

# **Addressing Research and Extension Needs of the Cold Climate Wine Industry:**

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## **SCRI Planning Workshops**

November 12-13, 2009, Burlington, VT  
February 11-12, 2010, Bloomington, MN

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## Appendix A

### Project Team

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#### *University of Minnesota*

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### Project Abstract

**Addressing research and extension needs of the emerging cold-climate wine industry in the Northeast and Upper Midwest.** Research and Extension Planning Project. Cold-climate wine grape cultivars with *Vitis riparia* parentage, released since the early 1990s, have created new and rapidly expanding small winery enterprises (over 250 wineries, 3,300 acres of grapes, 1300 growers) in New England, Northern NY, and the Upper Midwest (notably NE, IA, MN, and WI), with tremendous positive economic impact on rural areas. These *V. riparia*-based cultivars differ in their growth habits and fruit composition from less-hardy, traditional hybrids of *V. vinifera* and other *Vitis* species. Long-term viability of these new businesses and cultivars will depend upon a coordinated research effort to optimize viticultural, enological, and business management practices. The goal of this proposal is to bring research and extension scientists and stakeholders from 10 Midwestern and Northeastern states and winery associations together to outline and prioritize research and extension needs, form an industry-supported team to address them, and submit an SCRI grant in FY2010. The resulting CAP or SREP project will integrate the three SCRI focus areas of production (viticulture), distribution and processing (enology and winemaking practice), and consumers and markets, with the long-term goal of enhancing the profitability and sustainability of the emerging cold-climate winery and vineyard businesses in the upper Midwest and Northeast.

## Cold Climate Wine Industry Grant Planning 2009-2010 Executive Summary

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Growth in the cold climate wine industry in the upper Midwest and Northeast has been spurred by the introduction of new, cold hardy grape cultivars released by the University of Minnesota grape breeding program and private breeders. In preparation for submitting a five year, multi-state grant proposal to the USDA-National Institute of Food and Agriculture Specialty Crops Research Initiative (SCRI), we solicited input from representatives of regional grape and wine industry associations from 14 states to identify pressing research needs. The following research and extension gaps were identified through an online survey and two grower/winemaker meetings held in Vermont and Minnesota in 2009 and 2010.

### **Viticulture**

- Optimal vineyard management
- Nutritional needs of new cultivars
- Requirements for fruit maturity
- Site selection mapping
- Control of foliar phylloxera
- Disease susceptibility/phytotoxicity to copper and sulfur

### **Enology**

- Hybrid fruit chemistry
- Managing high acids and malic acid
- Appropriate wine styles for new cultivars
- Processing decisions
- Varietal characteristics
- Appropriate harvest parameters

### **Marketing/Economics**

- Impact on rural development
- Business profitability
- Marketing new varieties
- Winery economics
- State regulations

### **Extension**

- Educational resources
- Wine analysis facilities
- Centralized information on cold climate
- “Owner’s manual” for new varieties

The need for a large, multi-state grant proposal is driven by the unique circumstances of the cold climate wine industry.

**The grape varieties are new to growers.** Most of the *V. riparia*-based Minnesota varieties and Swenson hybrids have been released since the early 1990s. Research into optimizing growing practices and vinification of new varieties with unique fruit chemistry are needed to help them realize their potential.

**The grape varieties are also new to consumers.** The wine market is dominated by products branded by varietal names, and consumers may be wary of these new, unfamiliar varieties. The successful retailing of the new varieties will require informed marketing at the level of the winery and potentially a unified cold climate wine industry.

**Vineyards and wineries are small and young.** With many businesses less than ten years old, education and outreach are needed now to foster a strong start and sustainable investments.

**The industry is dispersed across the upper Midwest and Northeast.** Establishing these new products in the marketplace will require a unified interstate effort. Similar needs are found in both cold climate regions, and no state has sufficient resources to single-handedly support the necessary research and extension.

## Full Report

### Cold Climate Wine Industry Grant Planning 2009-2010

*November 12-13, 2009, Burlington, VT*

*February 11-12, 2010, Bloomington, MN*

**Introduction.** A new and robust small winery industry is developing in the upper Midwest and Northeast, in regions that were once considered too cold for wine grape production with conventional hybrid and *V. vinifera* wine grape cultivars. Following the introduction of ‘Frontenac’ in 1996, the University of Minnesota has released three additional cold-hardy wine grape cultivars that survive winter low temperatures down to -30°F: ‘Frontenac’, ‘La Crescent,’ and ‘Marquette.’ Private breeders have also released cold-hardy varieties such as ‘Brianna’ and ‘St. Croix’ which are increasing in acreage.

Over the past ten years, these cultivars have spawned an emerging wine industry that encompasses 250 wineries, 3,300 acres of grapes, and 1,300 producers in 14 states in the upper Midwest and Northeast. These growers and vintners are newly-immersed in the complex enterprise of growing and vinifying grapes, developing retail businesses, and marketing their wine. Their businesses are having an enormous positive economic impact in their rural communities. Because this is a fledgling industry utilizing new germplasm and dispersed across several states, outreach efforts in production, processing, and commercialization have been fragmented and piecemeal in nature. The long-term viability and sustainability of this emerging industry and its small-scale producers requires a systems-based, coordinated research and extension effort addressing production, processing, and marketing cold climate grapes and wines.

**Planning meetings.** To develop a systematic research and outreach effort, we held two planning sessions in Vermont (November 12-13, 2009) and Minnesota (February 10-11, 2010) which brought together representatives of 14 state producer groups and 11 land-grant universities. Following brief presentations on viticulture, winemaking, and the economics of small vineyards and wineries, participants were asked to comment upon challenges and opportunities they saw in each of these areas. In addition, prior to the meetings, representatives of each state winery or vineyard association completed a brief online survey requesting the following information:

1. Basic information on the acreage, varieties, and wineries represented by their organization.
2. Priorities from a list of topics in grape production, wine production, and business management.
3. The top three vineyard, winemaking, and business development issues facing their region (open-ended responses).

In this report, we summarize results from the online survey (pages 5-11) followed by the input we received during each of the planning meetings with industry participants (pages 12-17).

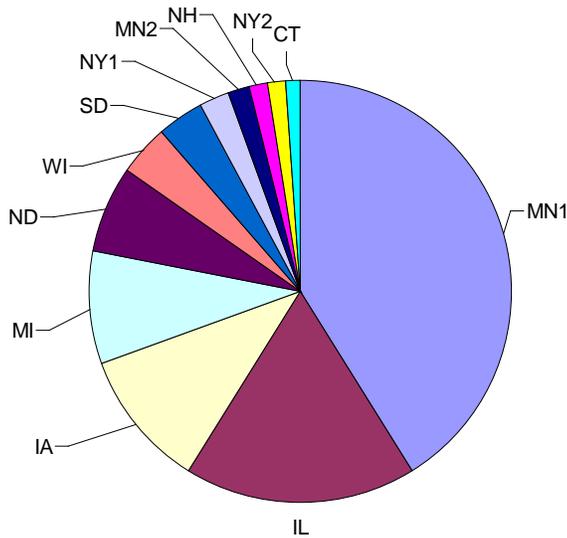
## Online Survey Results

**1. Organizations by state** (13 Responses). Thirteen organizations from 11 states responded to the online survey. Two states (New York and Minnesota) had two participating organizations.

Table 1.

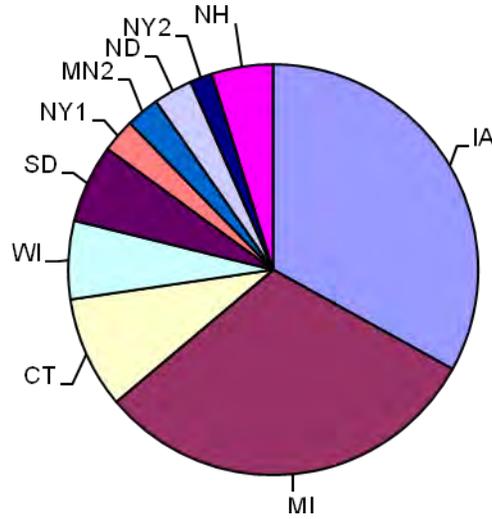
State	Organization
Connecticut	Connecticut Vineyard and Winery Association
Illinois	Illinois Grape Growers and Vintners Association
Iowa	Iowa Wine Growers Association
Michigan	Michigan Grape and Wine Industry Council
Minnesota	Minnesota Grape Growers Association
Minnesota	Western Minnesota Winegrowers
New Hampshire	New Hampshire Winery Association
New York	Northern New York Wine Grape Growers
New York	Lake Champlain Grape Growers Association
North Dakota	North Dakota Grape Growers Association
Pennsylvania	Penn State Cooperative Extension (Potter County)
South Dakota	South Dakota Specialty Producers Association
Wisconsin	Wisconsin Grape Growers Association

**2. Organization membership** (12 responses). Total membership in these organizations was 1,707. The Minnesota Grape Growers Association had the highest number due to membership from other Midwestern states and Canadian provinces



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**3. Estimated total wine production represented** (10 responses). Iowa and Michigan led in wine production. Figures weren't available for the Minnesota Grape Growers Association or Illinois.



**Total wine production = 2,342,218 gallons**

**4. Acreage by variety.** Respondents reported 3,152 acres of 'Cold Climate' varieties, led by 'Frontenac' and 'Marquette.' An additional 2,176 acres of other hybrid varieties were reported.

Table 2. Acreage reported by variety.

Variety	Cold Climate Acres	
	Acres	(%)
Frontenac	724	23%
Marquette	670	21%
La Crescent	341	11%
Frontenac Gris	216	7%
Edelweiss	211	7%
St. Croix	168	5%
St. Pepin	139	4%
Briana	122	4%
Prairie Star	90	3%
Other Cold Climate	470	15%
<b>Total Cold Climate</b>	<b>3,152</b>	

Hybrids/Other = 2,176 acres, total acreage reported = 5,328

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**5. Business type.** Respondents were asked whether their members had either a vineyard or winery, both a vineyard and winery, or neither. The majority (73%) had only a vineyard, 16% had both a vineyard and winery, and 5% had a winery only.

Table 3. Business type.

Type of Operation	Number	% of Total
Vineyard only	1245	73%
Winery only	79	5%
Both	271	16%
Neither	111	7%

**6 & 7. Vineyard age and size.** Vineyards are young and small in scale. Almost half (44%) of the vineyards were less than three years old and presumably ‘non bearing.’ Only 10% were more than ten years old. Eighty percent of vineyards were less than 5 acres in size, and only 3% were larger than 20 acres.

Table 4. Vineyard age.

Vineyard Age	Percent
0-3yr	44%
4-6 yr	29%
7-10 yr	17%
>10 yr	10%

Table 5. Vineyard size.

Vineyard Size	Number	%
0-5 acres	1,496	80%
5-10 acres	231	12%
10-20 acres	87	5%
>20 acres	40	2%
>50 acres	14	1%

**8. Winery size.** The 349 wineries reported by respondents were small (74% under 10,000 gallons/ 3,500 cases produced), but they were fairly evenly distributed across the winery size range of 500 to 10,000 gallons/year.

Table 6. Winery size.

Winery Size	Number	Percent
<500 gal	41	12%
500-1000 gal	30	9%
1000-2000 gal	42	12%
2000-5000 gal	82	23%
5000-7500 gal	58	17%
7500-10,000 gal	46	13%
>10000 gal	50	14%
Total	349	100%

**Ranking of viticulture, winemaking, and marketing/economics issues.** The next three questions asked respondents to rate (on a five point scale) the importance of different grape production, wine production, and marketing issues to their businesses and organizations.

**9. Viticulture practices.** Canopy management, optimizing yield and maturity levels, appropriate training and pruning systems, vine nutrition/fertilization, and disease management comprised the top five viticultural issues.

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Table 7. Ranking of viticulture issues.

Rank	Practice	Average Rating
1	Canopy management practices	4.36
2	Yield and maturity levels for optimizing quality	4.27
3	Appropriate training and pruning systems	4.20
4	Vine nutrition and fertilization	4.07
5	Disease management and varietal susceptibility	4.07
6	Varietal response to climate, soils	3.93
7	Appropriate cropping levels	3.93
8	Site influence on cold hardiness	3.53
9	Weed and vineyard floor management	3.33
10	Insect pest management	3.29
11	Spray technology	3.27
12	Crop estimation	2.93
13	Drainage and irrigation	2.87
14	Vineyard equipment and mechanization	2.60

**10. Winemaking/enology and fruit chemistry.** Respondents ranked strategies for improving wine quality, appropriate wine styles, flavor development and harvest timing, managing acids, and winery sanitation as the top five concerns.

Table 8. Ranking of enology and fruit chemistry issues.

Rank	Practice	Average Rating
1	Learning strategies for improving wine quality	4.43
2	Wine styles for cold-climate varieties	4.29
3	Flavor development and harvest timing	4.23
4	Managing acids	4.21
5	Winery sanitation	4.21
6	What yeast strains to use to modify flavor profile	3.93
7	Characteristic varietal flavors, pigments, phenolics	3.85
8	Sensory evaluation of wines	3.79
9	Role of malolactic fermentation in modifying flavors	3.57
10	Oak influence on cold climate variety flavor, maturation	3.36
11	Learning basic winemaking techniques	3.29
12	Fermentation problems/stuck fermentations	3.29
13	Specialty wine products (port, sparkling, etc.)	3.07
14	Equipment for small scale production	2.93
15	Distillation	1.86

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**11. Business/marketing/regulation issues.** Economic impact, profitability benchmarks, marketing strategies, grape production economics, and the impact of state regulations on sales and profitability were the top five concerns reported by respondents.

Table 9. Ranking of business/marketing/regulation issues.

Rank	Issue	Average Rating
1	Impact of wineries on rural development/economics	4.21
2	Benchmarks for business profitability	4.07
3	Marketing strategies for establishing local 'brand'	3.86
4	Economics of grape production	3.71
5	Impact of state ABC regulations on sales/profitability	3.71
6	Tasting room practices	3.71
7	Economics of wine production	3.64
8	Models for sustainable vineyards (variety mix, size)	3.57
9	Models for sustainable wineries (production, products)	3.57
10	Wholesale marketing to distributors	3.07

**Open ended responses.** Respondents were asked to provide comments on their top three concerns in grape production, winemaking and flavor chemistry, and business management/marketing. Verbatim comments follow the survey results (pg. 12).

**Grape production.** Opinions on industry-selected top priority viticultural issues varied, with climate and site suitability, labor, pest management practices, and nutrition all listed by at least three organizations. Grape quality issues (balancing yield, maturity, crop size) were listed as the 2<sup>nd</sup> priority by five participants, and pest management was the top topic listed as the third priority. Total responses (across 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>) found pest management with the highest number of responses, followed by ‘balancing yield and maturity’

Table 10. Ranking of viticulture priorities.

Viticulture	First	Second	Third	Total
Climate - site suitability, cold hardiness, heat units, risk of spring/fall frosts	3	2	0	5
Varietal performance	1	1	1	3
Balance of yield, maturity levels, crop size and estimation	2	5	2	9
Canopy management	0	2	3	5
Labor availability	3	0	0	3
Disease and insect pest management	3	2	5	10
Nutrition and fertility	3	0	3	6

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**Wine Production.** Respondents cited a wide variety of issues related to wine production, fruit quality, and facilities and equipment, which fall into three categories: basic training, specific production issues, and fruit and wine quality issues.

Several respondents cited the need for more commercial experience, better facilities, and training in basic winemaking skills. Although some specific winemaking issues were reported, the most important and widespread concern cited was managing acidity in the winery. About one third of the comments related to fruit quality, consistency, quality assurance, and the need to maintain minimum quality standards across wineries.

Table 11. Ranking of wine production priorities.

Category	Wine Production	First	Second	Third	Total
Basic training	Commercial experience	1	0	0	1
	Inadequate equipment, facilities	0	1	0	1
	Laboratory skills	0	1	0	1
	<b>Total</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>3</b>
Specific production issues	Managing acids, acid/sugar balance	4	2	3	9
	Winery sanitation	1	0	1	2
	Wine flaws	2	0	0	2
	Use of oak	0	1	1	2
	Small scale production techniques	1	0	0	1
	Cold stabilization	1	0	0	1
	Filtration	0	1	0	1
	Yeast strains	0	1	0	1
	Stuck fermentations	0	1	0	1
	Blending	0	0	1	1
	<b>Total</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>21</b>
Fruit and wine quality	Methoxypyrazines	1	0	0	1
	Consistent fruit quality, supply	1	1	0	2
	Quality assurance	1	0	0	1
	Wine styles, 'typicity,' cultivar characteristics	1	1	1	3
	Flavor maturity and harvest dates	0	1	0	1
	Consumer friendly wines	0	1	0	1
	Consistency among wineries	0	1	0	1
	Product mix	0	0	1	1
<b>Total</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>11</b>	

**Business, economics, marketing.** Respondents rated information about vineyard and winery production and profitability 'benchmarks' as a first priority, with various aspects of marketing and branding as important concerns. Also important was issues dealing with the state regulatory and licensing apparatus.

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Table 12. Ranking of business, economics, and marketing priorities.

Category	Business, Economics, Marketing	First	Second	Third	Total
Profitability	Profitability benchmark for wineries	3	1	2	6
	Grape production economics	2	1	0	3
Regulatory environment	State regulatory, licensing, taxation	1	3	2	6
Marketing	Marketing/branding	1	2	3	6
	Tasting room practices	1	0	0	1
	Wholesale marketing	1	0	0	1
	Joint marketing across regions	0	1	1	2
	Quality assurance programs (eg. VQA)	0	0	1	1
Community	Impact of wineries on rural economic development	1	1	0	2
Miscellaneous	Continued variety development	0	1	0	1

**General comments.** At the end of the survey, respondents were asked to provide additional comments of their choosing. These comments are transcribed below:

- We are at the beginning phases looking at Swenson varieties in the coldest spots in PA.
- The Minnesota Grape & Wine industry is in urgent need of extension support in the field. Due to funding cuts, extension services to this industry has been nil throughout this decade. The growers association has attempted to provide a modicum of support through annual education events of limited value. The need for extension assistance is great and growing each year
- The Vermont wine industry is very much in its infancy. We are still learning what we can grow and where. The impacts of each micro-climate on each variety are diverse throughout the state. As a result of some of the diverse nature, there are some growers/wineries attempting to change local content laws to force 100% Vermont grown, which will benefit a minority of the growers/wineries.
- Needs vary widely with the size of the operation. I suggest that the planning team focus on a specific size range of winery/ vineyard for their needs assessment. Trying to meet the needs of all producers in many states will be impossible.
- This survey is a good start.
- We need more support from Extension, but recognize the constraints that exist at this time a potential solution would be to include the U of MN in with the concept to use part of the Excise Tax generated by sales to establish a Minnesota Wine Board. This should be part of a much larger discussion.
- If we are to succeed with "New Varieties" we need to emphasize selling "varietals" to educate the public to the "Vin Locale" and not using fanciful names such as "Proprietor's Reserve"
- While many of the new cold-climate varieties are a big improvement on the varieties previously available, there is still much room for improvement. Creating better red varieties is critical. Helping growers to best utilize existing vineyards for profitability and sustainability is challenging due to the lack of experience of growers and the general lack of understanding of how these new varieties fit into this new viticultural landscape. Building a strong foundation of general viticultural principles and practices within the industry is essential. But even more, growers need help understanding how to develop profitability in their vineyard businesses. Brave new world challenges, aren't they?
- We need some core basic research on the vine such as variety, fertilization and disease but at the same time we need to "push" the industry very quickly to understand the importance of very high quality grapes. We do not have 20 years to learn this. Wine consumers expect a high quality product even if the grapes are coming from a vineyard that is only 5 years old and it is only the second or third year that the winery is in business.

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### Summary of Planning Workshops

Similar agendas for industry planning sessions (see Appendix 1) were held in Vermont (November 12, 2009, 40 attending) and Minnesota (February 10, 2010 54 attending).

**Introduction to the SCRI grants and planning process.** The funding philosophy for the SCRI grant program is to support multi-state, transdisciplinary research and extension projects that provide a comprehensive, systems-based approach to addressing industry needs. Our planning project was selected because it supports a new, expanding industry, identified a widely-dispersed but significant grower/winery audience, and addresses a need for a unified approach to the following industry components:

- production (new varieties, better utilization of novel germplasm)
- processing (flavor development, winemaking processes and styles need to be adapted to these mostly 'high acid' cultivars)
- marketing/consumer acceptance (novel products that need to be promoted to support continued expansion; development of wine industry and 'culture' in new regions of the country).

The planning process brought together industry and research/extension personnel to focus on needs and issues faced by this new industry. The purpose of the planning workshops was to enumerate the broad range of production, processing, and marketing/economic issues that need to be addressed to foster continued growth and development of this new cold climate viticulture enterprise. The planning sessions provide a roadmap for future research and educational needs that can serve as a backdrop to support requests for funding for both local and regional projects and a more comprehensive regional SCRI project request in 2011.

Discussions at both MN and VT were recorded on flip charts and by designated note-takers. Full notes are available at <http://blogs.cce.cornell.edu/grapes/cold-climate-research-extension-needs>.

**Viticultural issues.** Peter Hemstad, grape breeder with the University of Minnesota, discussed characteristics of MN releases (Frontenac, Frontenac gris, La Crescent, Marquette) and cold-climate varieties from private breeders (St. Croix, Sabrevois, St. Pepin, Edelweiss, Brianna, Prairie star, and Louise Swenson). Viticultural and cold-hardiness characteristics vary, but most share a heritage that includes *V. riparia*. Some, in particular the 'Swenson hybrids,' have *V. labrusca* in their background. *V. riparia* imparts cold-hardiness but also early bud break and retention of high berry acidity at harvest. Management needs to address performance in different climates and soils as well as moderating acidity through canopy management, cropping levels, and use of appropriate training systems.

**Discussion:** Discussion at both meetings centered around 1) varietal matching with sites and different climatic conditions, 2) management of crop load, canopy, and training systems to manage fruit composition at harvest, and 3) the need for continued breeding to improve on characteristics of existing cultivars (e.g. lower acidity, white varieties suitable for dry wine styles). Several specific issues with different cultivars were also mentioned. Major themes and research questions included:

1. How do varieties perform under the wide range of variable climates and soils under which they are being grown in the upper Midwest and Northeast?
  - a. How does variable growing season heat accumulation and season length affect maturity and fruit composition? Minimum growing degree days for consistent ripening?
  - b. How to cope with year-to-year variability in weather and fruit composition?
  - c. How do variable winter cold profiles affect cold hardiness and risk of winter injury?
  - d. How does disease resistance vary as affected by climate and location?
  - e. How sensitive are new varieties to sulfur and copper-based fungicides?

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2. What vine management practices specific to these new varieties will assist in desired development of flavors, phenolics, and acidity?
  - a. What training systems should be used to manage maturity, vigor, cropping levels and cost?
  - b. What canopy management (shoot, fruit thinning, leaf removal) practices are appropriate and cost effective?
  - c. How much can crop level and shoot density management reduce acidity in high acid cultivars? How to adjust management for variable seasons?
  - d. What nutritional needs and soil/tissue testing standards are appropriate for these new varieties (Nitrogen, micronutrients, foliar sprays)?
  - e. What growing practices are economically and environmentally sustainable?
  
3. What characteristics are needed for further variety development?
  - a. Lower acidity
  - b. Non-aromatic white variety
  - c. Dry white variety comparable in quality to 'Marquette'
  - d. More tannic reds
  - e. Short-season, extremely winter hardy cultivars (e.g. North Dakota)
  - f. Desirable flavor components.
  - g. Disease resistance

### Viticulture education and extension needs

- GIS based climate maps to guide variety and site selection
- Risk of spring/fall frost injury (first/last frost dates)
- Current information on planting, vine spacing, training, trellising
- Pruning practices, guidelines
- Canopy management for cold-hardy cultivars and their growth habits
- Vineyard tours across similar regions
- Information on all cold hardy varieties (eg. both MN and private cultivars) in one location

### Specific issues with cultivars

- Shelling with 'La Crescent'
- High acids with 'Frontenac' and 'Frontenac gris'
- Poor fruit set with 'La Crescent'
- Multicolored Asian Lady Beetle
- Anthracnose on some cultivars
- Early bud break and mid-winter warm periods
- Early budbreak on 'Marquette'
- Fruitfulness of secondary buds (associated with spring freeze of primaries)
- Managing K in high Mg soils
- Mechanization options

**Pest Management.** Lorraine Berkett (University of Vermont, VT meeting) and Tim Martinson (Cornell, VT and MN meetings) presented a summary of pest management issues. Varietal susceptibility ratings for diseases are being compiled by Berkett, but the sensitivity of cultivars to fungicides (eg. copper and sulphur products) is unknown. 'Louise Swenson' is apparently very sensitive to sulfur phytotoxicity. Martinson shared photos of anthracnose, foliar botrytis, downy mildew, black rot, and powdery from 2009 visits in NY vineyards. Many riparia-

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based cultivars are prone to foliar phylloxera infestations. Affordable spray technology for small scale vineyards is available, however many small-scale vineyards don't have adequate sprayers.

**Discussion:** Much information exists for disease and insect pest management, much of it directly applicable to cold climate cultivars. But varietal susceptibility to diseases in different climates and sensitivity to copper- and sulphur-based fungicides (both rated for organic production) is not well understood. Some varieties are susceptible to anthracnose, which is rarely seen in commercial vineyards of standard (*V. vinifera*-based) varieties in NY. Research questions include:

1. What is the range of disease resistance to major pathogens and insects among these cultivars
  - a. 'Frontenac' immune to downy mildew outside of MN
  - b. Anthracnose susceptibility
  - c. General disease severity ratings by cultivar
2. What management programs (spray timing, materials, canopy and cultural management practices) are appropriate and suitable for disease management in cold climate cultivars?
  - a. Fungicide phytotoxicity to sulphur and copper
  - b. Optimal management for anthracnose
  - c. Matching spray programs to varietal susceptibility

### **Specific pest management concerns**

- Virus incidence and susceptibility
- Timing of foliar phylloxera control
- Information on floor management/weed management
- Vole and other rodents
- Abiotic factors (wind, hail, etc.)

### **Pest management education and extension needs**

- Disease warnings
- Timely updates on insect, disease management
- Disease models with local weather stations
- Sustainable pest management information

**Winemaking/enology.** Anna Katharine Mansfield (Cornell) and Murli Dharmadhikari (Iowa State) outlined enology/fruit composition, and winemaking issues. Cold climate cultivars are unique in fruit composition (high malic acid to tartaric ratio), anthocyanins (that produce color), and low tannins. Yeast assimilable nitrogen (YAN) is important, variable, and difficult for wineries to measure. Flavor development and aroma profiles are unknown for these cultivars. These profiles can be used to guide vineyard practices, develop regional and varietal identity, and manipulate characteristics for different wine styles and price points.

**Discussion:** Many mentioned the challenge in managing high acid and high pH in these high-acid cultivars. Techniques including partial malolactic (ML) fermentation and vineyard management to minimize acids were discussed. Several specific winemaking issues (oak, tannins, yeast selection, winery sanitation) were mentioned. Research questions include:

1. What flavor and wine chemistry attributes define these new cultivars?
2. How can high acidity and pH be managed?
3. What types and styles of wine are most marketable and appropriate for these cultivars?

## Appendix A

### 4. What harvest parameters are needed to produce quality wine?

**Enology extension and education needs.** Training in numerous winemaking topics and techniques is a key need of new wineries throughout the upper Midwest and Northeast. A wide variety of topics, ranging from basic winemaking to winery sanitation to blending, acid management, and wine styles were mentioned. Some specific winemaking issues mentioned were:

- Oak use with different varieties
- Feasibility of ML fermentation, given high malate concentrations
- Hydrogen sulfide (H<sub>2</sub>S) and YAN
- H<sub>2</sub>S and rosé styles
- Heat treatment/thermo vinification
- Wine flaws and 'hybrid funk' off-aromas

**Business management/marketing/production economics:** Miguel Gomez (Cornell) presented an overall summary of business development costs and time for a vineyard/winery operation for the Vermont meeting. Goals for business are important-- 'Do you want to make wine or make money?' A vineyard requires three years before income starts and five years to reach 'full capacity.' From vineyard planting through wine production/sales it takes 11-13 years to get into 'positive net income' position. Starting a winery with purchased grapes to generate earlier cash flow helps reduce this income lag. Sequencing winery first, vineyard later reduces time to 10 years, generates 4% return on investment after 10 years; 13% after 20 years. Investment for a 10,000 case winery was estimated to be around \$3 million (M). At the Minnesota meeting, Bill Gartner (University of Minnesota) detailed the economic impact from vineyard and winery sales and investment and winery-generated tourism from 25 Minnesota wineries. A direct economic impact of \$21M plus \$14M from indirect economic activity was estimated, for a total economic impact of \$35M. Approximately 70% of vineyards were established between 2003 and 2007 in this 2007 study.

**Discussion:** With most of the development and business startups occurring since the year 2000, most cold climate vineyards and wineries are still in the developmental and expansion phase. The long-term profitability and sustainability of these businesses is important. Much of the discussion in both Vermont and Minnesota centered on: 1) how to sell and market new, unfamiliar varieties; 2) impact of regulations (grape sourcing for wineries, out-of-state grapes, taxation, regulations for licensing and sales); 3) managing retail businesses and tasting rooms; 4) the need for models/benchmarks for new and existing wineries and vineyards; 5) quality assurance (establishing quality standards to reduce/limit wine flaws that could impact regional reputation); and 6) documenting regional economic impact of wineries on rural economies.

Research questions:

1. What is the overall economic impact of the Cold Climate cultivars across the Northeast and upper Midwest?
  - a. jobs created per million dollars invested (norm for agricultural jobs = 1 job/ \$1M invested)
  - b. impact on surrounding communities
2. How do we sell and promote products made from these new varieties?
  - a. individual winery
  - b. wine trails
  - c. state
  - d. regionally- branding across state lines.
  - e. venues: social media/internet/press releases
  - f. local foods/locavore movement

## Appendix A

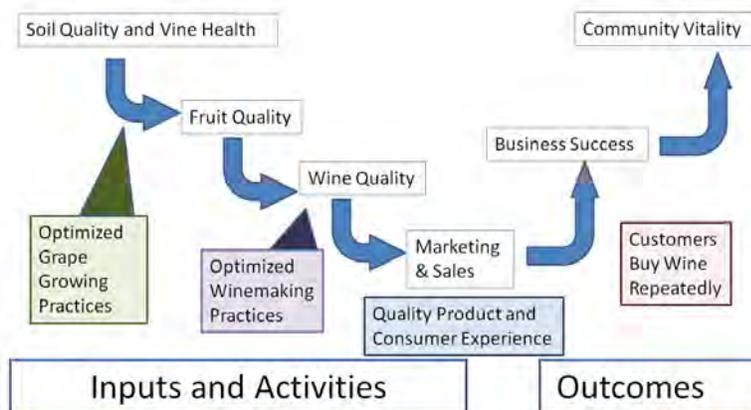
3. What business models for vineyards and wineries lead to sustainable profitability?
  - a. production costs per ton/acre of grapes
  - b. production cost of wine per bottle
  - c. willingness to pay for 'quality'
  - d. how to access capital
4. How do we manage tasting rooms to maximize customer satisfaction and sales?
  - a. what do customers want?
  - b. developing a wine culture in areas without a tradition of them
5. How do state laws and regulations impact development?
  - a. local grape content laws vary among states
6. How do we educate consumers and 'brand' our products? Will a 'Vintners Quality Alliance' help?

**Business, marketing, economics education and extension needs.** Many of the topics listed above involve education of winery owners and managers, and/or are amenable to research/extension projects that involve collecting information/data at individual wineries or with participation of state winery associations. State associations are essential partners in this effort.

## Appendix A

**Overall Project Model:** The input we gained at the Vermont and Minnesota led us to propose the following model for a five-year, multistate SCRI grant to address the needs of the industry, in partnership with the regional groups represented at the SCRI planning session:

### Successful Cold-Climate Grape and Wine Industry



**Outcomes:** Our purpose as a group is to support growth and development of the Cold Climate wine industry. This will provide benefits in rural economic development to the communities in which these businesses are located.

**Supporting these outcomes:** To have a successful, thriving cold climate wine industry, vineyards and wineries must:

- *Produce mature, sound fruit from varieties that are well matched with their site and climate, by utilizing optimized grape growing practices, and defining varietal quality parameters. (Production)*
- *Optimize winemaking practices to produce high quality wines that are available to a diverse market. (Processing and Distribution)*
- *Provide quality products and a satisfying consumer experience (Marketing, Consumers and Community)*

**Research and Outreach** are essential to help the industry grow and thrive:

- **Vineyard and Wineries are small and young.** With many businesses less than ten years old, continuing education and outreach are needed to develop capacity in the industry
- **Varieties are new.** Most of the *Vitis riparia*-based MN varieties and Swenson hybrids have been released within the past ten years. Research to optimize both growing practices and vinification of these new varieties (with unique fruit chemistry) will be needed to realize the full potential of this new material.
- **Community collaboration is needed.** Establishing these new products in the local and regional marketplaces will require a coordinated effort across group and state boundaries in the cold climate viticulture regions.

## Appendix 1: Workshop Agenda

### Day 1: Industry Meeting (November 121, Vermont; February 10, Minnesota)

- 8:30-9:00 *Introduction and Purpose: Addressing common needs across the Northeast and Upper Midwest.* Forming a research and extension alliance to address viticultural, enological, and marketing/business management needs to support long term sustainability and growth of cold-climate- based wineries. Martinson, Luby
- *Survey Results and Findings*
  - Round-table: Representatives of each state or regional based industry group
- 9:00-9:45 *Viticultural Characteristics of V. riparia-based Cold-climate cultivars.* Peter Hemstad and Jim Luby
- 9:45-10:15 *Stakeholder input on viticulture strengths and weaknesses and how to address them.*
- 10:15-10:30 Break
- 10:30-11:15 *Fruit Chemistry, Winemaking, and Flavors.* Anna Katharine Mansfield and Murli Darmadhikari
- 11:15-12:00 Stakeholder input on winemaking practice, problems, opportunities, including wine styles
- Noon-1:00 Lunch
- 1:00- 1:30 *Pest complexes and management (including equipment) in differing environments.* Lorraine Berkett, Tim Martinson, and Peter Hemstad .
- 1:30-2:00 Stakeholder input on winemaking practice, problems, opportunities, including wine styles
- 2:00-2:30 *Economics, business development opportunities and needs for Northern wineries and vineyards.* Miguel Gomez, Bradley Rickard
- 2:30-3:15 *Stakeholder discussion about business development issues.*
- 3:15-5:00 *Summary, brainstorming and identification of project advisory group.*
- Close with informal wine tasting (Frontenac, Marquette, La Crescent & other *V. riparia*-based varieties)

### Day 2: Morning working-group session.

- 8:00-11:00 Project team meeting to filter input, identify research objectives and potential scientific and industry collaborators, begin formulating research plan: Teams assigned to produce objectives and draft for viticultural, enological, and social/economic components of full SCRI SREP or CAP grant.

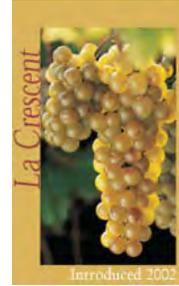
**Appendix 2: Attendees at the Vermont Planning Workshop**

**Cold-Climate Viticulture Research/Extension  
Planning Workshop**

*Burlington Hilton, Burlington, VT*

*November 12, 2010*

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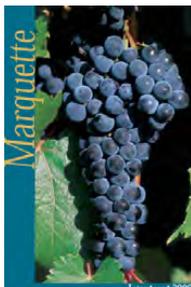
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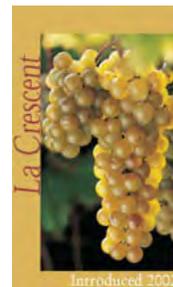
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**Appendix 3: Attendees at the Minnesota Planning Workshops**



**Cold-Climate Viticulture  
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*February 10-11, 2010*

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