



Northern Grapes News

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Insights from the Northern Grapes Project Baseline Survey

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New plantings of cold hardy grapes, and thus, the amount of wine made from them, continues to increase substantially across the Midwest to the east coast. As part of the *Northern Grapes Project*, a baseline study of the industry was completed in 2012 by a team at the University of Minnesota. A total of 600+ responses, representing 21% of the vineyard and winery owners contacted across 12 states, were received. This survey was conducted to allow us to estimate the current economic impact of this emerging, (but rapidly growing), industry, so that comparisons can be made in 2016 when the *Northern Grapes Project* is slated to be completed. All indications at this point are that growth in both vineyards (although slowing a bit from previous years) and wineries will continue to increase.

Economic Impact. Results revealed that total wine grape growing (including cold-tender grapes) in these states amounted to \$81 million in total economic impact. The portion of economic impact due to cold hardy grapes was 43% of the total, or \$34.8 million (Table 1). Economic impact was determined by estimating total expenditures by those directly involved in growing wine grapes on their land and the resulting indirect expenditures resulting from vineyard spending (e.g. wages to manufacturing laborers who made the machine a vineyard purchased). Economic impact for wineries was calculated in the same manner. Total economic impact from farm winery operations in the 12 states amounted to \$421.4 million with 39%, or \$194.5 million, coming from the production of wine made from cold hardy grapes (Table 2).

In addition, wineries are tourist attractions. Using very conservative estimates, the economic impact from tourists visiting winery operations was valued at \$219.9 million with 55%, or \$113.3 million, attributed to cold hardy grapes (Table 3). However, this is a very low number as it does not include any expenditures from tourists who visit tasting rooms or travel, outside of a group, to visit a winery. Michigan State University is finishing research on tasting room visitors that will allow us to estimate the percentage of customers who visit wineries that are also consid-

Table 1 Economic Impact of Vineyards			
	Output	# of Employees	Labor Income
Direct - All grapes	\$45,500,000	4,000	\$12,400,000
Total - All grapes	\$81,000,000	6,800	\$24,500,000
Total - Cold hardy grapes	\$34,800,000	4,000	\$10,100,000

Table 2 Economic Impact of Wineries			
	Output	# of Employees	Labor Income
Direct - All grapes	\$243,800,000	5,800	\$56,000,000
Total - All grapes	\$421,400,000	9,900	\$145,700,000
Total - Cold hardy grapes	\$194,500,000	4,960	\$68,400,000

Table 3 Economic Impact of Winery Visitors			
	Output	# of Employees	Labor Income
Direct - All grapes	\$106,000,000	1,700	\$39,600,000
Total - All grapes	\$219,900,000	2,500	\$68,000,000
Total - Cold hardy grapes	\$113,300,000	1,300	\$35,300,000

ered tourists. When these figures are available we will revise the economic impact of tourism attributed to wineries. This number will become even larger, indicating the tourism importance of wineries to local communities.

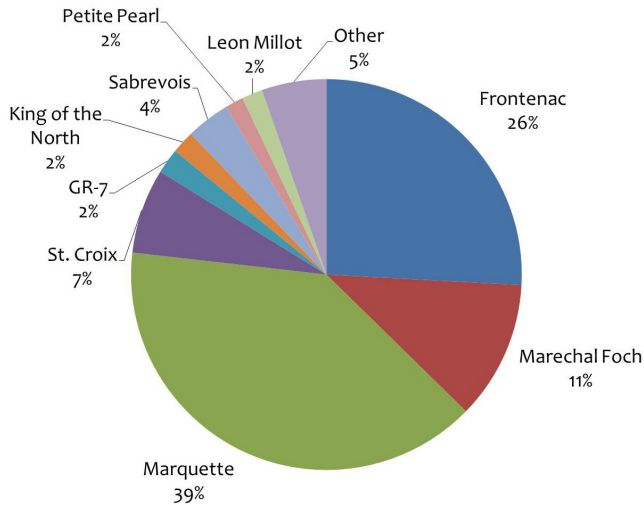


Figure 1. Total reported planted vines, red cultivars.

Cultivar popularity. One of the issues limiting vineyard and winery growth in the past was the lack of cold hardy cultivars that are suitable for winemaking. However, that is changing. Winemakers are mastering the enological challenges of cold hardy grapes and more cultivars are being introduced, such as Marquette. Marquette’s popularity is such that it now accounts for 39% of the cold hardy red-fruited grapes in the ground (Fig. 1).

White grapes are more evenly distributed in terms of grower preference; there is no clear-cut favorite (Fig. 2). Frontenac gris and La Crescent have been popular with growers since their introduction to the market, but recently, there has been increased interest in Brianna, which is the most popular white grape planted in the last four years.

Continued growth expected. When considering the young age of many of the vineyards, it becomes clear that there will be much more production entering the market in the near future. Of vines in the ground, approximately 45% percent are four years or younger. As it takes three to four years for grapevines to mature and reach full production, substantially increased yields can be expected from vineyards in the next few years. There does appear to be sufficient capacity in the winery sector to absorb this increased production, as new wineries emerge on a regular basis and our research indicates that many current winery owners intend to substantially increase production in the future. However, as mentioned above, survey results also indicate that vineyard growth is slowing, which could lead to grape shortages in the future if the rate of winery growth continues along its present path.

While the development of cold hardy cultivars has allowed the wine industry in the Midwest and northeast to grow,

significant challenges still remain. Vineyard owners and managers indicated that diseases and pests were the main obstacle, followed by cost of labor and government policies. Even though growing grapes requires much less land than traditional row crops and therefore opens the market up to many more potential growers, the challenges to producing a successful crop are just as significant, if not more so, for vineyards. This could be one of the reasons for what appears to be decreasing enthusiasm for significantly expanding grape acreage.

Wine sales. We noticed some interesting trends in wine sales as well. Wineries are selling most (52%) of their wine directly to consumers at the farm winery location. Only 18% ends up in liquor stores and just 14% is sold through a distributor. However, one surprising result reveals what we feel is a missed opportunity: sales to restaurants account for only 1% of the total. With the local food movement gaining increasing popularity, more local wine should be available at area restaurants. The reasons for this lack of connectivity between local restaurants and wineries could be due to policies and regulations that prevent direct sales, but that is not the case in all states. Local food, with local wine, at a local restaurant seems to be an ideal setting for the new cold hardy wines. Getting these wines into restaurants would increase exposure and brand awareness, thereby further driving sales. This is an area where marketing, coupled with image building, would pay big dividends.

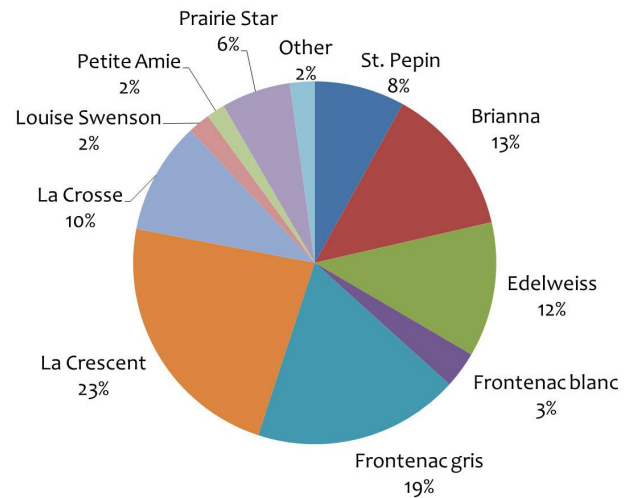


Figure 2. Total reported planted vines, white cultivars.

The Northern Grapes Project continues with new reports expected soon. Studies on policies affecting farm winery operations, tasting room attributes important to visitors, opportunities for collaboration between wineries and the tourism trade, and methods to increase sales at the farm winery are now nearing completion. The economic impact reported in this article, along with other study findings, will be reported shortly on a state by state basis. The main reports on vineyards (<http://northerngrapesproject.org/wp-content/uploads/2013/06/Grapes-Final-Report.pdf>) and wineries (<http://northerngrapesproject.org/wp-content/uploads/2013/06/Winery-Final-Report.pdf>) are available online.

NGP Team Profile: Jim Luby



Jim is a professor in the Department of Horticultural Science at the University of Minnesota, where he directs breeding programs in grapes, apples and other fruit crops. He is the co-director of the Northern Grapes Project and is also a member of the fruit composition and genetics team.

1. How did you develop an interest in plant breeding and horticulture?

My interest in plant breeding came about as a result of my first undergraduate job in college where I worked for an oats breeder. It combined a number of my passions at the time. I thought “Hey, this is cool! You get to work in agriculture, work with plants, apply an interest in genetics. And you get to work outside!” This first job led to another in the DeKalb wheat breeding program and then a PhD in oats breeding at the University of Minnesota. During those several years of working with cereals, I acquired an allergic and asthmatic response to grain dust so when it came time to look for a job at the end of graduate school I applied for a number of horticultural breeding positions – peppers, onions, and the job I eventually took in fruit breeding.

2. When you were hired as the fruit breeder at the University of Minnesota, for which crops were there established breeding programs? Have you continued working with all of these crops?

When I first started there were breeding programs in apple, blueberry, raspberry and strawberry, as well as a grape breeding effort that had just been started by Pat Pierquet (who is now at Ohio State University) and Elmer Swenson, who had been a field plot technician at UMN in the 1970s. A lobbying effort by the Minnesota Grape Growers Association in 1984 resulted in a legislative appropriation specifically for grape breeding which allowed us to greatly expand our grape breeding effort by hiring Peter Hemstad. Another appropriation in 1997 allowed us to build a research winery and hire enologists and winemakers. Large cuts in state investment in the fruit breeding program in the 2000s resulted in greater reliance on royalty and grant funding and caused us to focus primarily on grapes and apples with much lesser efforts in other crops.

3. You have two scientists, Peter Hemstad (grapes) and David Bedford (apples) working with you in the breeding programs. Can you describe the roles each of you play?

I am fortunate to have two very experienced colleagues in Peter Hemstad and David Bedford with 28 and 33 years of experience, respectively, in our program. In the early years, I was more involved in the day-to-day evaluations of seedlings and selections and management of the vineyards and orchards. As my position at the University has changed over the years to involve more teaching, more graduate student advising, more grant administration, and other duties, I have been less involved in the day-to-day management of the breeding programs. Meanwhile, Peter and David have become very experienced with the breeding material and have taken over more of the routine management of the breeding program. Recently, I have also become more involved in trying to move both our grape

and apple breeding programs into DNA-marker informed breeding through our participation in the USDA-SCRI funded *VitisGen* and *RosBREED* projects. Peter, David and I also work very closely on variety commercialization issues with our colleagues in the University of Minnesota Office of Technology Commercialization.

4. You're also involved in the *VitisGen* SCRI Project. How do you see outputs from the Northern Grapes Project and *VitisGen* benefitting each other and the cold-climate grape industry?

The *VitisGen* project is moving us towards DNA-informed breeding of grapes for fruit quality, disease resistance, cold hardiness and dormancy – all traits that have high priority for us in breeding for northern climates. In particular, the *Northern Grapes* team studying fruit composition should be able to feed some complementary information to allow us to develop markers for fruit quality traits such as acidity, anthocyanins, aromatics and phenolics.

5. In your opinion, what is the most exciting research-based information that will come out of the Northern Grapes Project?

The most exciting aspect of the *Northern Grapes Project* is that it examines the whole system needed to consistently produce and deliver a high quality product and consumer experience. The wine region won't be successful because of great winemakers alone. Nor because of great growers. Nor because of great marketers. Nor because of great research and extension efforts. We need to be excellent in all of these areas. The *Northern Grapes Project* is exciting because it draws together growers, winemakers, researchers and extension specialists from across the cold climate region and from many different backgrounds and disciplines so that we can do more collectively than we could ever do in isolation to develop a successful cold climate grape and wine industry.

NGP Team Profile: Peter Hemstad



Peter has been the grape breeder at the University of Minnesota since 1985 and was very involved in the development of 'Frontenac', 'Frontenac gris', 'La Crescent' and 'Marquette', which are now the foundation of the northern grape industry. Peter is also co-owner of Saint Croix Vineyards, which was established in 1992 and has won numerous awards for its wines produced from cold hardy grapes.

1. You're a co-owner of Saint Croix Vineyards in Stillwater, MN. How has owning a vineyard and winery influenced your job as a grape breeder?

Co-owning a winery and working there on nights and weekends has actually been a significant benefit to my 'day job' at the U of M. It gives me a much better appreciation of the realities of our industry and what the real needs are. I pour wine on a regular basis to customers in our tasting room, who usually have no idea that I'm either a scientist or a winery owner. Their comments on the wines really help give me a better understanding of what Midwestern consumers actually want. And when we are thinking of introducing a new grape I always ask myself, "Is this something that I would consider planting in my own commercial vineyard?" That seems to be the bottom line to me.

2. You earned your MS degree from Cornell University, working with Dr. Bruce Reisch, who breeds grapes. How did you find your way to Cornell and Bruce's program?

I learned a lot about viticulture from my time working with Bruce Reisch at Cornell in the early 1980s, but my interest in horticulture started long before that. I can only assume that one of the things I have in common with many of the other people involved with the *Northern Grapes Project* is that I was a pretty geeky kid! In my case, I grew up fascinated by plants which probably started with helping my parents and grandparents with their gardens. But I was also very interested in wild species of plants. I actually saw myself becoming a botanist studying endangered species in the Amazon until fate intervened.

I had applied to the Cornell botany department and everything was all arranged for me to interview with an esteemed botany professor who was an expert in plant taxonomy. I flew to Ithaca and showed up at the designated time for my interview with the professor. When I asked the department secretary if he was in, her expression changed and she was quiet for a moment. Then she said, "He died last week and his funeral is tomorrow!" I met with the department head and he said that since he had died so suddenly they had no idea when they would be replacing him and weren't even sure that they would replace him with another taxonomist.

So, I went back to my hotel room and took another look at the Cornell catalog of courses. I came across the 'Pomology and Viticulture' Department and decided to talk to them. It turned out they had a fellowship opening up and thought I might qualify. Suddenly my interest in fruit grew tremendously! That's how I ended up in that department. Once I did, I tagged along with several of the fruit breeding professors to help decide which crop to do my research on. I was really impressed when I tasted through the grape collection at Geneva. There were over a thousand different

varieties and I was amazed by all the different shapes, sizes, colors and flavors of grapes. The more I thought about it the more I realized that this was the crop for me! I have never regretted that decision.

3. What do you enjoy most about being a grape breeder?

One of the main things I really enjoy about being a grape breeder is playing a role in helping to develop a whole new industry. It is very satisfying for me to see our U of M varieties being grown throughout the northern tier of states and on into Canada, not to mention Germany or China. Hopefully some of these varieties will be grown for many years into the future.

I also enjoy the difficult challenge of trying to develop worthwhile new grape varieties. It isn't easy. First there is the thought process that goes into developing a successful grape breeding strategy. After that, it is quite challenging to taste hundreds of seedlings in a day and to try to determine which of them have the chemistry and flavor profile necessary to make a high quality wine. And then, of course, it is very interesting to taste the resulting wines from these selections. The last challenge is to consider all the various strengths and weaknesses of our selections and try to get the big picture and make an overall determination of which ones should actually be named. I take that very seriously.

4. What qualities do you hope the next wine grape released from the University of Minnesota breeding program will possess?

Well, I hope it will be commercially successful and either an improvement on the existing varieties or perhaps fill a niche that we don't currently have a good variety for. For example, a good cold hardy white that has what it takes to make a high quality dry white wine. That seems to be the biggest need currently on the part of our industry. We have some promising selections in that category and we also have some

nice tannic reds and delicious muscats coming along as well. We even have a few table grapes and rootstocks that we are working on.

5. In your opinion, what is the most exciting research-based information that will come out of the *Northern Grapes Project*?

The *Northern Grapes Project* is a very exciting project and the most beneficial aspect of it to me is that we have so many researchers from a large number of states all working together to raise the bar on the state of the art for cold hardy viticulture and enology. This should really benefit our new industry in many very practical ways and I'm happy to be a part of it.

The Disease Management Puzzle: Putting the Pieces Together

Dean Volenberg, University of Wisconsin Extension - Door County

Good disease management is among the most important tasks for a grape grower. With five or six major diseases (powdery mildew, downy mildew, black rot, phomopsis, anthracnose, and sometimes botrytis), it can seem like a complicated puzzle. But a few unifying principles can simplify the task, and help you successfully achieve your goal: clean, disease-free fruit and healthy foliage.

Types of fungicides. Many people first think of spray programs and pesticides when it comes to disease management. There are a number of fungicides registered for use in vineyards, but your goal should not be to learn everything about each one. This information can come from a number of spray guides that are published annually for different regions of the US. Instead, become aware of how the fungicides are classified. They can be grouped into two major classes based on how they protect the plant from infection. Systemic fungicides are those that are absorbed or taken up by the plant. All systemic fungicides are not the same and are further classified based on how they move in the plant. The other class of

Both systemic and contact fungicides are affected by plant growth. Systemic fungicides are prone to dilution by grapevine growth, as during the spray interval, the vine grows new shoots, leaves, tendrils, or floral parts, and berry size may increase. Some types of systemic fungicides will move into the new tissue, resulting in an overall dilution of the fungicide in the plant. In the case of contact fungicides, tissue that emerged after the application was made will not be protected. However, contact fungicides can be redistributed and diluted on grape tissue surfaces by dew, rainfall, or overhead irrigation. This redistribution is limited and will not compensate for poor spray coverage nor will it adequately protect newly-emerged tissue. As the number of days between sprays increases, systemic fungicides are further diluted and more and more new tissue is left unprotected by contact fungicides.

Weather and phenology. In integrated pest management, it is often said that you have to know your enemy; in terms of grape pathogens, this is particularly important. For each of the fungi that attack grapes, there are specific circumstances that favor infection of the plant (Table 1). The weather conditions and developmental stage of the plant (phenology) both come into play. For example, powdery mildew is the only one of the six major fungal pathogens which does not require free water for infection and can infect fruit only until four to five weeks after bloom, whereas botrytis does require free water and can infect fruit the entire growing season. A weather station located in the vineyard provides real-time environmental data, which can be coupled with grape disease predictive software models to help determine if an infection period occurred for a specific fungal pathogen.



photos: Dean Volenberg, Univ. of Wisconsin

Downy mildew infection on underside of leaves (left) and immature fruit (right). Grape berries are nearly resistant to infection by downy mildew by approximately four weeks after bloom, but it's important to apply fungicides from immediately before bloom through a few weeks after bloom to prevent infection.

fungicides is contact fungicides, which adhere to plant surfaces. The important thing to remember about all fungicides is that their efficacy can be affected by a number of different factors.

Ontogenic resistance. Grape berries become more resistant to infection by some fungal pathogens as they age, a phenomenon called ontogenic resistance. Flowers and very small berries are quite susceptible to powdery mildew, downy mildew and black rot. Older berries are more resistant. The critical period for protecting the fruit from these

three pathogens is from immediate pre-bloom to four weeks post bloom. If a grower does everything right during the critical period, managing these pathogens will be relatively easy, but if sprays are missed, it can be very difficult to recover. It's also important to remember that the critical period for protecting the crop from pathogens can be prolonged by spring frost events, as they often result in a mix of both primary and secondary buds producing flower clusters. In such instances, the flowering period becomes extended and the onset of ontogenic resistance in the berries will be delayed. Therefore, the crop will need to be adequately protected with fungicides over a longer-than-normal period.

Cultural practices. There are also many cultural practices that can make disease management easier. For example, as most grape fungal pathogens need water for infection to occur, reducing the duration of leaf wetness periods can help control fungal disease. In designing vineyards, select sites that have good air flow and orient rows north south if possible, as this promotes the most rapid drying of the canopy due to maximized sun exposure. Canopy management practices such as shoot thinning, hedging, and leaf pulling can all result in increased air flow and sun exposure leading to faster grape tissue drying. Leaf pulling also allows more thorough spray coverage during application of fungicides.

Table 1
The Six Major Grape Fungal Pathogens

Pathogen	Water needed for infection	Berry disease threat period	Foliar disease threat period	Overwintering locations
Anthracnose	Yes	Pre-bloom to veraison	1-5" shoots to harvest	Infected canes
Black rot	Yes	Pre-bloom to 3-4 weeks post-bloom	1-5" shoots to veraison	Canes, spurs, & mummy berries
Botrytis	Yes	Immediate pre-bloom to harvest	Bloom to harvest	Canes & mummy berries
Downy mildew	Yes	Early bloom to 4-5 weeks post-bloom	8-12" shoots to post harvest	Leaf debris & upper layer of soil
Powdery mildew	No	Immediate pre-bloom to 4-5 weeks post-bloom	1-5" shoots to harvest	Fungal fruiting bodies in bark crevices
Phomopsis	Yes	Immediate pre-bloom to bloom	1-5" shoots to harvest	Infected canes and rachises

Table 2
Relative Disease Susceptibility of Selected Cold-Hardy Grape Cultivars¹

Cultivar	Black rot	Downy mildew	Powdery mildew	Botrytis	Phomopsis	Anthracnose
Frontenac	+++	+	++	++	+	+
Frontenac Gris	++	+	++	++	+	+
La Crescent	++	+++	++	+	+++	+
La Crosse	+++	++	++	+++	++	+
Leon Millot	+	++	+++	+	+	+
Marechal Foch	++	+	++	+	+	++
Marquette	+++	+	+	+++	?	?
St. Croix	?	++	++	++	+++	+

Key to ratings: + = slightly susceptible; ++ = moderately susceptible; +++ = highly susceptible; ? = susceptibility not established
¹ Information adopted from the *2013 Midwest Small Fruit and Grape Spray Guide*.

Scouting. Scouting the vineyard is very important and should be done, at a minimum, on a weekly basis. It is important to familiarize yourself with the common grape pathogens and their symptoms. Scouting early in the season is fairly straight forward since there is very little green tissue, but as the season progresses, be prepared to spend more time scouting. Later in the season, monitor leaves within the canopy and examine fruit clusters. As you “learn” your vineyard, you will likely identify areas where some pathogens appear first, such as a shaded area or a spot with reduced air flow. These areas are noteworthy and you should keep good records that include exactly where you scouted and what you found. This information will be vital, especially if you have to apply a rescue fungicide treatment. The records will allow you to perform follow-up scouting in the same area and determine if the pathogen problem was controlled.



photo: Wayne Wilcox, Cornell Univ.
Black rot lesions on Vignoles canes.

Sanitation. Proper sanitation in the vineyard can help reduce fungal inoculum. Dormant pruning and the removal of pruning debris reduces fungal overwintering structures. Remember, many grape fungal pathogens do not overwinter inside the plant, but rather need to reinfect each season. Therefore, removing mummy berries and cane wood from the vineyard reduces black rot and powdery mildew inoculum, respectively.

Genetic resistance. Some cold-climate cultivars are highly susceptible to some pathogens, whereas others are virtually resistant to these same pathogens (Table 2). For example, La

Crescent is highly susceptible to downy mildew, but Frontenac is resistant. This information can be found in most regional spray guides and can be used in planning your disease management program.

Once you understand how the biology of the pathogen, the environment, ontogenic resistance, and vineyard management practices interact, a disease management strategy emerges. Your disease management program should always focus in on the period of immediate pre-bloom to four weeks after bloom, as this is the period when the fruit is highly susceptible to many of the common fungal pathogens. Remember, however, that fruit becomes resistant to some of the common grape fungal pathogens by four weeks post-bloom, but the berries and other tissue remain susceptible to others throughout the growing season. But with diligent scouting and understanding of how environmental conditions affect fungal pathogens, you will be able to adequately protect your crop. Take the time to understand the role each piece of the disease management puzzle and you will end up with quality fruit.

Selected References on Grape Fungal Pathogens

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Development of new Cold-Hardy Grape Cultivars at the University of Minnesota

Tim Martinson, Cornell University

Cold-hardy grape varieties have been a topic of research at the University of Minnesota's Horticultural Research Center near Excelsior, MN for over a century. But it wasn't until the late 1970s that the focus shifted in earnest to developing wine grape varieties that would survive the region's low winter temperatures and provide attractive wine quality attributes. Investment in the program has produced Frontenac (1996), La Crescent (2002), Frontenac gris (2003) and Marquette (2006) which are now widely planted throughout the Midwest and cooler portions of the Northeast.

Last June, my colleague Keith Striegler and I had the opportunity to visit with project leader Jim Luby, breeder Peter Hemstad, and enologist Katie Cook to learn more about how the program produces and evaluates new cultivars.



1. Enologist Katie Cook, project leader Jim Luby, and grape breeder Peter Hemstad at the University of Minnesota's Horticultural Research Center west of Minneapolis/St Paul.



3. New cultivars start with crosses between selected parents. Pollen is collected from the male parent and is used to fertilize the female parent. Vines with perfect flowers (both stamens and pistils) have to be emasculated (i.e. stamens removed) to prevent self-pollination. About 20 to 30 crosses are made annually.



2. Our first stop was the block of Chardonnay and Pinot Noir adjacent to the station. It is trained to the 'mini-J' system, which entails a laborious annual burial of dormant vines to enable them to survive -20 to -30°F winter low temperatures.



4. Seeds resulting from crosses are germinated and seedlings planted in a 'no-spray' seedling block. Approximately 3000 to 5000 seedlings are generated annually and only those showing superior disease tolerance are selected. Just 50 to 60% of the seedlings make it to the next stage.



5. Seedlings from the nursery are planted in the 'first test' vineyard block, where they are evaluated for growth habit, disease resistance, and fruit characteristics. Some 3000 to 5000 vines are evaluated annually in these vineyards.



photo: J. Ogrodnik

6. Grapes planted in the 'first test' vineyard are evaluated for several years. They may have female only (left), male only (right) or perfect flowers (center, suitable for commercial, self-pollinating varieties), but one must wait two to three years before vines reach maturity and produce flowers to find out. Vines with only male or female flowers (shown at right with pink flagging) are marked in the field, and are eliminated unless they have a particularly unusual or favorable growth habit or disease resistance.



7. Selections made in the 'first test' vineyard are propagated to make 12-24 vines for the replicated 'second test' vineyard, where enough fruit will be produced for winemaking. There is three-year lag before vines mature and produce fruit. Note the semi-erect growth habit of vines in the foreground and more procumbent vines in the background. Growth habit is evaluated as pruning, training, harvesting, and disease and pest management are easier with more erect vines.



photo: Dave Hansen, Univ. of Minnesota

8. Small-scale winemaking is done by Nick Smith, pictured here, on second test and advanced selections over several years. As selections near release, different winemaking techniques are evaluated by Katie and Nick to provide winemakers with a starting point for exploring a new grape's potential.



9. A variety of other genetic trials, experiments, and grapevine accessions are also maintained in 10 acres of plantings. Grapes collected in the wild, such as this *Vitis aestivalis* accession from southeast Minnesota (top), are a resource for the breeding program. The original 'mother vines' of several UMN releases, such as the original Marquette vine (bottom) are also maintained.

It takes time. Add up a year from cross to seedling, four or more years in the 'first test', three to four years in the 'second test' to first fruit, and several years of fruit and wine evaluations, and you're looking at 15 to 20 years from crossing to release of a new cultivar.

That makes it remarkable that the UMN breeding program has produced three unique and widely-planted varieties in the span of 21 years. Frontenac (18 years from cross to release), La Crescent (14 years), and Marquette (17 years) were produced and evaluated in the shortest possible amount of time.

Varieties available now are just the start from a relatively young breeding program. Each generation of crosses and selections unlocks new, unexploited genetic potential.

Keith and I closed out our visit to the HRC by tasting wines made from three of 21 promising selections currently in the 'second test'. The two whites and one red wine, made by Katie Cook and the staff, were exceptional and unique. One of the two whites had a pronounced muscat aroma. If these selections continue to prove themselves in vineyard and winery, new varieties should be released in the next few years.

Grape breeding is a slow and expensive process, requiring years of sustained effort. Crosses made this year will be the start of new varieties introduced to consumers by wineries 20 years from now. Based on the UMN's track record, it's clear that more great cold-climate varieties are in the pipeline.

The program's success to date has come about through a relatively modest annual investment – which has resulted in 3,000 acres planted across the upper Midwest and Northeast, and well over 200 new wineries. That's a great return on

Chronology of UMN grape crosses and releases

Cultivar	Cross made	Vine selected	Release
Frontenac	1978	1983	1996
La Crescent	1988	1992	2002
Marquette	1989	1994	2006

Note: Frontenac gris is a sport of Frontenac, and therefore not a result of a separate cross.



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



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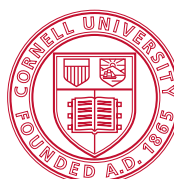
eViticulture.org

eViticulture.org is the national online viticulture resource containing the latest science-based information for viticulturists.

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