



# Year 4 Progress Report

## September 2014 - September 2015



### **Northern Grapes:** **Integrating Viticulture, Winemaking, and Marketing of New Cold-Hardy Cultivars** **Supporting New and Growing Rural Wineries**

**USDA Specialty Crops Research Initiative Coordinated Agricultural Project (CAP) #2011-51181-30850**

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The *Northern Grapes Project* officially started in September 2011. The project initially received two years of funding. In the third year (2013), a “no-cost extension” maintained availability of previously-allocated funding to the project team, and some project members secured additional funds through state specialty crop block grant programs. We successfully reapplied for and received two additional years of funding for September 2014 through September 2016. Year 4 was the first year of the renewed funding, and team members were glad to be up and running again at full capacity. The fruit composition team continued to unravel the changes that occur during fruit ripening and to identify compounds in both the grapes and wines. Vineyard studies looking at training systems, crop load, nutrient management, and fungicide sensitivity continued for the fourth season in all locations. The enology team conducted trials looking at yeast selection, deacidification methods, and skin contact. The marketing and economics team conducted willingness to pay and cost of production studies, and surveyed tasting room visitors. In this year of the project alone, our extensive outreach efforts reached an estimated audience of 3,460 via numerous outlets, including the *Northern Grapes Symposium*, our capstone event of the year. The *Northern Grapes Project Webinar Series*, likely the most visible of the outreach products, had a live audience of approximately 835 at the 12 live sessions, and over 250 views of the recorded webinars.

#### **Project Goals and Rationale**

The *Northern Grapes Project* is a coordinated agriculture project (CAP), with objectives encompassing the three Specialty Crop Research Initiative (SCRI) focus areas of production (viticulture), processing and distribution (winemaking) and consumers/markets (vineyard and winery business management and marketing). Its focus is the new cold-hardy varieties developed by the University of Minnesota and private breeders that have made possible grape and wine production in cold-climate areas where it was previously not feasible to grow grapes. These new cultivars have spawned an emerging industry in the upper Midwest and cooler portions of the Northeast and New England composed of over 300 wineries, 3,300 acres of grapes, and 1300 growers.

The project's goals are to enhance and support growth and development of this industry through a coordinated research and outreach effort focused on varietal performance, specific viticultural and winemaking practices, and marketing/consumer studies. To accomplish these goals, multi-disciplinary teams are addressing:

- Varietal performance and resulting fruit and wine flavor attributes in different climates.
- Applying appropriate viticultural practices to achieve consistent fruit characteristics for winemaking.
- Applying winemaking practices to the unique fruit composition of cold-climate cultivars to produce distinctive, high quality wines that consumers will like and purchase.
- Understanding consumer preferences and individual/regional marketing strategies that will increase sales and growth of wines made from cold-climate cultivars and result in sustained profitability of wineries and vineyards.

The project is a partnership among multi-disciplinary research and extension personnel at 11 universities and 23 regional/state winery and grape grower associations. It is managed by a seven-member executive committee, and a project advisory council (PAC) encompassing industry, research, and extension personnel.

## Below are short summaries of each study conducted as part of the Northern Grapes Project. Please click on the study title to access a full research report.

\*If you are reading a printed copy of this report, it can be found on-line at [http://northerngrapesproject.org/?page\\_id=390](http://northerngrapesproject.org/?page_id=390)

### Objective 1: Document cold climate varietal performance in variable climates and understand the resulting sensory characteristics of the fruit and wines.

#### Evaluate cold-climate cultivar performance under a wide range of climates throughout the upper Midwest and Northeast.

This portion of the *Northern Grapes Project* is performed in conjunction with the USDA NE-1020 coordinated variety trial, which started in 2007. Detailed data on weather and standardized vine phenology, bud morality, disease, and yield were collected for a fourth year in locations spread across ND, SD, IA, MI, CT, VT, NY, and MA. Fruit samples from five cultivars (Frontenac, Frontenac gris, Marquette, La Crescent, and St. Croix) were collected at veraison and harvest and analyzed for fruit chemistry (organic acids, titratable acidity, sugars, and pH).



photo: Terry Bradshaw

*Sarah Kingsley-Richards and Anya Rose conduct canopy management at the University of Vermont NE 1020 trial.*

#### [Combined analysis of NE-1020 variety trials in ND, SD, NE, IA, MI, NY, VT, and CT.](#)

Since the 2012 growing season, we've annually measured vine phenology (budburst, bloom, veraison, harvest), yield and yield components, and primary fruit composition at these sites, following a standard data collection protocol. On-site weather data loggers provide hourly temperature and precipitation data during the growing season. Preliminary results have shown yields of ripe fruit of up to 7 T/acre for Frontenac and Marquette. Spring frost injury (2012) and cold injury (2014) limited yield at some sites. By collecting five seasons of crop and weather data, we hope to provide information about vine performance in different climates that will help growers inform site selection and match cultivars to the most suitable climates.

*Tim Martinson, Cornell University; Harlene Hatterman-Valenti, North Dakota State University; Anne Fennell and Rhoda Burrows, South Dakota State University; Paul Read, University of Nebraska; Diana Cochran and Gail Nonnecke, Iowa State University; Paolo Sabbatini, Michigan State University; Terry Bradshaw and Sarah Kingsley-Richards, University of Vermont; Francis J. Ferrandino, The Connecticut Agricultural Experiment Station*

#### [Click to access New York report.](#)

In 2005, 25 cold-hardy wine grape varieties were planted at the Willsboro Research Farm in Essex County, NY. Since then, eight years of data collected on these vines—including vine vigor, phenology, yield, fruit quality, and winter injury—show that many of these varieties have excellent potential for vineyards in the northeast region of New York.

#### [Click to access Vermont report.](#)

*Vitis riparia*-based cultivars Frontenac, LaCrescent, and Marquette continue to perform well at the test location with good bud hardiness. However, high acidity in the juice continues to present a challenge for wine making. Prairie Star has been inconsistent in yield in past years, but performed well in 2014 and 2015, and juice quality was good with lower acidity than most other Minnesota cultivars. St Croix continues to produce relatively lower acid juice, but yield in 2015 was roughly half of the target of four tons per acre.

#### Characterize changes in fruit composition during the ripening phase and how they influence grape chemistry/quality at harvest.

This team is characterizing northern grape cultivar ripening from gene expression, to metabolites produced by the grapes, to fruit and wine sensory characteristics. The goal is to understand ripening dynamics and to use this information to develop novel maturity indices that guide cultural practices and harvest timing.

#### [Phenolic compound profiles of cold climate wine grape cultivars.](#)

Cold climate wine grape cultivars have been profiled for production of phenolic compounds, including stilbenoids, that are thought to be important chemicals for disease resistance in grapes. We have found a high degree of diversity in these compounds across the sampled cultivars. Profiles are most visibly similar between closely-related cultivars, strongly suggesting a genetic basis for the synthesis of these compounds in grapes. Correlation of stilbenoid profiles with disease resistance traits will be used to develop marker-based selection of disease resistance in future grape breeding efforts.

*SL Teh, JJ Luby, and AD Hegeman, University of Minnesota*



photo: Anne Fennell

Dave Greenlee, owner of Tucker's Walk Vineyard and Winery, and NGP Advisory Council Member, racks off Frontenac Gris. Dave both provided grapes and made wine for team member Anne Fennell's studies.

### Frontenac gris and Brianna berry ripening.

In this study, grapes were sampled across a range of ripening parameters to provide greater sensory analyses of the fruit chemistry, aroma and flavor components and associated gene expression in berry pulp and skins and wines of Frontenac gris and Brianna. Brianna was originally selected as a table grape; however, since it was named in 2002, it has become valued by Midwestern Grape Growers for its ability to carry a crop on secondary buds. Early recommendations for Brianna indicated that it should be picked at pH 3.2 to 3.4. Preliminary results from our studies indicate aromas are more intense at lower pH prior to the fruit color changing to yellow.

Anne Fennell, South Dakota State University and Dave and Sue Greenlee, Tucker's Walk Vineyard and Winery

### Pre-fermentation skin contact temperatures and their impact on aroma compounds in white wines made from La Crescent grapes using aroma dilution analysis and simultaneous multidimensional gas chromatography – mass spectrometry - olfactometry.

Aroma extract/headspace dilution analysis (AEDA), solid phase microextraction (SPME), and simultaneous multidimensional gas chromatography – mass spectrometry – olfactometry (MD-GCMS-O) was used to determine which aroma(s) are dominant in the wines made from La Crescent berries. The aim of this study was to determine if pre-fermentation skin contact temperatures (70°F – Lot A, 45 °F – Lot B, no skin contact treatment – Lot C), spanning 24 h, had an impact on aroma compounds in La Crescent wines. Isoamyl alcohol, isoamyl acetate, ethyl butyrate,

ethyl hexanoate, ethyl octanoate, ethyl decanoate, and sulfur dioxide were found to be key compounds contributing to the aroma in La Crescent wines in all three treatment groups. Statistical analysis for significant difference in aroma compounds due to pre-fermentation skin contact temperature is currently being investigated and will be reported in Year 5.

Somchai Rice, Jacek A. Koziel, Jennie Savits, and Murlidhar Dharmadhikari; Iowa State University

### Determination of aroma compounds in red wines made from early and late harvest Frontenac and Marquette grapes using aroma dilution analysis and simultaneous multidimensional gas chromatography – mass spectrometry - olfactometry.

Aroma extract/headspace dilution analysis (AEDA), solid phase microextraction (SPME), and simultaneous multidimensional gas chromatography – mass spectrometry – olfactometry (MD-GCMS-O) was used to determine which aroma(s) are dominant in the wines made from Frontenac and Marquette berries harvested at 22 and 24 °Brix. Isoamyl alcohol, ethyl hexanoate, ethyl octanoate, and ethyl decanoate were found to be key compounds contributing to the aroma in wines made from Frontenac and Marquette wines. Statistical analysis for significant difference in aroma compounds due to sugar content at harvest is currently being investigated and will be reported in Year 5.

Somchai Rice, Jacek A. Koziel, Iowa State University and Anne Fennell, South Dakota State University

## **Objective 2: Develop and extend research-based vineyard management practices that allow sustained production of high quality fruit from cold climate cultivars.**

### **Evaluate crop and canopy management strategies to minimize fruit acid content and improve fruit composition.**

Training system, crop load, and canopy management studies were conducted at cooperating growers' vineyards on several different cultivars in CT, IA, MI, NE, NY, and WI. Extensive data were collected in all locations, including pruning weights, bud and shoot counts, yield, fruit chemistry, canopy density, time required to conduct cultural practices, and light distribution within the canopy.

### Effects of spacing, training, and pruning on vine performance and fruit quality of St. Croix.

Normalized (per unit length) crop yield for St. Croix in Connecticut was relatively independent of training methods. Winter bud kill had a much larger impact on cane pruned vines than spur pruned vines. Fruit chemistry and berry size was remarkably constant irrespective of training and pruning treatments, as well as plant spacing.

Francis J. Ferrandino, The Connecticut Agricultural Experiment Station





photo: Diana Cochran

VSP-trained Frontenac vines at Snus Hill Winery in Madrid, IA.

### **Iowa training systems trial.**

In Iowa, trials of different vine training systems in Frontenac, La Crescent, and Marquette grape cultivars showed that additional labor was required to train the Frontenac and La Crescent vines to the vertically oriented training systems (Vertical Shoot Positioning and Scott Henry). While these training systems increased yields in Frontenac in 2013, they produced the opposite effect on La Crescent vines. In 2014, the training systems treatments were continued in Marquette and Frontenac. In 2015, Marquette and Frontenac trained to Geneva double curtain required more time to prune compared with top wire cordon and vertical shoot positioning systems. Fruit quality was similar among all training systems. Yield data were not collected in 2015 due to early bird predation.

Diana R. Cochran and Gail R. Nonnecke, Iowa State University

### **Marquette crop load and training system trial for Michigan.**

The experiments conducted in 2015 confirmed some of the results collected in previous years. The crop load experiment conducted at SWMREC again demonstrated that Marquette has the potential to carry good yield per vine without compromising fruit quality at harvest. Marquette produced fruit without the noticeable high acids as reported in other northern locations, suggesting that this cultivar responds well to growing sites that are favorable for grape production.

Paolo Sabbatini and Pat Murad, Michigan State University

### **Marquette, Frontenac, St. Croix, and La Crescent training trial in Nebraska.**

When northern grape cultivars were tested on a variety of trellising systems in Nebraska, most performed better on a High Cordon or Geneva Double Curtain (GDC) system. In past years, yields and soluble solids were significantly higher for Frontenac and Saint Croix when trained to a GDC, with Marquette exhibiting similar crop yield patterns. In addition, titratable acidity exhibited a downward trend as well. These advantages were attributed to demonstrated better canopy structure which was evidenced by better measurable sunlight penetration.

Paul E. Read and Stephen Gamet, University of Nebraska-Lincoln

### **New York Frontenac training trial.**

In New York training system trials, Frontenac vines trained to Vertical Shoot Positioning (VSP) had reduced yields compared to Top Wire Cordon (TWC) and Umbrella Kniffin (UK). Fruit chemistry was largely unaffected by training system. Extreme cold during the winter of 2013-2014 resulted in extremely low yields in 2014, but almost no trunk damage, as was seen in other cultivars.

Timothy E. Martinson and Chrislyn A. Particka, Cornell University

### **New York Marquette training trial.**

In New York training system trials, Marquette had much higher yields on vines trained to Umbrella Kniffin (UK) and Top Wire Cordon (TWC) than on vines trained to Vertical Shoot Positioning (VSP). Fruit chemistry was largely unaffected by the larger crop on UK and TWC. The extremely cold temperatures during the winter of 2013-2014 resulted in some bud damage as well as trunk damage to over 25% of the vines, leading to vine collapse during the summers of 2014 and 2015.

Timothy E. Martinson and Chrislyn A. Particka, Cornell University



photo: Tim Martinson

Umbrella kniffin-trained Frontenac vine about one week after the May 23rd frost event, when temperatures reached a low of 27 °F.

### **Recovery from frost injury in New York training systems trials in 2015.**

A late spring frost in 2015, when shoots were 3-6" long, killed over 90% of the shoots in Marquette and Frontenac training system trials. There was a good emergence of "second crop" shoots from secondary and tertiary buds, as well as latent buds on cordon-trained systems. Bloom was delayed by three to four weeks, and veraison by about three weeks, in second crop clusters compared to first crop clusters. Both crops were harvested on the same date; soluble solids on the second crop were within 1° of the first crop, but titratable acidity in second crop clusters was 4 g/L higher in Frontenac and 2.5 g/L higher in Marquette.

Timothy E. Martinson and Chrislyn A. Particka, Cornell University

### **Impact of shading on Frontenac and Marquette fruit composition.**

During harvest in 2013 – 2015, clusters were harvested from shaded and exposed areas of vines to determine the impact of sun exposure on fruit chemistry. In all years, brix were higher and titratable acidity was lower in clusters that were well-exposed to the sun. When comparing the differences in fruit chemistry due to training system vs. sun exposure, the results suggest that maintaining sun exposure is more important than training system in minimizing acidity and maximizing soluble solids.

*Timothy E. Martinson and Chrislyn A. Particka, Cornell University*



photo: Madeline Wimmer

*Janet Hedtcke, Assistant Superintendent at West Madison Agricultural Research Station, assists in harvesting the Frontenac training trials.*

### **Brianna, Frontenac, La Crescent, and Marquette training trials in Wisconsin.**

This study evaluated the effects of three training systems: Vertical Shoot Positioning (VSP), High Cordon (HC), and Scott Henry (SH) on the yield, fruit quality and labor requirements of Brianna, Frontenac, La Crescent, and Marquette in southern Wisconsin. SH resulted in higher yield for Brianna, Frontenac, and La Crescent, but not for Marquette. La Crescent had the lowest yield in the VSP system, due to a significantly lower number of clusters per vine and cluster weight. Higher yields in SH system in Frontenac did not affect cluster weight, berry size, nor did it negatively impact fruit quality. The higher yield observed in Brianna and La Crescent in the SH system negatively impacted the accumulation of soluble sugar (Brix) in comparison to HC system.

*Amaya Atucha and Madeline Wimmer, University of Wisconsin-Madison*

### **Frontenac, La Crescent, and Marquette crop load trials in Wisconsin.**

This study evaluated the effect of pre-bloom and post-bloom cluster thinning on yield and fruit quality parameters of Frontenac, La Crescent, and Marquette in Wisconsin. The treatments affected fruit yield, with 50% post-bloom thinning significantly reducing yield in Frontenac and Marquette. Post-bloom thinning affected cluster weight in Frontenac, but not in Marquette. Pre and post-bloom thinning treatments had a significant impact on Brix and TA during the fruit sample period. In Marquette, the 50% post-bloom thinning of cluster increased Brix levels, and in Frontenac all thinning treatments had significantly higher Brix than the control. Although there were significant differences in TA among treatments, there were no clear trends in any of the varieties.

*Amaya Atucha and Madeline Wimmer, University of Wisconsin-Madison*

### **North Dakota research update.**

Research conducted through the funding provided by this grant is pivotal to the understanding of how to successfully grow cold hardy winegrapes year after year in North Dakota. This report includes information on fall acclimation, weed control during establishment, and the effects of trellis systems and leaf pulling on Frontenac.

*Harlene Hatterman-Valenti, North Dakota State University*

## **Determine optimal mineral nutrition and soil management practices for cold climate cultivars.**

The goal of this research is to determine the relationship between soil characteristics, leaf petiole and blade nutrient contents, and fruit yield and juice characteristics of Frontenac, La Crescent, and Marquette, and to determine the optimal nutrient conditions to maximize fruit yield and quality. Sixteen study sites are located in five states (IA, MN, ND, NY, and SD).



photo: Diana Cochran

*Mark Rippke and Genna Tesdall collect soil samples at Blackwing Vineyard in Glenwood, IA*

### **Grapevine nutrition and juice quality.**

Based on a preliminary analysis of two years' data (2012-2013), the pH, TA, and YAN concentration of juice yielded by cold-hardy grape cultivars may be influenced by the selection of the site on which the vineyard is established (through soil texture and native soil concentrations of K and organic matter) and nutrient management (through the use of amendments or inter-row plantings providing or depleting N, K, or organic matter). In contrast, no soil or tissue characteristics were consistently related to juice sugar concentration, which may suggest that other factors have more influence over this variable. Including 2015 data in the analyses will provide a stronger indication of which influences on grape juice chemistry are most robust and consistent.

*Carl Rosen and James Crants, University of Minnesota*

## Develop sustainable pest management recommendations based on cold-climate cultivar copper and sulfur sensitivity and disease resistance.

Copper and sulfur pesticide sensitivity trials were conducted in Wisconsin, as injury from these pesticides occurs in some grape cultivars, but the sensitivity of cold-hardy cultivars is not known. Further, trials are being conducted in no-spray vineyards in two locations in Wisconsin to determine relative disease resistance.

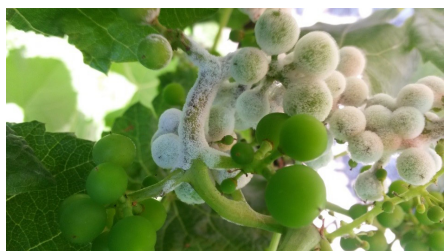


photo: David Jones

*Downy mildew infection in a no-spray field on Valiant in early June in Wisconsin. Nearly 100% of the clusters were infected beyond recovery.*

### Sensitivity of northern grape cultivars to fungicides and cultivar susceptibility to diseases.

Copper, sulfur, and difenoconazole fungicides cause leaf injury to some wine grape cultivars, but the sensitivity to popular northern cultivars is not known. In 11 trials conducted over four years, we showed that in general, the 15 cultivars tested were not highly sensitive to these fungicides. Notable exceptions, however, were that Brianna was highly sensitive to copper, and Leon Millot and Maréchal Foch were highly sensitive to sulfur. The first year of disease susceptibility studies yielded some interesting early results, but more years of data are needed to develop conclusive results.

*Patricia McManus, Victoria Kartanos, Matt Stasiak, and David Jones, University of Wisconsin-Madison*

## Objective 3: Develop and optimize winemaking practices to sustainably produce and market distinctive, high quality wines from cold climate cultivars.

### Assess yeast strains for selected cold-hardy cultivars.

As little is known about what yeast strains will work best with the unique juice chemistry of the cold-hardy cultivars, enologists are conducting trials with select cold hardy grapes, using yeasts selected for their ability to enhance desirable aromas in each cultivar.

#### Yeast selection for cold-hardy wine grapes.

Seven cold-hardy wine grape cultivars (Brianna, Chancellor, Frontenac gris, Frontenac, La Crescent, Marquette, and Prairie Star) sourced from Vermont and two New York locations were fermented with six yeasts to assess optimal strain X cultivar pairings for each. A total of 25 wines were produced, including two to eight lots of each wine, depending on availability. All wines are currently in cold stabilization, and will be finished, bottled, and used for sensory evaluation in the summer or fall of 2016.

*Anna Katharine Mansfield, Cornell University*

### Optimize deacidification methods for cold climate cultivars.

The high acidity of cold hardy cultivars can challenge even the most skilled winemakers. Therefore, enologists are evaluating both biological and chemical methods of reducing acidity during the winemaking process. With chemical deacidification methods, team members hope to selectively reduce malic acid and retain tartaric acid, if possible. Further, studies are being conducted to determine if certain yeast strains are more effective at reducing malic acid during the winemaking process.



photo: Katie Cook

*A research wine at the University of Minnesota enology lab.*

#### Using malic acid-reducing yeasts for cold climate wine grapes.

Three yeast strains that purportedly metabolize malic acid at higher rates reduced total acidity compared to the control yeast by 0.9 to 1.6 g/L in La Crescent wines and 0.4 to 0.9 g/L in Frontenac rosé wines.

*James Luby and Andrew Horton, University of Minnesota*

#### Optimizing deacidification methods for cold climate cultivars.

A comprehensive study of treatment variables for double-salt deacidification suggested that pH has the greatest impact on malic acid loss. Concentration of soluble solids and ethanol had lesser effects, as did temperature, though trends for the latter were contradictory. In a scaled-up wine production trial, malic acid loss was slightly higher at ambient temperature in Frontenac gris, but under refrigeration in La Crescent. No parameters seemed capable of preferential removal of malic acid.

*Anna Katharine Mansfield and Chris Gerling, Cornell University*



## Skin contact trials on aromatic white cold hardy cultivars.

While regional and viticultural variables do impact wine aroma and flavor, the final sensory profile is also heavily influenced by processing parameters. Pre-fermentation skin contact treatments are often employed by winemakers to produce aromatic styles of white wines, but the effect of skin contact on the concentration of free and bound aroma compound has not been studied in the cold climate grape cultivars. The goal of this work is to determine if pre-fermentation skin contact treatments on La Crescent and Edelweiss grapes produce a positive impact on wine aroma.



photo: Tammi Martin

Jennie Savits of Iowa State University works on the La Crescent skin contact trials.

### Skin contact trial in La Crescent.

We studied the effect of 24 hours pre-fermentation skin contact, at two temperatures, on the aroma intensity of La Crescent wines. The sensory panelist could not differentiate between the wines produced by three treatments. We also conducted chemical analysis of aroma compounds using GCMS with sniff port. The results of the study were reported under Objective 1 of the project.

Murli Dharmadhikari, Jacek Koziel, and Somchai Rice, Iowa State University and Anna Katharine Mansfield, Cornell University

## Anthocyanins in red cold hardy cultivars.

Traditional red wine grape cultivars are unusual among *Vitis* species in that their color is provided almost entirely by monoglucoside anthocyanins. All other known non-vinifera grapes contain both mono- and diglucoside anthocyanins, and often more of the latter. Because the structure of diglucoside anthocyanins make them less capable of binding in molecules that stabilize color, wines made from interspecific hybrids with higher levels of diglucoside anthocyanins are more likely to have unstable color in atypical hues. While extensive research has been performed on *V. vinifera* monoglucosides, little is known about typical anthocyanin types and quantities in interspecific cold-hardy red hybrid grapes.

### Characterizing anthocyanins in red cold hardy hybrids.

While the color of cold-hardy red hybrid wines has been observed to differ from that of traditional *V. vinifera* reds, little is known about the type and amount of anthocyanins (pigments) in these cultivars. In this initial characterization of hybrid grape anthocyanins, concentrations of diglucosides appear to be universally higher than monoglucosides in hybrid grapes. Higher diglucoside concentration suggests that hybrid wine color will be a different hue than that of traditional reds, and that color compounds are less likely to form stable complexes that form the brick-red color expected during aging.

Anna Katharine Mansfield, Cornell University

## Objective 4: Identify strategies to support sustainable development of businesses based on cold climate cultivars, from the individual winery to regional agri-tourism.

### Identify the consumers of cold climate wines.

Information about consumer behavior and preferences is essential for marketing and product development of cold climate wines. It also provides benchmarks for future studies to assess the impacts of this project and changes in the industry over time, including changes in brand awareness, consumers' perceptions of the product, and the market penetration of cold climate wines.

### Upper Midwest winery tasting room visitor study.

Surveys of 1,345 tasting room visitors were completed in Wisconsin, and another 667 were completed in Minnesota. They constitute an extensive data set for enhancing understanding of tasting room visitors and their awareness and perception of cold climate wines. Preliminary analyses indicate the respondents from both states are much more aware of these wines and related grape varieties than are Michigan tasting room visitors. Year 5 will focus on analyses to generate further insights that can be used to increase brand awareness and tasting room sales.

Don Holecek and Dan McCole, Michigan State University

## Branding research for cold climate wines.

The goal of research under this objective is to improve branding of cold climate wine regions, as well as individual wineries and wines, to create a long-term image that appeals to target markets. Experimental auctions are underway at wineries in cold-hardy U.S. wine regions to assess consumers' willingness to pay for wines based on packaging and label content. Further studies were conducted to determine if consumer willingness to pay changed as they learned more about wines they are tasting, such as production region and information about the grape variety used to make the wine.

### Impact of different types of information on consumer value of cold hardy wine.

Because consumers typically have less experience with cold-hardy wines, wineries must inform potential buyers about them via tasting room staff, wine notes, and labels. In this study, 145 subjects participated in experimental auctions to determine how different types of information about cold-hardy wines impacted their true value for those wines.

Dan McCole, Michigan State University



photo: Haiyan Song

Bill Gartner of the University of Minnesota talks to participants in the wine tasting study at Serra Vineyards in Grants Pass, OR.

### Cold hardy wine branding.

Three groups of approximately 200 wine testers were employed to ascertain acceptance and desired characteristics for cold hardy wines; three reds and three whites were tasted. The first group tasted the wines without any information, the second group tasted the wines with information about the grape used to make the wine revealed, and the third group tasted the wines with all the information available to Group 2 testers revealed to them plus information about where the wine originated (state and winery).

William C. Gartner, University of Minnesota

## Complete a production economics study and develop an online, interactive tool for producers to benchmark their costs and returns.

Small-scale startup vineyards have different cost structures than well-established commercial vineyards, and existing publications aimed at *vinifera* grapes do not reflect practices and costs for cold hardy grape producers. An integrated research-extension approach will be employed in collaboration with stakeholders to provide benchmarks of production costs and returns, and make an interactive tool growers can use to benchmark their operation.

### Cost of establishment and operation cold-hardy grapes in the Thousand Islands region.

There is growing interest in expanding acreage of cold-hardy hybrid grapes in the Thousand Islands region. In response, we developed cost studies for various cold-hardy hybrid grapes for a representative production unit. These cost and return estimates can help northern grape growers make superior production decisions to identify low-cost production practices and to maximize profits.

Miguel I. Gómez, Dayea Oh and Sogol Kananizadeh, Cornell University

## Northern Grapes Project Outreach Efforts

Outreach in the *Northern Grapes Project* is integrated with our research effort in order to consistently deliver information to those working in the cold climate grape industry. In the fourth year of the project, our outreach efforts reached an estimated audience of 3,460 via the *Northern Grapes Webinar Series*, the *Northern Grapes Enterprise Workshops*, the *Northern Grapes Symposium*, and other presentations at grower meetings and field days. We also published four editions of the *Northern Grapes Newsletter* and seven issues of *News You Can Use* and maintained the *Northern Grapes Project* website, which had nearly 10,000 visits this year. We added over 360 members to our *Northern Grapes Project Webinar Series* listserve (2,009 members total), broadcasting webinars to an audience of approximately 835 people.



## The Northern Grapes Symposium

The fourth *Northern Grapes Symposium* was held on March 18 and 19 in Syracuse, NY, in conjunction with the Eastern Winery Exposition. Approximately 480 people attended presentations by team members Tim Martinson, Murli Dharmadhikari, Gail Nonnecke, Paolo Sabbatini, Jim Luby, Bill Gartner, Anna Katharine Mansfield, Miguel Gomez, Dan McCole, Mike White and graduate student Alex Fredrickson. Further, industry members Kristina Randazz-Ives (Coyote Moon Vineyards) Craig Hosbach (Tug Hill Vineyards), and Seth McFarland (Mac's Creek Winery and Vineyards) participated in a panel discussing optimal winemaking practices.



photo: Jeff Richards

*Tim Martinson speaks about training system studies at the 2015 Northern Grapes Symposium, which was held in conjunction with the Eastern Winery Exposition.*

**Dharmadhikari, M. and A. Fredrickson.** March 18, 2015.

Managing, Adding, and Enhancing Tannins for Red Hybrid Fermentations. Eastern Winery Exhibition, Syracuse NY. Eastern Winery Exhibition, Syracuse NY.

**Dharmadhikari, M., C. Hosbach, K. Randazzo-Ives and S.**

**McFarland.** March 18, 2015. Achieving Optimal Fruit Expression for White Hybrids. Eastern Winery Exhibition, Syracuse NY.

**Gomez, M.** March 19, 2015. Consumer Expectations and Buying Patterns in the Tasting Room: Study Results. Eastern Winery Exhibition, Syracuse NY.

**Luby, J., B. Gartner, and A. K. Mansfield.** March 18, 2015.

Northern Grapes Project: Scope and Accomplishments. Eastern Winery Exhibition, Syracuse NY.

**Martinson, T. E. and I. Dami.** March 18, 2015. Recovering from 2014 Winter Damage in New York and Ohio. Eastern Winery Exhibition, Syracuse NY.

**Martinson, T., G. Nonnecke, and P. Sabbatini.** March 18, 2015.

Optimal Training Systems, Cropping Levels, and Canopy Management for Marquette, Frontenac, and La Crescent. Eastern Winery Exhibition, Syracuse NY.

**Martinson, T.** March 19, 2015. How to Achieve Economically Sustainable Vineyards with Quality Fruit. Eastern Winery Exhibition, Syracuse NY.

**McCole, D.** March 19, 2015. Results of wine tourism studies in Michigan. Eastern Winery Exhibition, Syracuse NY.

**White, M.** March 17, 2015. Launching your Vineyard or Winery. Eastern Winery Exhibition, Syracuse NY.

## Northern Grapes Enterprise Workshops

The *Northern Grapes Project* sponsored or co-sponsored thirteen enterprise workshops with participation by over 325 people this year. Many events were part of university field days, such as the very popular University of Minnesota Grape Breeding and Enology Programs Open House and Field Tour while others were stand-alone meetings. New project member Anna Wallis, Cornell Cooperative Extension Associate and fruit specialist for Northern New York, held a number of workshops, with topics ranging from a harvest workshop to a vineyard site evaluation workshop.



photo: Nicholas Howard

*John Thull leads a vineyard tour at the University of Minnesota Grape Breeding and Enology Programs Open House.*

**Burrows, R., C. Rosen, and A. Fennell.** Feb. 28, 2015. Viticulture Workshop. Rapid City, SD.

**Hemstad, P., J. Thull, and J. Luby.** Sept. 6, 2014. University of Minnesota Grape Breeding and Enology Programs Open House and Field Tour. University of Minnesota Horticultural Research Center, Excelsior, MN.

**Read, P.** July 11, 2015. Ground Covers, Vineyard Floor Management and Crop Estimation Field Day. Oak Creek Vineyards, Raymond, NE.

**Wallis, A. and L. Pashow.** Sept. 24, 2014. Grape Harvest Workshop. Willsboro Research Farm, Willsboro, NY.

**Wallis, A., T. Martinson, and T. Bradshaw.** Nov. 6, 2014. North County Grape Industry Advisory Meeting. Willsboro Research Farm, Willsboro, NY.

**Wallis, A.** Jan. 13, 2015. NGP Webinar Viewing –Emerging Cultivars. Clinton County CCE Office, Plattsburgh, NY.

**Wallis, A.** March 10, 2015. NGP Webinar Viewing - Tannins. Clinton County CCE Office, Plattsburgh, NY.

**Wallis, A. and R. Lamoy.** March 28, 2015. Vineyard Pruning Workshop, Champlain Valley. Hid-In-Pines Vineyard, Morrisonville, NY.

**Wallis, A. and G. Barnhart.** April 4, 2015. Vineyard Pruning Workshop, Upper Hudson Valley. Victory View Vineyards, Schaghticoke, NY.

**Wallis, A., A. Farmer, and M. Spiak.** April 25, 2015. Vineyard Site Evaluation Workshop, Upper Hudson Valley. The Fossil Stone Vineyards, Greensfield, NY.

**Wallis, A., W. Wilcox, and A. Landers.** May 7, 2015. Vineyard Pest Management Workshop, Upper Hudson Valley. Victory View Vineyards, Schaghticoke, NY.

**Wallis, A. W. Wilcox, and A. Landers.** May 13, 2015. Vineyard Pest Management Webinar. Clinton County CCE Office, Plattsburgh, NY.

**Wallis, A. and B. Webright.** May 20, 2015. Vineyard Business Management Workshop. Saratoga County CCE Office, Ballston Spa, NY.

**Wallis, A. and B. Webright.** May 27, 2015. Vineyard Business Management Workshop. Clinton County CCE Office, Plattsburgh, NY.

## Northern Grapes Webinar Series

The *Northern Grapes Project* hosted six webinars this year (monthly, November through April). All webinars were recorded and are archived on the [Recorded Webinars tab](#) of the project website. Our webinar email list currently contains over 2,009 unique email addresses. Approximately 835 participants joined the live sessions, and webinar recordings (including webinars from Years 1 - 3) were viewed over 250 times. In early 2015, we used two models to estimate the value of the webinar series; one looked at the value of time invested in watching webinars, and the other calculated the “green” savings of participating in webinars instead of attending presentations in person. We also surveyed webinar attendees, asking them how much they’d pay to watch a live webinar, how much they’d pay to access the archived webinars, as well as how much money they had earned and how much they had saved due to information presented during the webinars. We found that the total value of the series through Year 4 was \$3,043,671. Of particular note, survey respondents indicated that the webinar series increased their economic returns by over \$1000 each.

*Chrislyn Particka, Cornell University*



**Lerch, S. and M. White.** Nov. 20, 2014. [Trellis design and construction and pruning fundamentals prior to your first cut.](#)

**Sacks, G. and J. Jastrzebski.** Dec. 16, 2014. [Stuck on you – Sulfur spray residues in the vineyard and winery.](#)

**Hart, M. and T. Plocher.** Jan. 13, 2015. [Emerging cold hardy wine grape cultivars.](#)

**Martinson, T., J. Thull, and B. Utter.** Feb. 10, 2015. [Comparing and contrasting vertical shoot positioning and top wire cordon training systems.](#)

**Mansfield, A. K.** March 10, 2015. [Building the perfect body: tannin strategies for red hybrid wines.](#)

**Gartner, B. and D. McCole.** April 21, 2015. [Branding strategies for cold climate wines.](#)

## Web Presence



The *Northern Grapes Project* [Website](#) and [Facebook](#) page were further developed and maintained in Year 4. The website logged nearly 10,000 visits by 6,400 users this year, with an average visit time of almost three minutes. The project website contains general information about the project, as well as archived webinars and newsletters, and data-driven reports developed by team members. The Facebook page primarily serves as a way to advertise project achievements, upcoming webinars, and publication of newsletters.

*Chrislyn Particka, Cornell University, webmaster*



## Northern Grapes News

Four issues of the *Northern Grapes News* were published in year two, containing 21 articles written primarily by team members. Many of the articles contained data and results from the first four years of the project as well as profiles of team members. All newsletters were delivered electronically to approximately 3,200 people through project extension personnel and the Advisory Council, and are archived on the [“Newsletters” page](#) of the project website.

Chrislyn Particka, Cornell University, editor



### 3 December 2014. Vol 3, Issue 4

**Loseke, B. and P. Read.** 2014. Delaying budbreak for northern vineyards. *Northern Grapes News* 3(4): 1-3.

**Particka, C.** 2014. Northern Grapes project receives additional funds. *Northern Grapes News* 3(4): 3.

**Tuck, B. and B. Gartner.** 2014. Results from the Northern Grapes Project baseling survey – a series. The role of winery tourists in the cold-hardy wine industry. *Northern Grapes News* 3(4): 4-5.

**Particka, C. and Z. Vickers.** 2014. NGP team profile: Zata Vickers. *Northern Grapes News* 3(4): 6.

**Particka, C. and A. Hegeman.** 2014. NGP team profile: Adrian Hegeman. *Northern Grapes News* 3(4): 7.

**Particka, C.** 2014. Eastern Winery Exposition and Northern Grapes Symposium. *Northern Grapes News* 3(4): 8.

### 4 March, 2015. Vol 4, Issue 1

**Rolfes, D., G. Nonnecke, and P. Domoto.** 2015. Effects of canopy management practices on cold-hardy grape cultivars. *Northern Grapes News* 4(1): 1-5.

**Tuck, B. and G. Gartner.** 2015. Results from the Northern Grapes Project baseling survey – a series. Industry maturation and concerns. *Northern Grapes News* 4(1): 5-6.

**Particka, C. and G. Nonnecke.** 2015. NGP team profile: Gail Nonnecke. *Northern Grapes News* 4(1): 7.

**Particka, C. and J. Koziel.** 2015. NGP team profile: Jacek Koziel. *Northern Grapes News* 4(1): 8.

**McFarland, M.** 2015. Vitisnord 2015. *Northern Grapes News* 4(1): 9.

### 15 May, 2014. Vol 4, Issue 2

**Mansfield, A. K.** 2015. When species matters: All is not equal in the world of wine tannins. *Northern Grapes News* 4(2): 1-3.

**Sabbatini, P. and J. Emling.** 2015. Impact of spring frost damage on Marquette in Michigan. *Northern Grapes News* 4(2): 4-5.

**Particka, C. and A. K. Mansfield.** 2015. NGP team profile: Anna Katharine Mansfield. *Northern Grapes News* 4(2): 6.

**Particka, C. and C. Gerling.** 2015. NGP team profile: Chris Gerling. *Northern Grapes News* 4(2): 7.

**Tuck, B. and G. Gartner.** 2015. Results from the Northern Grapes Project baseling survey – a series. Growth and development of wineries. *Northern Grapes News* 4(2): 8-9.

### 10 August 2015. Vol 4, Issue 3

**Gartner, B.** 2015. Does production region matter? *Northern Grapes News* 4(3): 1-2.

**Particka, C. and M. White.** 2015. NGP team profile: Mike White. *Northern Grapes News* 4(3): 3.

**Particka, C. and P. Read.** 2015. NGP team profile: Paul Read. *Northern Grapes News* 4(3): 4.

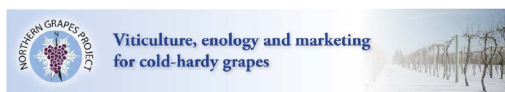
**Martinson, T. and T. Burr.** 2015. I have galls in my vineyard: Should I call my nursery? *Northern Grapes News* 4(3): 5-6.

**Dharmadhikari, M., J. Savits, and T. Martin.** 2015. Cold climate wine quality assurance program. *Northern Grapes News* 4(3): 6-8.



## Northern Grapes News You Can Use

The *News You Can Use* series was continued this year; the intent is to provide our audience with brief, timely information, generated via research and outreach conducted as part of the *Northern Grapes Project*, as well as material derived from other sources. *News You Can Use* is published during the months that the newsletter is not, and is distributed electronically to approximately 3,200 people via project extension personnell and the Advisory Council. It is also and is [archived on the project website](#).



### News You Can Use

#### Winery Sanitation September 2014



Evan Miles scrubs the floor of the Cornell Vinification & Brewing Technology Laboratory.  
photo: Anna Katharine Mansfield

A good winery sanitation program is of key importance to wineries of all sizes, as it will improve product quality, production consistency, and product safety. The costs of having a poor sanitation program include poor product quality (or perhaps unsalable product), a loss of revenue, and a damaged reputation. As harvest is drawing near, now is a good time to review your winery's sanitation program.

Dr. Randy Worobo, Associate Professor in the Department of Food Science at Cornell University, is a well-known food safety expert, and has presented many winery sanitation workshops across the U.S. In the June 2012 Northern Grapes Project Webinar "Introduction to Winery Sanitation: Options to Applications," Dr. Worobo covered the basics of winery sanitation.

Link to webinar: <https://www.youtube.com/watch?v=x0q4rzbWNDM&feature=youtu.be>

#### Additional Resources:

Winery Sanitation, Presspad Podcast #9, Hans Walter-Peterson, Chris Gerling, and Randy Worobo, Cornell University  
<http://blogs.cornell.edu/presspad/2012/09/25/presspad-podcast-9-winery-sanitation/>

Winery Cleaning and Sanitation (slide set), Michael Sipowicz, Texas Cooperative Extension

**Particka, C.** 2014. [Winery sanitation](#). News You Can Use, September 2014.

**Particka, C.** 2014. [Wine deacidification](#). News You Can Use, October 2014.

**Particka, C.** 2014. [Keep a cork in it: Stabilizing sweet wines for bottling](#). News You Can Use, December 2014.

**Particka, C.** 2015. [Winery customer satisfaction](#). News You Can Use, January 2015.

**Particka, C.** 2015. [Grapevine nutrition](#). News You Can Use, March 2015.

**Particka, C.** 2015. [Winery profitability](#). News You Can Use, April 2015.

**Particka, C.** 2015. [Herbicide drift](#). News You Can Use, June 2015.

## Other Presentations

Members of the *Northern Grapes Project* gave over 50 presentations throughout the year at field days and grower meetings outside of the *Northern Grapes Enterprise Workshops* and *Northern Grapes Symposium*. These presentations covered topics in all four objectives of the project.

**Atucha, A. and Wimmer, M.** July 29, 2015. Training systems and canopy management to improve fruit quality of cold hardy wine grapes. West Madison Agricultural Research Station, Madison WI.

**Dharmadhikari, M.** March 7, 2015. The Northern Grapes Project: Winemaking. 18th Annual Nebraska Winery and Grape Growers Forum and Trade Show, Omaha, NE.

**Fennell, A.** February 6, 2015. Grapevine cold hardiness. North Dakota Grape and Wine Association Conference, Bismark, ND.

**Fennell, A. and J. Luby.** January 29, 2015. Northern Grapes fruit ripening updates. Illinois Grape Growers and Vintners Association Annual Meeting, Springfield, IL. Presentation delivered by WebEx.

**Fennell, A.** May 26-28, 2015. Functional Genomic Analyses of Abiotic Stress Tolerance Traits in Grapevine. BioSNTR NSF All Investigator Meeting, Pierre, SD.

**Gerling, C., A.K. Mansfield, A. Fredrickson, D. Manns, and C. Martins Tahim.** January 29, 2015. Cold climate enology projects. Illinois Grape Growers and Vintners Association Annual Meeting, Springfield, IL. Presentation delivered by WebEx.

**Hatterman-Valenti, H.** March 6, 2015. The Northern Grape Project. 18th Annual Nebraska Winery and Grape Growers Forum and Trade Show, Omaha, NE.

**Hatterman-Valenti, H.** March 6, 2015. The Northern Grape Project. 18th Annual Nebraska Winery and Grape Growers Forum and Trade Show, Omaha, NE.

**Hatterman-Valenti, H.** Sept 19, 2015. NDSU high-value research project. NDSU Horticulture Field Day, Absaraka, ND.

**Hatterman-Valenti, H.** February 7, 2015. NDSU germplasm enhancement project update. ND Grape and Wine Assoc. Annual Meeting and Conference, Bismarck, ND.

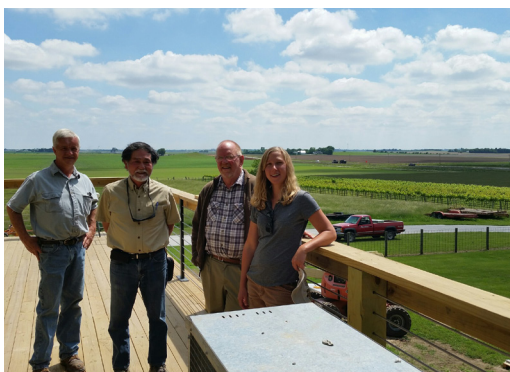


photo: Brad Beam

*Mike Swiney, owner of Arpeggio Vineyards in Pana, IL, with Paul Domoto, Tim Martinson, and PhD student Sarah Bowman visit during Domoto and Martinson's visit to Illinois, during which they gave presentations to growers in the northern and southern parts of the state.*

- Hazelrigg, Ann.** June 25, 2015. Vineyard Integrated Pest Management. Vermont Grape and Wine Council Annual Meeting, Randolph, VT.
- Li, J. and M. Gomez.** 2014. Does passion for wine matter? The effects of owner motivation in non-traditional wine regions. Current Advance in Viticulture and Enology Conference, Agriculture In-Service Conference. Presented November 18, 2014, Ithaca NY
- Luby, J.** February 13, 2015. Grape breeding for Cold Climate Wine Production at the University of Minnesota, Minnesota State University-Mankato, Biology Seminar Series.
- Luby, J.** January 18, 2015. UMN Grape Research Update, including update on Northern Grapes Project. Minnesota Grape Growers Association.
- Luby, J.** 2015. Cold climate wine and table grapes. HortScience 50(9)S137 (Abstr.). Presented Aug. 5, 2015 at the American Soc. for Horticultural Science Annual Conference, New Orleans. Recorded presentation available at <https://ashs.confex.com/ashs/2015/webprogram/Paper22445.html>.
- Martinson, T.** October 27, 2014. Training trials on Marquette and Frontenac from 2012-2014. Northern New York Grape Growers Association meeting. Watertown, NY.
- Martinson, T.** November 11-13, 2014. NE 1020 meeting; lead meeting, including discussions of Northern Grapes Project. Geneva, NY.
- Martinson, T.** March 24, 2015. The Northern Grapes Project. National viticulture extension leadership conference, Lodi, CA.
- Martinson, T.** April 21, 2015. How growers adopt practices: Examples from 15 years of grape extension. Plant Pathology and Plant Microbe Biology Seminar, Geneva, NY.
- Martinson, T.** June 1 and June 3, 2015. Frontenac and Marquette training trials. Illinois Grape Growers and Vintners Association business development seminars. Carbondale and Joliet, IL.
- Martinson, T.** June 1 and June 3, 2015. How to achieve economically sustainable vineyards with quality fruit. Illinois Grape Growers and Vintners Association business development seminars. Carbondale and Joliet, IL.
- McCole, D.** January 29, 2015. Wine tourism and tasting rooms. Illinois Grape Growers and Vintners Association Annual Meeting, Springfield, IL. Presentation delivered by WebEx.
- McManus, P. S.** January 25, 2015. Disease management for beginning grape growers. Wisconsin Fresh Fruit and Vegetable Conference.
- McManus, P.S.** February 7, 2015. Sensitivity of northern grape varieties to copper, sulfur, and difenoconazole. Minnesota Grape Growers Association Cold Climate Grape Conference, Minneapolis, MN.
- McManus, P.S. and D. Schreiner.** July 29, 2015. Northern Grapes Project research update. West Madison Agricultural Research Station Vineyard Walk. Madison, WI.
- McManus, P.** January 29, 2015. Sensitivity of northern grape varieties to copper and sulfur. Illinois Grape Growers and Vintners Association Annual Meeting, Springfield, IL. Presentation delivered by WebEx.
- Nonnecke, G. and D. Cochran.** February 27, 2015. Northern Grape Research: Update and Future Plans. Iowa Wine Growers Association, Cedar Rapids, Iowa.
- Olson, B., H. Hatterman-Valenti, and C. Auwarter.** 2015. Frontenac response to training systems and leaf removal. Amer. Soc. Enol. Vitic. East. Sect. 40th Annual Conference, July 23-25, Dunkirk, NY.
- Olson, B. and H. Hatterman-Valenti.** February 7, 2015. Does the training system and leaf influence Frontenac yield and fruit characteristics? ND Grape and Wine Assoc. Annual Meeting and Conference, Bismarck, ND.
- Particka, C.** January 29, 2015. The Northern Grapes Project. Illinois Grape Growers and Vintners Association Annual Meeting, Springfield, IL.
- Particka, C., E. Stafne, and T. Martinson.** 2015. Valuation of the Northern Grapes Project Webinar Series. HortScience 50(9)S340 (Abstr.). Presented Aug. 6, 2015 at the American Soc. for Horticultural Science Annual Conference, New Orleans.
- Read, P. E. and S. Gamet.** 2015. Can accumulated growing degree days be used to predict harvest timing for hybrid grape cultivars in the Midwest? ASEV Annual Conference, June 18, 2015, Portland, Oregon.
- Read, P. E. and S. J. Gamet.** 2015. Grapevine recovery from herbicide damage. HortScience 50(9)S123 (Abstr.). Presented Aug. 4, 2015 at the American Soc. for Horticultural Science Annual Conference, New Orleans.
- Read, P.** February 13, 2015. Nebraska, the next Napa Valley? Nebraska Home Builders Association.
- Read, P.** April 25, 2015. Nebraska, the next Napa Valley? Northeast Nebraska Plant Fair, Norfolk, NE.

- Read, P.** April 27, 2015. Nebraska, the next Napa Valley? Heritage Womens' Club, Lincoln, NE.
- Read, P.** May 27, 2015. Nebraska, the next Napa Valley? Heritage League, Hillcrest Country Club, Lincoln, NE.
- Read, P.** June 1, 2015. Nebraska, the next Napa Valley? Kiwanis Club, Seward, NE.
- Sabbatini, P.** June 24, 2015. Viticulture in extreme climates. Food East Research and Innovation Forum 2015, Udine, Italy.
- Sabbatini, P.** June 25, 2015. The role of summer canopy manipulation on vine performance and fruit quality. Conference on Recent Achievements in Viticulture for the Production of High Quality Wines, Jermann Winery Conference Center, Trussio, Italy.
- Sabbatini, P.** February 16, 2015. Impact of canopy management, crop load and vine balance on fruit quality in red wine grapes. Proceedings of the Ohio Grape and Wine Conference, Dublin, Ohio.
- Sabbatini, P.** January 13, 2015. Growing super-hardy cultivars in Michigan: impact of vineyard management on fruit quality. VINCO Conference and Tradeshow, Grand Junction, Colorado.
- Sabbatini, P.** January 25, 2015. Pruning, training and vine balance. Wisconsin Fresh Fruit and Vegetable Conference, Wisconsin Dells, Wisconsin.
- Sabbatini, P.** January 26, 2015. Hybrids research. Wisconsin Fresh Fruit and Vegetable Conference, Wisconsin Dells, Wisconsin.
- Sabbatini, P.** March 18, 2015. Optimal training systems, cropping levels and canopy management for Marquette, Frontenac and La Crescent. Eastern Winery Exposition, Lancaster County Convention Center, Lancaster, Pennsylvania.
- Stenger, J. and H. Hatterman-Valenti.** 2015. Evaluation of weed control options during vineyard establishment in North Dakota. Amer. Soc. Enol. Vitic. East. Sect. 40th Annual Conference, July 23-25, Dunkirk, NY.
- Stenger, J. and H. Hatterman-Valenti.** 2015. Environmental stability in the fall acclimation response of cold-hardy interspecific hybrid wine grapes. HortScience 50(9)S342 (Abstr.). Presented Aug. 6, 2015 at the American Soc. for Horticultural Science Annual Conference, New Orleans.
- Teh, S.L.** April 11, 2015. Vines and Wines in the Midwest: Challenges and Opportunities. Anoka and Hennepin County Master Gardener Update presentation.
- Teh, S.L.** April 13, 2015. Grape Breeding at the University of Minnesota. Lecture to Hort/Agro 4401 Plant Breeding and Genetics class at University of Minnesota.
- Teh, S.L.** January 18, 2015. Genetics of powdery mildew resistance in UMN grape breeding populations. University of Minnesota Research Update, Chaska, Minnesota.
- Teh, S.L., M.D. Clark, P. Hemstad, J.F. Ramirez, Q. Sun, L. Cadle-Davidson, A.D. Hegeman, J.J. Luby.** 2015. QTL Identification in an Interspecific Grapevine Cross Segregating for Resistance to Powdery Mildew, Downy Mildew, Black Rot, and Phylloxera. Plant and Animal Genome XXIII Conference. Abstract P0887.
- Tesdall, G., D. R. Cochran, and G. R. Nonnecke.** August 10, 2015. Northern Grape Research: Canopy and Crop Management. Iowa Fruit and Vegetable Growers Association Field Day. Horticulture Research Farm, Ames, IA.

## Popular Press and Radio

The *Northern Grapes Project* was featured in several popular press articles, with articles written by team members as well as journalists.

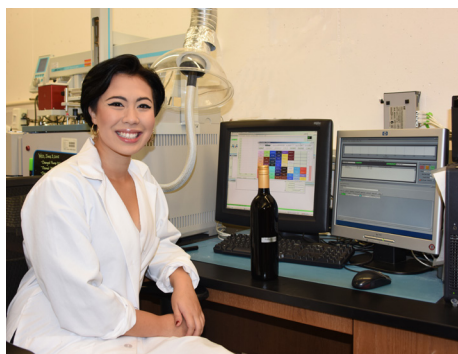


photo: Barb McBreen

*Nanticha Lutt, undergraduate student at UC-Berkeley, spent the summer in Dr. Jacek Koziel's lab at Iowa State University as a George Washington Carver Intern studying wine aroma.*

**Burrows, R.** 2014. Fall Soil Testing for Vineyards. Dakota Farm Talk Radio, October 30, 2014.

**Burrows, R.** 2014. Starting a Commercial Vineyard in SD. Dakota Farm Talk Radio, December 14, 2014.

**Burrows, R.** 2014. Grape Production. <http://igrow.org/gardens/gardening/grape-production/>

**Burrows, R., T. Eschenbaum, C. Logan, and S. Blachford.** 2014. Wine & Grapes. <http://igrow.org/community-development/local-foods/wine-grapes/#sthash.umE8thaJ.dpuf>

**Burrows, R.** Black Rot & Downy Mildew. 2015. <http://igrow.org/gardens/gardening/black-rot-downy-mildew-two-diseases-that-can-rot-grapes/>

**Donnelly, S.** 2 Apr 2015. Workshops slated for grape growers, vintners. Post Star Newspaper. [http://poststar.com/news/local/workshops-slated-for-grape-growers-vintners/article\\_f69943d5-5835-505c-a3fe-e3943fe98e8e.html](http://poststar.com/news/local/workshops-slated-for-grape-growers-vintners/article_f69943d5-5835-505c-a3fe-e3943fe98e8e.html)

**McBreen, B., and N. Lutt.** August 17, 2015. George Washington Carver Intern Studies Wine Aroma (video). Iowa State University, College of Agriculture and Life

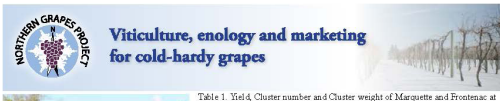
Sciences. <https://www.cals.iastate.edu/features/2015/george-washington-carver-intern-studies-wine-aroma>



- Sabbatini, P. and G.S. Howell.** 2014. Winter damage. The challenge to winegrowing in the Great Lakes and northern temperate zone. *Wines and Vines*. October: 74-79
- Sagasar, S. and H. Hatterman-Valenti.** 2015. ND Today TV program and discussed the grape and wine industry in North Dakota.
- Tubia, L.** June 2015. Effective management of northern grape diseases. *Wine and Craft Beverage News*. <http://wineandcraftbeveragenews.com/effective-management-of-northern-grape-diseases/>

## Other Publications

Members of the *Northern Grapes Project* published stand-alone extension publications as well as articles in referred journals, and trade magazines, and e-publications on various websites.



**Viticulture, enology and marketing for cold-hardy grapes**

Table 1. Yield, Cluster number and Cluster weight of Marquette and Frontenac at Clayton, NY in 2013 and 2014.

	2014				2013			
	Yield (lb/vine)	Clusters per vine	Cluster WT (g)	No. Missing Vines	Yield (lb/vine)	Clusters per vine	Cluster WT (g)	
Marquette	9.9	47	96	13	13.8	83.5	75	
TWC	7.7	43	81	11	7.4	69.4	48	
Umbrella	***	22	***	4	16.1	101.3	72	
VSP								
Frontenac	1.8	13	63	0	14.8	64.8	104	
TWC	1.1	8	62	0	12.9	57.2	102	
Umbrella	0.4	4	45	0	35.9	64.4	112	
VSP								

Harvest crew (L to R) Mike Collet, Steve Leach, Pete Zagrow, and Bill Wilgus



photo by Tim Martinson

**MARQUETTE AND FRONTENAC PLOTS HARVESTED AT CLAYTON**  
Tim Martinson and Christlyn Particka

**October 9.** We went up to Clayton, NY to harvest our training trials in Marquette and Frontenac. Last year it took a crew of 8 two full days. This year, six of us finished in a little over three hours. Last year's harvest was on September 27.

**Preliminary results (Table 1).** On vines without trunk injury (foliage and fruit green), yields were about 70% of (TWC) or equal (Umbrella) to 2013 yields. We were unable to harvest the VSP treatment, because turkeys harvested the grapes. However, many of the vines (13 of 24, TWC; 11 of 24, Umbrella) had suffered trunk injury and were collapsed.

Clusters were about 20% smaller in the TWC and Umbrella treatments than last year's clusters. The Frontenac, on the other hand, had very few clusters per vine (4 to 13) and low crop weight per vine. However, they didn't suffer trunk injury and vine collapse, as did the Marquette.

Left: Frontenac (f) and Marquette (f) clusters were smaller in 2014. Above: On the Marquette VSP, turkeys harvested the grapes before we could. Lower: Representative clusters from Big Wine Chardon (f) and the Blue VSP clusters (f) that the turkeys didn't get

photo by Tim Martinson

Page 3

- [Harvested at Clayton.](#) Veraison to Harvest. 8: 3.
- Martinson, T. and C. Particka.** 2014. [More on Marquette: Shaded versus Exposed Clusters on the Same Vine.](#) Veraison to Harvest. 9: 7.
- McGinnis, E., S. Sagasar, and H. Hatterman-Valenti.** 2015. Growing Grapes in North Dakota: A Guide for Home Gardeners and Hobby Growers. NDSU Extension Service Bull. H1761, North Dakota State University, Fargo, ND.
- Nonnecke, G. P. Domoto, D. Cochran and P. Tabor.** 2015. NE-1020 cold-hardy wine grape trial. Iowa State Univ. ISRF14-36:39-41. <http://farms.ag.iastate.edu/sites/default/files/NE1020ColdHardy.pdf>
- Particka, C. and T. Martinson.** 2014. [Marquette and Frontenac Fruit Composition at Clayton.](#) Veraison to Harvest. 3: 9.
- Particka, C. and T. Martinson.** 2014. [Marquette and Frontenac Fruit Composition at Clayton.](#) Veraison to Harvest. 4: 8.

## Other Newsletters, Blogs, Listserves, and Websites Associated with the *Northern Grapes Project*

Members of the *Northern Grapes Project* maintain a variety of web resources that are used to assist in distributing outreach products created by the project.

- Bradshaw, T. (Moderator).** VT Grapes listserv. Communications venue for IPM and horticultural information for commercial grape growers. 250 subscribers.
- Bradshaw, T.L.** UVM Fruit Blog, Grape IPM. 8 unique postings. <http://blog.uvm.edu/fruit/category/grape/>. No. of recipients per issue: 250. Total contacts: 2,000
- Burrows, R. (Moderator).** SD Grapes listserv. Communications venue for news & events, discussions among growers. 104 subscribers.

**Cochran, D.R.** (contact). Iowa State University Viticulture Home Page <http://viticulture.hort.iastate.edu/home.html>. Includes a link to the Northern Grapes Project website. Under “ISU Research”, a description of the ISU horticulture department’s research activity in the Northern Grapes Project with progress reports on the canopy management practices study, and the NE-1020 cold-hardy grape cultivar study.

**Hatteran-Valenti, H.** (Moderator). NDSU Grapes listserv. Communications venue for news & events, discussions among growers. 200 subscribers.

**Martinson, T. and C. Particka.** Northern New York Grape Management Update blog. 24 posts made during Year 4, targeted at addressing weather and production issues, and went out to a mailing list of 198 growers in northern New York. <http://blogs.cornell.edu/nnygrapeupdate>

**O’Connell, J. and Wallis, A.** CCE ENYCHP Grape Newsletter. 7 issues. No. of recipient per issue: 318.

**Read, P.** (editor) Nebraska VineLines electronic newsletter. Six issues. Audience: 425.

**Wallis, A. and Vohnoutkha.** (Moderators). ENYCHP Grapes listserv. Email list for enrollees of the Eastern NY Commercial Horticulture Program for Grapes, providing information on programs & events, newsletters, etc. 318 subscribers.

**Wallis, A. and Martinson, T.** (Moderators). CCE Cold Country Viticulture listserv. Email list for cold climate grape industry members (grape growers and winemakers) to share and discuss questions, news, and events. 142 subscribers.

## Northern Grapes Project Thanks Our Partnering Industry Associations

Connecticut Vineyard and Winery Association  
Connecticut Farm Wine Development Council  
Illinois Grape Growers and Vintners Association  
Iowa Wine Growers Association  
Lake Champlain Wines  
Massachusetts Farm Wineries and Growers Association  
Michigan Grape and Wine Industry Council  
Minnesota Farm Winery Association  
Minnesota Grape Growers Association  
Nebraska Winery and Grape Growers Association  
New Hampshire Winery Association  
New York Wine and Grape Foundation

North Dakota Grape and Wine Association  
Northern Illinois Wine Growers  
Northern New York Wine Grape Growers Association  
Pennsylvania Winery Association  
Scenic Rivers Grape and Wine Association  
South Dakota Specialty Producers Association  
South Dakota Winegrowers Association  
Upper Hudson Valley Wine and Grape Association  
Vermont Grape and Wine Council  
Western Iowa Grape Growers Association  
Wisconsin Grape Growers Association



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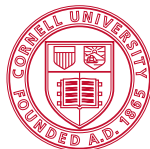
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