



Viticulture, enology and marketing for cold-hardy grapes



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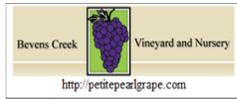
Tim Martinson and Alex Koeberle, Cornell University

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We thank industry donors for their generous support of continued outreach through the *Northern Grapes Project*. Although federal funding through the USDA ended in August, project team members are committed to continuing *Northern Grapes Webinars*, *Northern Grapes News*, and completion of the final project results in an indexed, searchable *Northern Grapes Project* website and *Owner's Manual*.

To date, nine producer associations have donated \$12,500, with individual donations of \$500-\$2000. Four Industry 'Gold Sponsors' (\$500) and one Silver Sponsor (\$250) have donated an additional \$2,250. Thank you so much for your support!

\$20,000 goal for 'gap' funding. These donations have gone a long way towards supporting the cost of providing the outreach described above during 2017. The \$20,000 goal reflects the cost of 25% time commitment (salary and fringe benefits) for a program associate to produce and complete the webinars, newsletters, and permanent website. The project team, led by Paolo Sabbatini of Michigan State, is preparing a new funding proposal to the USDA to continue the Northern Grapes Project.



Thanks to Mike White. We acknowledge the extraordinary effort that Mike White, Iowa State University, has made to contact producer groups and suppliers to solicit donations to this effort. Thank you Mike!

We are still accepting additional donations to reach the \$20,000 goal. If you wish to make a donation, please contact either Mike White (mlwhite@iastate.edu) or Alex Koeberle (alk239@cornell.edu).

Tim Martinson
Program Director

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Lessons Learned: Northern Grapes Baseline and Economic Impact Study

Brigid Tuck, University of Minnesota

One of the goals of the *Northern Grapes Project* is to understand how the economics of the cold-hardy grape industry are changing. To accomplish this goal, University of Minnesota conducted two surveys. The first survey, conducted in 2012 and covering the 2011 season, established an industry baseline. The second survey, conducted in 2016 and covering the 2015 season, provided an opportunity to measure change against the baseline. The two surveys allow the opportunity to compare the industry at two distinct points in time.

The comparison of the 2011 to the 2015 season provides insights into the cold-hardy grape and wine industry. Here are a few of the key observations:

- **Cold-hardy grapes are a significant driver of growth in the vineyard and winery industry.** Results indicate economic output generated by cold-hardy grapes was 34 percent higher in 2015 than 2011. Output from the vineyard and winery industry as a whole, including traditional and cold-hardy grapes, was only 6 percent higher.
- **There are continued signs of an industry moving towards maturity.** Of particular interest is the notable increase in the number of vineyard employees. The survey results show a shift from volunteer to paid labor in vineyards. This could be a reflection of the growing size of vineyards, but also a sign that vineyards are becoming more profitable. Wineries are also showing this trend towards maturity. Wineries are increasingly planting vineyards to grow their own grapes or using contracts with vineyards, showing a strong degree of pre-planning.
- **Total cold-hardy wine production dipped slightly in 2015 as compared to 2011.** This is the result of lower production per winery reported in the 2015 survey. That, in turn, may be the result of the increased number of new wineries which had limited or no production in 2015. Also, the 2014 growing season, which feeds into wine produced in 2015, was a poor growing year in many of the participating states due to a severe winter throughout most of the northern states. Therefore, grape availability may have been a factor. Despite the decline, sales at wineries using cold-hardy grapes were higher in 2015 versus 2011. This may be the result of an increase in the price per bottle sold and an increase in the number of tasting

How Northern Grapes Vineyards and Wineries have Changed from 2011 – 2015

This table shows changes in acreage, expenditures, sales, and employment from surveys conducted in 2012 and 2016 across 12 states in the Midwest and Northeast.

Vineyard:

- Acreage increased from 5900 to 7580 (28%)
- Production increased by 17% (despite arctic vortex)
- Yield 3.5 to 3.2 T/acre (9% decrease)
- Vineyard expenditures \$69M to 92M (34%)
- Labor costs \$19M to 30M (56%)
- Labor costs per vineyard \$5K to 9K
 - Shift from “free” owner-operator labor to paid labor

Winery:

- Tasting room visits/winery 8,000 to 10,500 (31%)
- Cold-hardy grape purchases \$21M to 23M (7%; total grapes purchased rose 26%)
- Total winery sales \$493M to 450M (2% decrease)
- Sales of cold-hardy wines \$150M to 167M (11%)
- Winery employment 5,800 to 8,500 (47%)
- Labor costs winery \$56M to 71M (27%)
 - Shift to part-time annual employment (vs. seasonal)

Economic impact:

- Vineyard economic contribution \$46M to 80M (75%)
- Vineyard employment 5900 to 7800 jobs (32%)
- Winery economic contribution \$215M to 255M (19%)
- Winery employment 5000 to 8400 (68%)
- Winery visitors \$140M to 204M (45%)
- Winery visitor-associated jobs 1500 to 2526 (49%)
- Total economic contribution \$401M to 539M (34%)
- Total employment 12,600 jobs to 18,736 jobs (49%)

(Note: Only those attributed to cold-hardy varieties and wines made from them are reported. Many wineries also source fruit from standard varieties grown elsewhere.)

Sources:

Tuck, B. and W. Gartner. 2014. [Economic Contribution of Vineyards and Wineries of the North](#), Univ. of Minnesota Extension Publication.

Tuck, B. and W. Gartner. 2013. [Vineyards and Grapes of the North](#). Univ. of Minnesota Extension Publication.

Tuck, B. and W. Gartner. 2013. [Wineries of the North](#). Univ. of Minnesota Extension Publication.

New 2016 publications now available online:

The following sources on overall NGP economic impacts are available through [Univ. of Minnesota Extension](#) (Tuck, B. and W. Gartner).

- [Economic Contribution of Vineyards and Wineries of the North, 2015](#)
- [Wineries of the North](#)
- [Vineyards and Grapes of the North](#)

room customers. Wineries also reported an increased sale of inventoried wine in 2015.

- **Tourism remains a critical component of winery success.** Tasting rooms remain the primary source of a winery's sales. The 2015 results show wineries selling a higher percentage of all wine from the tasting room (84 percent) compared to 2011 (73 percent). Wineries selling wines from cold-hardy grapes also tend to be located in rural areas, creating a need to draw customers to the site. The number of tasting room customers per winery was higher in 2015. Con-

tinued financial success likely depends on further tourism development.

- **Tasting room operations are more sophisticated.** The results show an uptick in the percent of wineries charging for tastings and selling food with their wine service. In the early days of the industry, wineries appeared to be more concerned with bringing in customers to taste wines, than with making a large profit off the tasting room. Our latest survey indicates this may be changing.

NGP Team Profile: Brigid Tuck



Brigid Tuck is a Senior Economic Impact Analyst for the Center of Community Vitality. She joined the University of Minnesota Extension in 2008 and has since conducted numerous economic studies of tourism, education, manufacturing, retail, infrastructure, and local food industries across Minnesota. For the Northern Grapes Project, Brigid has led the baseline and close-of-project surveys which will evaluate the economic impact of this project.

1. Tell us how your interest in community economics and agriculture developed.

I grew up, and continue to live on, my family farm. I'm fourth generation, so you could say agriculture is in my blood. Every morning when I left for school, my dad would shout out the door "remember, you can make a difference". When I realized I could make a difference and work with rural communities, I knew I had the career for me!

2. How is the economic impact information you generate used by industry, government and community groups? What does this information enable stakeholders to accomplish?

My work in economic impact has two goals – both focused around education. My work with industries and businesses tends to focus on educating stakeholders and decision-makers on economic value. The hope is the information can be valuable as decisions are made. For example, we did a study looking at the economic impact of a plant closure. The community used the data to apply for, and receive, a grant to help in planning for the closure. My work with communities tends to focus on helping them think about their economic future.

3. Most NGP survey respondents are very small, start-up vineyards and wineries. From your perspective, what has surprised you the most comparing baseline and close-of-project surveys and what are the major economic challenges this young industry will face?

Increasing business sophistication on the behalf of both vineyards and wineries comes through clearly in the data. I have also observed it in Minnesota. I first started working on economics and grapes in 2007. In touring the state to learn more, I visited many small operations

with most of the labor provided by the owner with little expectation of income for their labor. Between the baseline survey (2011) and the close-of-project (2015), the data shows a significant uptick in the amount of hired labor and a decline in the amount of volunteer (owner and family) labor. This trend is also important as it hints that vineyards and wineries have enough gross profit to pay for labor.

Challenges remain around the marketing and continued sale of wines. My colleagues and I were worried early on about a glut of grapes on the market. The rise in the number of wineries helped to absorb the excess grapes. As long as wineries can sell their product, the industry should be successful. However, wineries are still relying primarily on tasting rooms for their sales. The data still shows relatively limited use of liquor stores or distributors for wine sales. One has to wonder if there is a cap, in terms of total demand through tasting rooms. Working together on tourism initiatives may be one way to expand the cap.

4. Other wine industry studies in various states show much higher numbers than the NGP surveys. For example, a 2012 survey estimated a \$401M impact for Iowa alone, while the NGP estimated \$401M across 12 states. Why are the numbers so different?

My philosophy in conducting economic impact studies has always been to take a conservative approach. This aligns with my goals to help communities make decisions.

In this project, it is difficult to make apple-to-apple comparisons, as the scope of these reports are often different. We focus primarily on cold-hardy wine grapes and locally-produced wines. In some of the project states, cold-hardy grapes are only a small portion of total grape production. Some states also have large commercial wineries that import grape juice from other states to produce wine. These wineries were not the focus of our work.

There are two fundamental ways our study methodologies differ. First, some of the other studies appear to engage in double-counting. In economic impact studies, labor is a component of output (thus already included in the output figures). I've seen studies that add labor to output, thus counting it twice. Some studies also count the grape's value of production at both the vineyard and the winery. This is counting that same grape twice.

Second, we follow best practices when measuring tourism impacts. Not all visitors to a winery are "tourists". Some winery visitors are local residents. These visitors are not creating "new" income in the region, as they likely would have spent their dollar in the region, had the winery not been there. They may have seen a movie instead or gone to a brewery. In our study, we counted only non-locals as tourists, which, in some cases, significantly reduced the tourism impact. Further, we used conservative per day, per person expenditures while visiting the winery.

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

I'm sure I should say my own research here! However, I found Miguel Gomez's work around tasting room customer preferences quite interesting. As I mentioned in my response, tasting room sales are critical to winery success. Miguel had some intriguing insights into best practices to sell more wine through the tasting room. I think it also points to how important research into multiple aspects of the industry can be helpful.

Vineyard Practices: Insights from the 2012 and 2016 Northern Grapes Surveys

Tim Martinson, Cornell University

The producer surveys we conducted in 2012 and 2016 had two distinct goals. The first was to measure industry size and economic impact at the start and the end of the *Northern Grapes Project*.

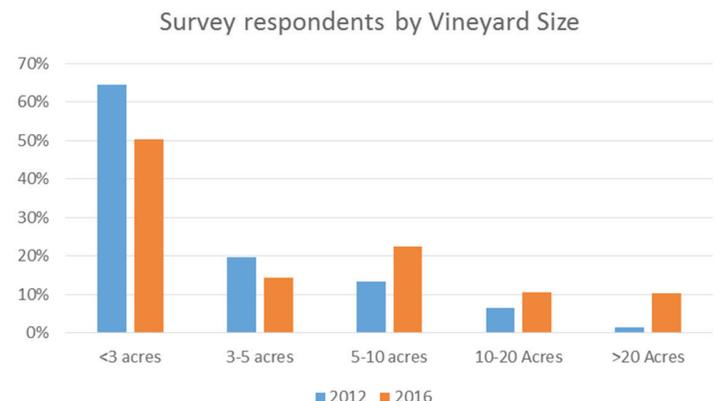
The second goal was to take a detailed look at project impacts. In addition to acreage, production, and wine production, we asked questions about viticultural practices in the following areas:

- Acreage & Planting Intentions
- Training Systems
- Canopy Management
- Cropping Levels
- Fertility Practices
- Insect and Disease Management

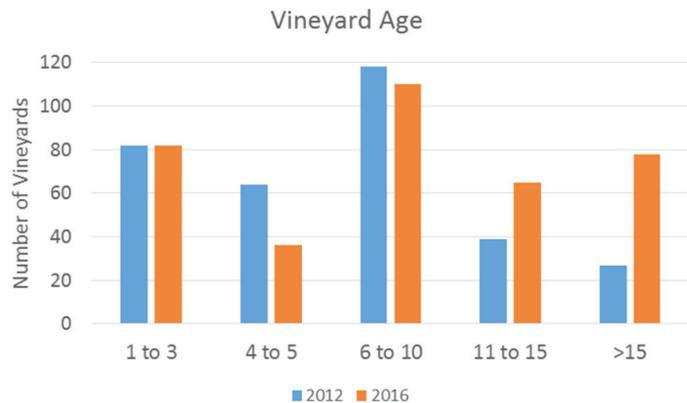
Here are some key observations about the state of vineyards in 2011 and 2015:

- **Vineyard size.** Although small, startup vineyards <3 acres comprised over half of the survey responses, the 2016 survey had more respondents with larger

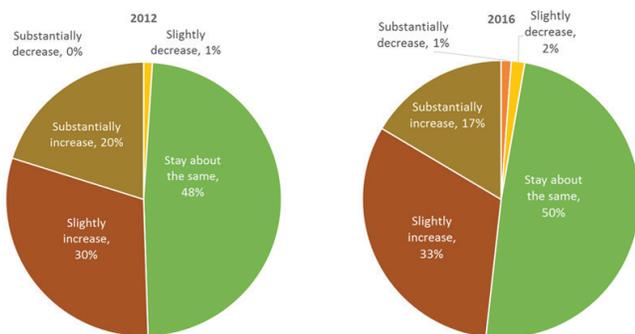
vineyards. The overall average in reported acreage increased from 4.3 acres in 2012 to 12.9 acres in 2016. Although the total number of survey respondents was similar (331 response in 2012; 372 in 2016), we received more responses from larger, established growers (with up to 200 acres in production). The numbers could indicate that vineyards have grown overall, or that interest from larger, established growers increased over the course of the project. Or it could be some combination of the two.



- **Vineyard Age.** In both surveys, about one quarter of respondents had nonbearing vineyards (1-3 years old) and about one-third were 6-10 years old. However, in the 2016 survey, there were about three times more respondents with vineyards 11+ years old.

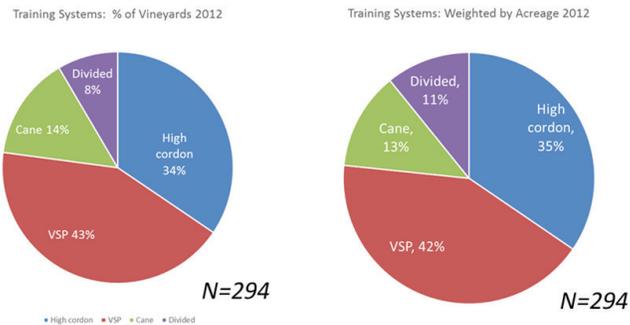


- **Growers reported plans to either stay 'about the same' or increase the size of their vineyard.** Responses in both the 2012 and 2016 surveys were similar: About half reported 'stay the same', about one-third plan a 'slight increase', and about one fifth are planning to 'substantially increase' the size of their vineyard (see chart below).

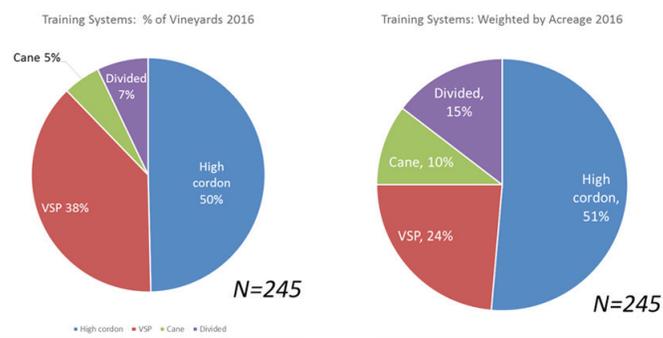


- **Training systems.** Growers are shifting from low and midwire cordon training systems with vertical shoot positioning (VSP) to high cordon and divided canopy training systems. Larger-scale growers with more acreage are more aggressively adopting the high training systems.

In 2012, growers reported 34% of their grapes on high cordon, 43% on VSP, and the remainder on cane-pruned (14%) and divided (8%) canopy systems. These results were the same in 2012 when we adjusted for reported acreage (right).



By 2016, growers reported 50% on high cordon and 38% on VSP (left). However, when we adjusted these percentages by vineyard size (right), the acreage in VSP shrunk to 24% and the amount in cane-pruned and divided canopy systems doubled.

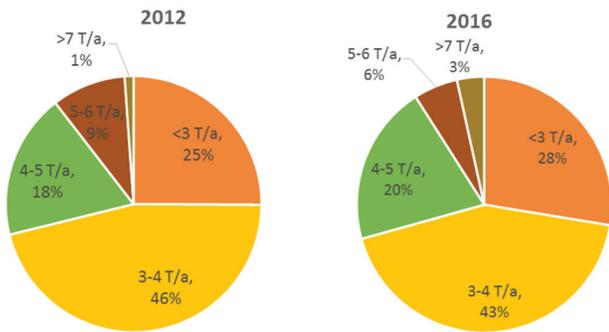


My interpretation of these trends is this: Labor requirements for VSP are dramatically higher than those for high cordon-trained systems. As vineyards expand beyond a few acres, it becomes harder to maintain the amount of labor to successfully implement VSP. In addition, our studies in New York have shown a significant yield advantage for high training systems with the fruiting zone at the top.

- **Yield targets.** Growers need to aim for higher yields. In both 2012 and 2016, one-quarter of the growers reported yield targets of <3 Tons/acre, and an additional 40-45% reported yield targets of 3-4 T/acre. The remaining 25% were targeting yields from 4 to 7 T/acre. Given production costs^{1,2} and small vineyard size, my sense is that production of these varieties under 4 T/acre will not be profitable – even with \$1500/ton grape prices. And I also feel that with proper management and good sites, there's no reason why growers cannot produce 5-6 T/acre consistently.

¹Gómez et al. 2015. [Cost of Est. and Prod. of Cold Hardy Grapes in the Thousand Islands Region of New York - 2015](#). Cornell University.

²Gómez et al. 2016. [Cost of Est. and Prod. of Cold Hardy Grapes in the Chautauqua Region of New York - 2015](#). Cornell University.



• **Canopy Management.** Several questions addressed how many ‘passes’ through the vineyard were made during the growing season. Practices included shoot suckering, shoot thinning, shoot positioning (vertical or downward), skirting or hedging, and cluster zone leaf removal. While responses weren’t tied to specific training systems, we were able to attribute different practices with different training systems.

In 2012, the average number of passes was the same (4.5 vs 4.6) for VSP and high cordon training. The number of passes in 2016 was much lower for the high cordon-trained vineyards (2.6) and decreased modestly for the VSP vineyards (3.8).

Table 1. Number of passes reported for implementing canopy management practices in vineyards trained to High Cordon and mid-wire or low-wire Vertical Shoot Positioned (VSP).

	2012		2016	
	High Cordon	VSP	High Cordon	VSP
N	99	99	105	105
Average	4.5	4.6	2.7	3.8
Maximum Number	15	13	16	18

Note: We used a subset of the responses with >4 acres of vineyards for this table.

There are limitations to these numbers: Particularly in 2012, many vineyards were recently planted, and still in the process of being trained. This may have increased the number of passes compared to a mature, fully established vineyard. The 2016 survey had more respondents with large, established vineyards. In both surveys, those respondents with small vineyards (<4 acres) generally reported many more passes through the vineyard than those with commercial-sized vineyards.

Nonetheless, growers with VSP-trained vineyards reported more passes for canopy management than those with vineyards trained to high cordon.

• **Cropping levels.** Managing cropping levels is thought by some to be the key to grape and wine quality. The surveys asked growers to cite which practices they used to manage cropping levels for quality. Results were similar in the 2012 and 2016 surveys (Table 2).

Dormant pruning to a specific bud number per foot of canopy was cited most frequently (two-thirds of respondents), followed by shoot thinning (45%). Post-bloom cluster thinning (35%) and cluster thinning at veraison (33%) were the next most common practices.

Table 2. Percentage of survey respondents citing different methods of adjusting cropping levels for quality.

Crop Control Methods	2012	2016
Dormant pruning (shoots/ft)	63%	73%
Shoot thinning	46%	45%
Pre-bloom cluster thinning	12%	12%
Post-bloom cluster thinning	35%	37%
Cluster thinning at veraison	26%	33%
Shoot-length based cluster thinning	19%	20%
N responses	297	246

I have mixed feelings about the results. Certainly the first ‘cut’ at managing crop is to get the right number of buds retained. So dormant pruning, followed by post-budburst shoot thinning should be the standard to arrive at the appropriate shoot density (4-6 shoots per foot of canopy). Shoot thinning, if done early enough (<10 in shoot growth) can be conducted rapidly – and is perhaps the most cost-effective way to improve quality.

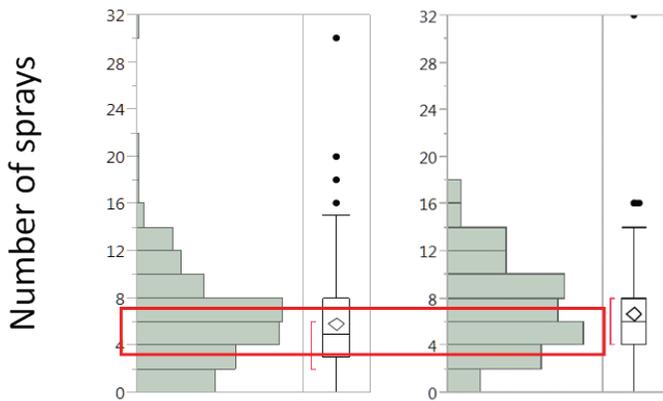
Cluster thinning, on the other hand, is more expensive – and often has only a modest impact on fruit composition at harvest. So for me, it is a practice of ‘last resort’. Cluster thinning at veraison is time consuming, directly reduces yield, and may only measurably result in higher soluble solids (brix). It will not result in lower acids or ‘faster ripening’.

- **Fertility.** Our results in both years showed that many survey respondents can better utilize soil and tissue testing, both pre-plant and in mature vineyards, to provide guidance for applying fertilizers and lime to their vineyards. Notably, 50% (2016) to 70% of respondents didn't know their site's soil pH, and 15% had never tested their soil. About half of respondents (45-55%) had never had tissue tests (eg. petiole tests) in their vineyard as well.

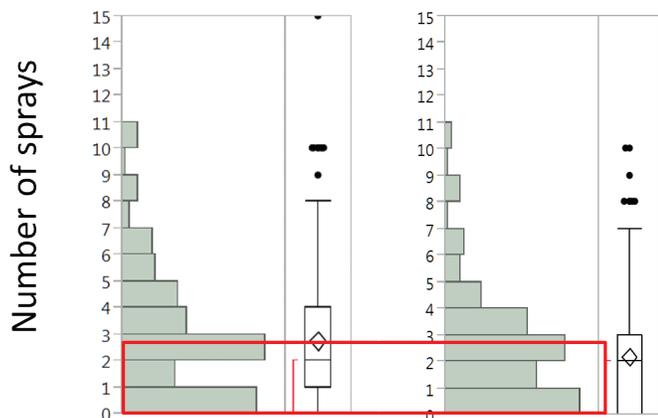
- **Disease and Insect Management.** Survey respondents reported a wide range of responses about the number of fungicide and insecticide sprays applied in their vineyards. Overall, the median number of fungicide sprays (4 to 6) and insecticide sprays (2-3) was on target, but the range of responses was enormous. Fully half of respondents were in the 8-16 fungicide spray category (some reporting up to 32 sprays), and in the 4-11 insecticide spray categories. Growers applying this many sprays are not only wasting money and time, but they are also greatly increasing the risk of pesticide resistance.

I feel that most of the over-application reported is due in part to lack of knowledge about the diseases and insects – when they appear, when critical control ‘windows’ are, and when to ignore them. In particular, several responded that sprays needed to be applied at

How many fungicide sprays do you apply?



How many insecticide sprays do you apply?



‘7-10 day intervals’. While that’s a simple (but costly) program, effective disease and insect management can be accomplished with far fewer sprays.

Summary. Although about 25% of responses in both years represented new (nonbearing) vineyards less than three years old, we had more responses from older established vineyards (>15 years) in the 2016 survey. This probably affected responses to questions about training systems, spray frequency, and fertility practices. Overall, the surveys told us the following:

- **Vineyard size has grown.** Average size grew from 3.4 acres to 12.9 acres.

- **Respondents see further growth ahead.** Half reported maintaining current acreage, and slightly less than half (47%) expect to either slightly increase (33%) or significantly increase (14%) their acreage.

- **Training systems shift from VSP to high cordon and divided canopies.** More growers are reporting high cordon training, and the trend is most pronounced with larger-acreage growers. Labor requirements probably play a role in this.

- **Disease and insect management are still challenging.** There are ample opportunities for growers to adopt more efficient and effective disease and insect management practices.

- **Better use of soil and tissue sampling is possible.** More growers would benefit from soil and tissue sampling to improve fertility management.

- **Labor is the largest expense, and a limiting factor in vineyard size.** Labor availability (both skilled and unskilled) is second only to disease and insect management as a concern. As vineyard size increases, hired labor becomes more important – and vineyard mechanization to reduce labor costs will be needed in the future for profitable production.

- **Growers should aim for higher yields.** Four tons per acre is my benchmark for ‘minimum’ production to approach profitability. Five to six tons/acre on good sites should be attainable in many areas.

Acknowledgements. Thanks from the *Northern Grapes Project* team to everyone who completed this survey (331 in 2012 and 372 in 2016). We recognize that the questions weren't always simple to answer, and some were quite detailed. We truly appreciate the effort and time expended in your responses.

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We would like to thank the following organizations and businesses for their support of the *Northern Grapes Webinar Series*:



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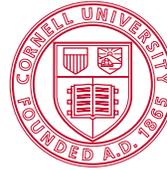


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