluster</th>
<th>Berry wt. (g)</th>
<th>Adj. # of shoots</th>
<th>Yield (g) per shoot (adj)</th>
<th>Clusters Per shoot (adj)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWC</td>
<td>4.3 b</td>
<td>13.8</td>
<td>83.5 b</td>
<td>76.6 a</td>
<td>63.2 a</td>
<td>1.21 ab</td>
<td>36.9 b</td>
<td>178.1 a</td>
<td>2.3 a</td>
</tr>
<tr>
<td>VSP</td>
<td>2.3 c</td>
<td>7.4</td>
<td>69.4 c</td>
<td>49.2 b</td>
<td>43.4 b</td>
<td>1.13 b</td>
<td>36.3 b</td>
<td>94.2 b</td>
<td>1.9 b</td>
</tr>
<tr>
<td>Umbrella</td>
<td>5.0 a</td>
<td>16.1</td>
<td>101.3 a</td>
<td>72.5 a</td>
<td>59.2 a</td>
<td>1.23 a</td>
<td>41.0 a</td>
<td>178.8 a</td>
<td>2.5 a</td>
</tr>
</tbody>
</table>

**Marquette 2013 Yield**

![Bar chart showing Marquette yield comparison between TWC, VSP, and Umbrella for 2012 and 2013.](image)
Marquette Fruit Composition

- Brix
- pH
- Titratable acidity

Comparison between 2012 and 2013 for different cultivars (TWC, VSP, Umbrella).
ii. Canopy management.

*Will modifying the light environment through canopy management practices improve fruit and wine making characteristics?*

- Shoot thinning
- Shoot positioning
- Summer hedging
- Leaf removal

**Team:** Gail Nonnecke & Paul Domoto (IA)
Tim Martinson (NY)
Rebecca Harbut (WI)
Iowa Canopy Management
Time to perform tasks

Frontenac
- Control
- SP
- ST
- LT
- ST + SP
- SP + LT
- ST + LT
- ST + SP + LT

La Crescent
- Control
- SP
- ST
- LT
- ST + SP
- SP + LT
- ST + LT
- ST + SP + LT

Minutes per Vine
Objective 2a

iii. Cropping level management.

New York Thinning Study at Coyote Moon:
• La Crescent ‘Crop Load’ August 13 2012
Shaded vs Exposed Clusters

Marquette 2014

- 6 vines
- 5 exposed and 5 shaded
- Individual Brix, pH, TA

Exposed vs Shaded:
- Brix: Exposed 24.0, Shaded 21.8
- pH: Exposed 3.28, Shaded 3.25
- Titratable Acidity (g/l): Exposed 11.0, Shaded 9.5
Objective 2b
Approach

Study will be conducted in grower vineyards representing different soil types.

Sites: MN (4), IA (4), SD (3), ND (2), NY (1)

i. Annual soil sampling.

ii. Nutritional profiling of cold climate cultivars.
   – Petiole and leaf blade samples will be collected 3 times during the growing season (Full bloom, Pre-veraison, Veraison)

iii. Correlation with yield, vine and fruit parameters.
   – Pruning weights
   – Yield
   – Fruit composition (SS, pH, TA, yeast assimilable N)

Team: Carl Rosen* (MN), Paul Domoto & Gail Nonnecke (IA), Rhoda Burrows (SD), Harlene Hatterman-Valenti (ND), Tim Martinson (NY)
## Normal Nutrient Ranges for Grapes
Based on Petiole Analysis

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>At Bloom <em>(for American hybrids)</em></th>
<th>Mid-July to Mid-Aug. ** <em>(Fertilizing Fruit Crops. OSU Bull. 458)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>1.6 to 2.8 %</td>
<td>0.9 to 1.3 %</td>
</tr>
<tr>
<td>Phosphorous (P)</td>
<td>0.20 to 0.60 % ? ?</td>
<td>0.16 to 0.29 %</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>? 1.50 to 5.00 % ?</td>
<td>1.50 to 2.50 % ? ?</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>0.40 to 2.50 % ? ?</td>
<td>1.20 to 1.80 %</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>0.13 to 0.40 %</td>
<td>0.26 to 0.45 %</td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>No data (&gt;0.1%)</td>
<td>No data (&gt;0.1%)</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>18 to 100 ppm</td>
<td>31 to 150 ppm</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>40 to 180 ppm</td>
<td>31 to 50 (200) ppm</td>
</tr>
<tr>
<td>Boron (B)</td>
<td>25 to 50 ppm</td>
<td>25 to 50 ppm</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>5 to 10 ppm</td>
<td>5 to 15 ppm</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>20 to 100 ppm</td>
<td>30 to 50 ppm</td>
</tr>
<tr>
<td>Molybdenum (Mo)</td>
<td>0.2 to 0.4 ppm</td>
<td>0.3 to 1.5 ppm</td>
</tr>
</tbody>
</table>


Full Bloom vs Mid-Summer

Opposite of the first cluster.
Most recently fully expanded leaf.

Figures adapted from: Grapevine Nutrition and Fertilization in the San Joaquin Valley. 1978 Univ. of California publ. 4087
Objective 2c
Approach

1. Characterize the disease and insect susceptibility of cold climate grape cultivars.

2. Determine the sensitivities of cold climate grape cultivars to copper- and sulfur-based fungicides.

Procedure: Replicated cultivar trials in

• **VT** (Lorraine Berkett)
• **WI** (Patty McManus* & Rebecca Harbut).
Objective 3: Applying winemaking practices to their unique fruit composition to produce distinctive wines

- 209 Fermentations
  - IA, MN, NY
- Yeast strain evaluations
  - 48 wine lots, 4 cultivars
- Deacidification methods
  - 52 wine lots, 6 methods
- Enological Tannins
  - 36 wine lots, 2 cultivars, 6 treatments
- Yeast-Assimilable N
  - Survey of cultivars
Obj. 4: Understanding consumer preferences, individual & regional **marketing strategies** to increase sales, profitability

- **Baseline/Economic Impact Survey** – 600 responses
- **State Winery Policy Survey** – (see Northern Grapes News #2)
- **Tasting Room ‘Customer Satisfaction’ survey** – 6 wineries (IA and NY) – Collected by tasting room staff
- **Consumer profiles and tourism characteristics** – 15 wineries (MI) – 930 surveys
Percent of Wine Sales
n=130

- Tasting room/winery visitors: 52%
- Liquor stores: 18%
- Distributors: 14%
- Other: 8%
- Farmer's Markets: 5%
- Restaurants: 1%
- Households: 2%
Importance in Overall Marketing Strategy
(1 = Unimportant, 5 = Very Important):

n=135

- Own Wine Branding: 4.0
- Special Events: 3.6
- State Winery: 3.3
- Regional Partnership: 3.2
- Wine Trails: 3.0
- Winery Collaboration: 3.0
- Local Partnership: 2.9
- Regional Branding: 2.7
- Vineyard Tours: 2.6
- Wine Club: 2.4
Project Partnership

Partnering Industry Associations

Connecticut Vineyard and Winery Assn.
Illinois Grape Growers and Vintners Assn.
Iowa Wine Growers Assn.
Lake Champlain Wines
Massachusetts Farm Wineries and Growers Assn.
Michigan Grape and Wine Industry Council
Minnesota Grape Growers Assn.
Nebraska Winery and Grape Growers Assn.
New Hampshire Winery Assn.
New York Wine and Grape Foundation
North Dakota Grape Growers Association
Northern Illinois Wine Growers
Northern New York Wine Grape Growers
Scenic Rivers Grape and Wine Association (Iowa & Illinois)
South Dakota Specialty Producers Assn.
Upper Hudson Valley Wine and Grape Assn.
Vermont Grape and Wine Council
Western Iowa Grape Growers Assn
Wisconsin Grape Growers Assn.

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More Information

http://northerngrapesproject.org/

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