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# Economic Contribution of Vineyards and Wineries of the North, 2015

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IN PARTNERSHIP WITH THE NORTHERN GRAPES PROJECT, AN  
USDA, SPECIALTY CROPS RESEARCH INITIATIVE PROGRAM,  
NATIONAL INSTITUTE OF FOOD AND AGRICULTURE



Department of  
**APPLIED  
ECONOMICS**



# Economic Contribution of Vineyards and Wineries of the North, 2015

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## EXECUTIVE SUMMARY: ECONOMIC CONTRIBUTION VINEYARDS AND WINERIES OF THE NORTH, 2015

The Northern Grapes Project assembled researchers from across 12 states to assist the cold-hardy grape and wine industry. The project had four main objectives to address cold-hardy grape varietal performance, viticulture practices, winemaking practices, and the economics of vineyards and wineries.

Under the economics-related objective, University of Minnesota conducted two surveys. In 2012, participating grape growers and wineries were surveyed to gather 2011 operations data.

In 2016, the survey was repeated to collect 2015 operations data. It was sent to grape growers and wineries in January and February of 2016.

The 2016 survey yielded 503 responses and results indicate the following.

- In 2015, wine grape vineyards, locally-sourced wineries, and winery tourists generated an estimated \$1.6 billion of economic activity in the participating states, including \$450.7 million in labor income. The industry also supported 36,000 jobs. In comparison the industry generated an estimated \$1.5 billion in 2011. Overall, economic contribution increased by 6 percent.
- In 2015, the *cold-hardy* wine grape and locally-sourced winery industry generated an estimated \$539.2 million of economic activity in the participating states. Of this, \$190.8 million was labor income. The industry also supported 18,700 jobs. In 2011, cold-hardy grapes generated an estimated \$401.0 million in activity. The cold-hardy grape contribution, while a portion of the overall contribution, rose by 34 percent.
- Wineries are a critical driver of cold-hardy-related economic activity. They generated nearly half of the total economic contribution (\$255.2 million). Winery-related tourism was responsible for an additional 40 percent of activity (\$203.6 million). The contribution from vineyards was smaller (\$80.3 million) yet grew the fastest between 2011 and 2015.
- The overall industry in participating states grew modestly during this time period (6 percent). The cold-hardy industry, a subset of the overall industry, grew more quickly, at 34 percent. The cold-hardy grape sector of the industry continues to show high growth.
- Employment at wineries producing cold-hardy wines and at vineyards growing cold-hardy grapes, increased significantly between 2011 and 2015. This is partially the result of a shift from volunteer labor to paid labor (including that of the owner-operator).
- Winery tourism also increased in the time period. Wineries continue to rely on drawing visitors to their tasting rooms to drive sales.

## NORTHERN GRAPES PROJECT

The Northern Grapes Project is a USDA-funded grant project. The project launched in September 2011. Its vision was “to develop grape production, winemaking, and marketing practices suited to the unique characteristics of *V. riparia*-based (Northern Grape) cultivars marketed through retail tasting rooms and their niche in the US wine market” (Martinson 2016)<sup>1</sup>.

The history of the Northern Grapes Project is tied to the development of cold-hardy grapes. Traditional grape varieties, often associated with California or New York’s Finger Lake region, are not suited to survive the cold winters of harsh northern climates. In the mid-1990s, University of Minnesota, along with other private and public breeders, began releasing grape varieties designed to flourish in colder climates. The release of these varieties sparked a major change in the grape growing and winery industry across the United States, particularly in the Midwest, New York, and New England. Vineyards and wineries soon began populating the regions. Iowa, for example, went from zero planted grape acres to 1,000 during a nine-year period. Minnesota went from two wineries in the 1970s to 62 by 2016.

The Northern Grapes Project team was assembled to assist the fledgling cold-hardy grape and wine industry. The project has four main objectives that address the vine, the vineyard, the winery, and the tasting room.

- *The vine*: understanding varietal performance and resulting fruit and wine flavor attributes in different climates
- *The vineyard*: applying appropriate viticultural practices to achieve consistent fruit characteristics for ripening
- *The winery*: applying winemaking practices specific to unique fruit composition to produce distinctive wines that consumers will like and purchase
- *The tasting room*: understanding consumer preferences and individual/regional marketing strategies to increase sales and sustained profitability of wineries and vineyards

In order to measure industry progress, the Northern Grapes Project plan included a survey of the industry, as well as, and an economic contribution analysis, at the project start (2012) and the project end (2016). This report is a summary of the 2015 economic contribution analysis. Where appropriate, it provides a comparison to the industry’s 2011 economic contribution. The 2011 report can be found at <http://www.extension.umn.edu/community/economic-impact-analysis/reports/>. A report on 2015 trends in vineyards and wineries is also available on the site.

The Northern Grapes Project is funded by the USDA’s Specialty Crops Research Initiative Program of the National Institute of Food and Agriculture.

## VINEYARD AND WINERY SURVEY

The Northern Grapes Project was a five-year project. One of its goals was to establish an industry baseline at the beginning of the project (2012) and then measure any changes to the baseline at the end of the project (2016). In order to achieve this goal, the University of Minnesota conducted a survey of vineyards and winery owners in early 2012. The survey asked questions about operations

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<sup>1</sup> Martinson, T. (August 2016). What we have accomplished: Reflections on the Northern Grapes Project. *Northern Grapes News*, 5(3). Retrieved from: <http://northerngrapesproject.org/wp-content/uploads/2016/08/NG-News-Vol5-I3-Aug-2016.pdf>.



in 2011. In 2016, the University of Minnesota repeated the survey, with questions covering operations in 2015.

### Survey Methodology and Response Rates

In December 2015, the University of Minnesota Extension team updated the 2012 survey instrument. All questions on the survey were reviewed for both necessity and effectiveness. As a result, several questions from the 2012 survey were dropped or modified.

Each participating state provided the Northern Grapes Project with contact information from their membership lists. The survey was deployed following established surveying techniques.<sup>2</sup>

On January 7, 2016, a pre-notification email was sent to the membership lists of nine states. On January 14, pre-notification emails were distributed to the remaining states.<sup>3</sup> The survey officially launched via email on January 19, 2016. The research team also sent reminder emails on February 3 and February 18.

The Northern Grapes Project webinar series also promoted the survey. Individual associations, councils, and organizations at the state level encouraged their members to complete the survey. Some organizations publicized the survey via their webpages and newsletters as well.

In total, 545 participants responded to the survey (Table 1). The highest number of responses came from Minnesota (110), New York (74), and Wisconsin (66). These are also states with relatively large membership lists. States with the highest response rates include Vermont (67 percent), Nebraska (38 percent), Michigan (32 percent), and New York (32 percent).

It is worth noting the composition of the membership lists, as most include not only grape growers and winery owners, but also people associated with the industry. This includes researchers, industry specialists, and media contacts. Since the survey was not directly targeted at this audience, they may not have responded, thus lowering response rates.

**Table 1: Number of Responses and Response Rates by State**

State	Number of Emails Sent	Number of Responses	Response Rate
Connecticut	65	17	26%
Illinois	231	49	21%
Iowa	169	46	27%
Michigan	176	57	32%
Minnesota	574	110	19%
Nebraska	50	19	38%
New York	228	74	32%
North Dakota	218	34	16%
South Dakota	109	15	14%

<sup>2</sup> Dillman, D.A. and Salant, P. (1994). *How to conduct your own survey*. New York: John Wiley and Sons.

<sup>3</sup> The gap was due to delays in receiving membership lists.



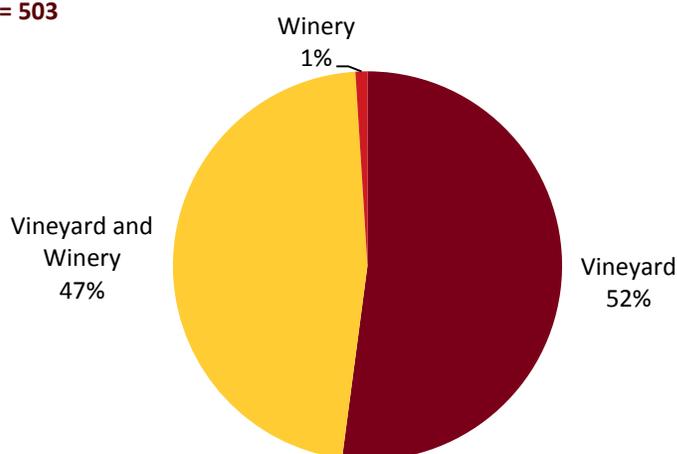
Vermont	36	24	67%
Wisconsin	221	66	30%
Other	None	34	N/A
Total	2,077	545	26%

Of the 545 respondents, 37 reported being involved in the industry in another capacity. Respondents indicating they were involved in another capacity were asked to indicate their particular role. These respondents were screened from the survey and answered separate, select questions.

## RESULTS

Survey respondents were nearly evenly divided between owning a stand-alone vineyard or a vineyard-winery combination (Chart 1). Fifty-two percent of respondents owned a vineyard while 47 percent owned a vineyard and winery combination.

**Chart 1: Survey Respondent's Role in Grape and Wine Industry, 2015, N = 503**



## ECONOMIC CONTRIBUTION

Wineries and vineyards contribute to the economic activity of their regions. Directly, wineries and vineyards stimulate the economy through the purchase of supplies (e.g., bottles, corks, labels, trellises, and bug deterrents) and spending on labor. These direct activities create secondary, or ripple effects, in the economy. As winery and vineyard employees spend their wages, this creates activity at grocery stores and gas stations, for example. As the manufacturer of bottle labels increases production, that drives further expenditures along the supply chain. Winery tourists also create economic activity as they travel to wineries.

The first step in an economic contribution study is to quantify the direct effects (i.e., direct spending) of an activity. Once the direct effects are known, they can be applied to an input-output model to measure the indirect and induced (spending that takes place as a result of direct spending) effects of the industry.

## Direct Effects

In this study, the direct effects of vineyards growing wine grapes, wineries utilizing locally-sourced grapes, and winery tourists were measured. Economic contribution is measured in terms of output (sales), employment, and labor income.

To calculate direct effects for this report, responses from the 2016 survey of vineyards and wineries were relied upon. That data was used to calculate averages per winery and per vineyard. The averages were extrapolated to cover all wineries and vineyards in the participating states. Total economic contribution was calculated on a per state basis and then added to each state to arrive at the total.

As in 2012, this study focuses on wine grape vineyards and wineries primarily using locally-grown grapes and fruits in their production. Additionally, since the Northern Grapes Project focuses on cold-hardy grapes in the participating states, so too, does this analysis.

In certain states, there are industrial-sized wineries that source a significant amount of grapes and juice from out-of-state. These wineries are not the focus of this study. Grapes grown primarily for juice or other purposes are also not considered here. To address this distinction, wineries are referred to as “locally-sourced,” indicating the primary source of their grapes is their home state. Vineyards are referred to as “wine grape” to distinguish them from vineyards growing primarily for other purposes.

## Direct Effects of Wine Grape Vineyards

Wine grape vineyards spent an estimated \$92.2 million in 2015 (Table 2). Of that, \$30.2 million was labor payments. The remainder, \$62.0 million, was split between operational expenditures (fertilizers, fungicides, cover crops) and capital investments (trellis systems, tractors, and ATVs). Grape growers spent an estimated \$27.3 million on operations and \$34.7 million on capital investments.

**Table 2: Direct Effect of Wine Grape Vineyards: Northern Grapes Project States, 2015**

	All Grapes	Cold-Hardy Grapes
Total Expenditures (millions)	\$92.2	\$44.1
Employment	6,960	4,490
Labor Expenses (millions)	\$30.2	\$13.8

Estimates by University of Minnesota Extension

Wine grape vineyards employed an estimated 6,960 individuals, either on a full-time, part-time, or seasonal basis. Harvest season is a peak period of employment. Vineyards often hire harvest crews.

Grape growers spent an estimated \$30.2 million on labor payments 2015. On a per employee basis, this equates to \$1,300. While this may seem low as a wage, most of the work is part-time and seasonal in nature. Additionally, many vineyard operators do not pay themselves a wage, instead



taking vineyard profits as income. It is unlikely they reported this as labor expenditures in their survey responses.

### Direct Effects of Cold-Hardy Wine Grape Vineyards

Cold-hardy grapes are one component of the wine grapes industry in participating states. In certain locations, cold-hardy grapes constitute almost all of the grapes (Minnesota and Wisconsin, for example). In other states, cold-hardy grapes are only a fraction of total wine grapes grown (New York and Michigan, for example). Thus, cold-hardy grapes are responsible for a fraction of the total impact of wine grape vineyards.

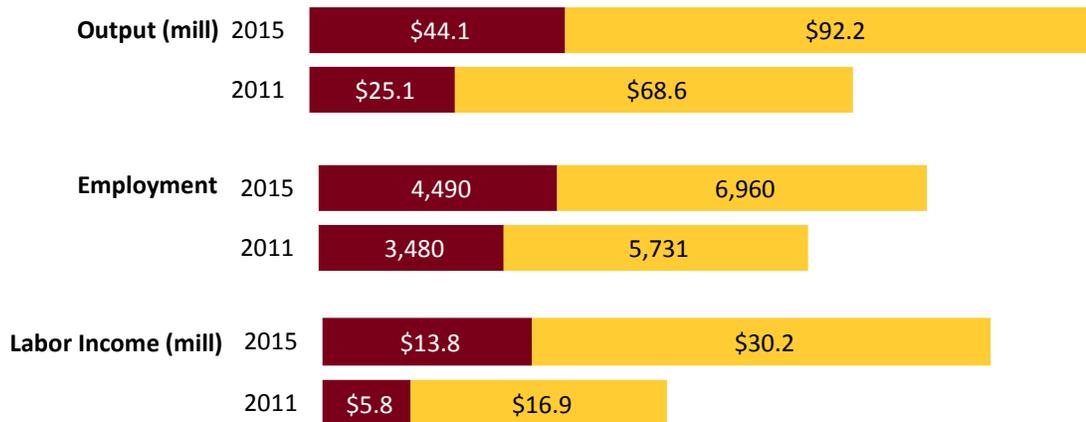
In 2015, wine grape vineyards spent an estimated \$44.1 million to produce cold-hardy grapes, including \$13.8 million in labor income and employment for 4,490 people.

### Comparison to 2011 Results

The 2016 survey results indicate a significant increase in spending by all wine grape vineyards between 2011 and 2015. In 2015, total wine grape vineyard spending was \$92.2 million. In 2011, wine grape vineyards spent \$68.6 million, including \$16.9 million on labor. Vineyards employed 5,731 people (Chart 2).

There are several potential explanations for the increase in spending across all wine grape vineyards. First, the number of vineyards increased between 2011 and 2015, thus driving up totals. Second, total expenditures per vineyard increased during this period. The average size of vineyards increased, thus increasing the amount of spending and employment. Finally, vineyard spending for labor also increased significantly. Vineyards shifted from free labor to paid staff. This is likely happening as vineyards mature.

**Chart 2: Direct Effect of Wine Grape Vineyards, 2011 and 2015**      ■ Cold-Hardy Grapes      ■ All Grapes



### Direct Effect of Locally-Sourced Wineries

In 2015, locally-sourced wineries using all grape varieties directly spent an estimated \$449.3 million, excluding grape purchases (they are accounted for in the vineyard data). Of this, \$70.9 million was for labor expenses (Table 3). Locally-sourced wineries employed 8,490 people in the

participating states. Expenditures by wineries include not only those to produce wine, but also those related to the operation of tasting rooms, any retail spaces, and for bottling. Employment includes full-time, part-time, and seasonal positions. The average wage per job was \$8,400.

**Table 3: Direct Effect of Locally-Sourced Wineries: Northern Grapes Project States, 2015**

	All Grapes	Cold-Hardy Grapes
Total Expenditures (millions)	\$449.3	\$144.3
Employment	8,490	4,260
Labor Expenses (millions)	\$70.9	\$33.8

Estimates by University of Minnesota Extension

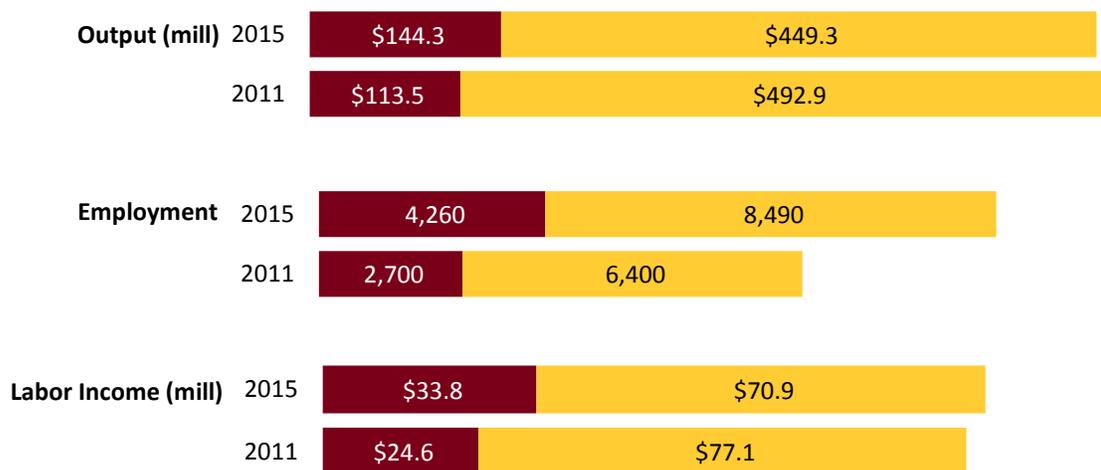
### Direct Effects of Cold-Hardy Locally-Sourced Wineries

As with wine grape vineyards, only a portion of total winery expenditures is related to cold-hardy grapes. In 2015, wineries spent an estimated \$144.3 million on items related to cold-hardy grapes. Of this, \$33.8 million was in labor to produce wines derived from cold-hardy grape varieties. Wineries also employed 4,260 people related to cold-hardy grapes.

### Comparison to 2011 Results

In comparison to 2011, overall expenditures by locally-sourced wineries using all grape varieties fell slightly (Chart 3). While the number of wineries in the participating states increased during the time period, estimated wine production fell slightly.

**Chart 3: Direct Effect of Locally-Sourced Wineries, 2011 and 2015** ■ Cold-Hardy Grapes ■ All Grapes



While overall expenditures across all locally-sourced wineries fell, those related to cold-hardy grapes grew. Since growth in the number of wineries occurred in states primarily growing cold-hardy grapes, it is not surprising this number increased slightly. Interestingly, the share of labor income associated with cold-hardy wine grapes showed the highest rate of gain. States with wineries using a higher share of cold-hardy grapes posted the largest increases in labor expenditures per winery.

### Direct Effects of Winery Tourists

In addition to selling wine, wineries also generate significant tourism activity. The winery survey results show two-thirds of wineries are located in a rural area. Since tasting rooms are an important component of branding and winery sales (accounting for nearly three-quarters of all sales), wineries need to attract tourists, as they spend money in the local economy and generate economic activity. The direct effect of winery tourists is the amount of money they spend during winery trips.

To measure the economic contribution of winery tourists, wineries were asked to report the number of tasting room customers in 2015. On average, each winery reported more than 10,300 customers. Not all of the customers, however, are considered tourists. Tourists are defined as those either 1) traveling more than 50-miles to visit the winery or 2) staying overnight during their winery trip. These two criteria were used to distinguish the total number of winery tourists from the total number of winery visitors. What is critical is that the visitor is on a trip inspired by a winery and is not simply visiting the winery as a result of some other reason for the trip (e.g., visiting friends). After determining the number of winery tourists, the next step is to determine the amount spent by each visitor. To do this, visitor spending profiles were obtained from each participating state’s official tourism bureau or published tourism source.<sup>4</sup>

In 2015, winery tourists spent an estimated \$303.9 million while visiting locally-sourced wineries in the participating states (Table 4). Of this, \$157.9 million went toward labor at the businesses providing goods and services to winery tourists. The visits also supported 4,610 jobs.

### Direct Effect Cold-Hardy Winery Tourists

Tourists visiting wineries specializing in cold-hardy grape wines spent an estimated \$103.2 million. The businesses visited by tourists paid \$40.4 million in labor income generated from the visits. There were also 1,690 jobs across the economy supported by cold-hardy winery tourism.

**Table 4: Direct Effect of Winery Tourists: Northern Grapes Project States, 2015**

	All Grapes	Cold-Hardy Grapes
Tourism Sales (millions)	\$303.9	\$103.2
Employment	4,610	1,690
Labor Expenses (millions)	\$157.9	\$40.4

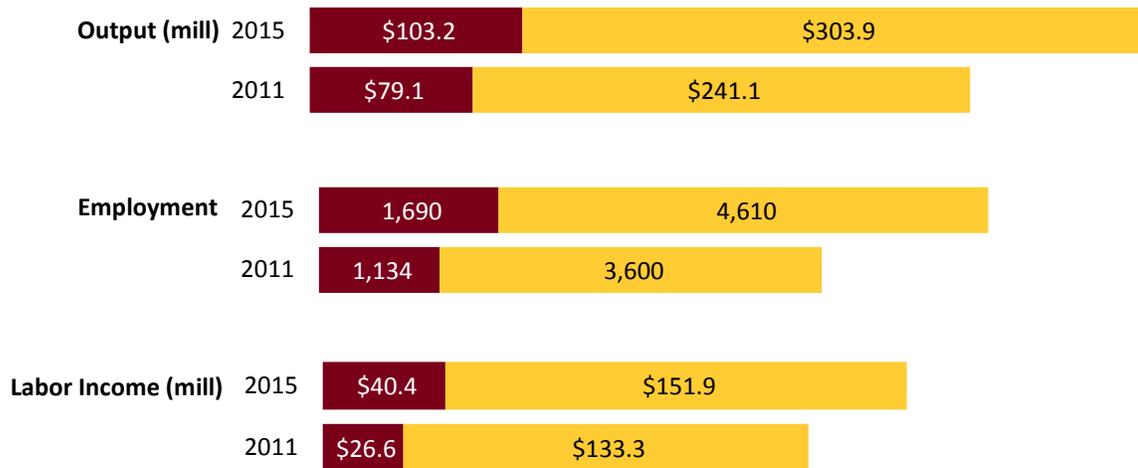
Estimates by University of Minnesota Extension

<sup>4</sup> For consistency, to calculate the direct effect in 2015, the per spending figures from the 2011 analysis were used and inflated using the travel price index.

### Comparison to 2011 Results

The economic contribution of winery tourists increased between 2011 and 2015 (Chart 4). In 2015, the direct effect was an estimated \$303.9 million compared to \$241.1 million in 2011. There are a variety of factors driving the increase -- the number of wineries grew, the number of tasting room visitors per winery grew, and per person spending grew.

**Chart 4: Direct Effect of Winery Tourists, 2011 and 2015** ■ Cold-Hardy Grapes ■ All Grapes



### Indirect and Induced Effects

Once the direct effects of an industry are measured, they can be applied to an input-output model. Input-output models trace the flow of goods and services throughout an economy. Once the flow is established, the model can quantify the relationships between industries in an economy. The relationships are measured in indirect and induced effects. This analysis uses input-output data from RIMS II (Bureau of Economic Analysis).

Indirect effects measure supply chain relationships. A winery, for instance, orders printed labels from a local company. The label maker, in turn, then purchases supplies (paper, ink, design services), creating a set of ripples in the economy. The sum of these supply chain effects are the indirect effects. They are business-to-business impacts.

Induced effects measure the relationships created in an economy through household spending. When employees of an industry spend salaries and wages, at say the local café, this generates a set of relationships, since the café then increases its purchases. The sum of these employee spending effects are the induced effects. They are consumer-to-business impacts.

The indirect and induced effects of wine grape vineyards, locally-sourced wineries, and winery tourists are highlighted in the next section of this report.

### Total Economic Effects

In 2015, wine grape vineyards, locally-sourced wineries, and winery tourists generated an estimated \$1.6 billion of economic activity in the participating states (Table 5). Locally-sourced wineries generated more than half (53 percent) of the economic activity. Winery tourism generated approximately 40 percent of the activity.

The industry supported more than an estimated 36,000 jobs in 2015. Both wine grape vineyards and locally-sourced wineries had relatively larger employment impacts. In the input-output model, one job is one job, whether it is full-time, part-time, or seasonal. Wineries and vineyards tend to have high levels of seasonal employment, which likely drives higher impacts.

Included in the \$1.6 billion of economic activity is an estimated \$450.7 million of labor income.

**Table 5: Total Economic Contribution of Wine Grape Vineyards, Locally-Sourced Wineries, and Winery Tourists: Northern Grapes Project States, 2015**

	<b>Wine Grape Vineyards</b>	<b>Locally-Sourced Wineries</b>	<b>Winery Tourism</b>	<b>Total</b>
Output (millions)	\$163.7	\$848.5	\$599.9	\$1,612.1
Employment	11,600	18,120	6,300	36,020
Labor Expenses (millions)	\$59.9	\$209.3	\$181.5	\$450.7

Estimates by University of Minnesota Extension

Overall, the economic contribution of wine grape vineyards, locally-sourced wineries, and winery tourism increased modestly over 2011 (Table 6). Total economic contribution grew about six percent. Employment, meanwhile, increased nearly 30 percent. This increase was largely driven by growth in the number of employees at wineries and vineyards, as explained earlier in the report.

**Table 6: Total Economic Contribution of Wine Grape Vineyards, Locally-Sourced Wineries, and Winery Tourists: Northern Grapes Project States, 2011**

	<b>Wine Grape Vineyards</b>	<b>Locally-Sourced Wineries</b>	<b>Winery Tourism</b>	<b>Total</b>
Output (millions)	\$119.9	\$926.0	\$469.4	\$1,515.3
Employment	9,400	13,500	5,300	28,200
Labor Expenses (millions)	\$32.8	\$234.0	\$141.7	\$408.5

Estimates by University of Minnesota Extension

### **Total Economic Effects of Cold-Hardy Grapes**

Cold-hardy grapes are a smaller, but critical, component of the wine and grape industry in the participating states. In 2015, wine grape vineyards, locally-sourced wineries, and winery tourism generated an estimated \$539.1 million of economic activity derived from the use of cold-hardy grapes (Table 7). As with the broader industry, locally-source wineries and winery tourism generate a significant portion of the impact. The cold-hardy grape industry also supports 18,700 employees and \$190.9 million of labor income.



**Table 7: Total Economic Contribution of Cold-Hardy Wine Grape Vineyards, Locally-Sourced Wineries, and Winery Tourists: Northern Grapes Project States, 2015**

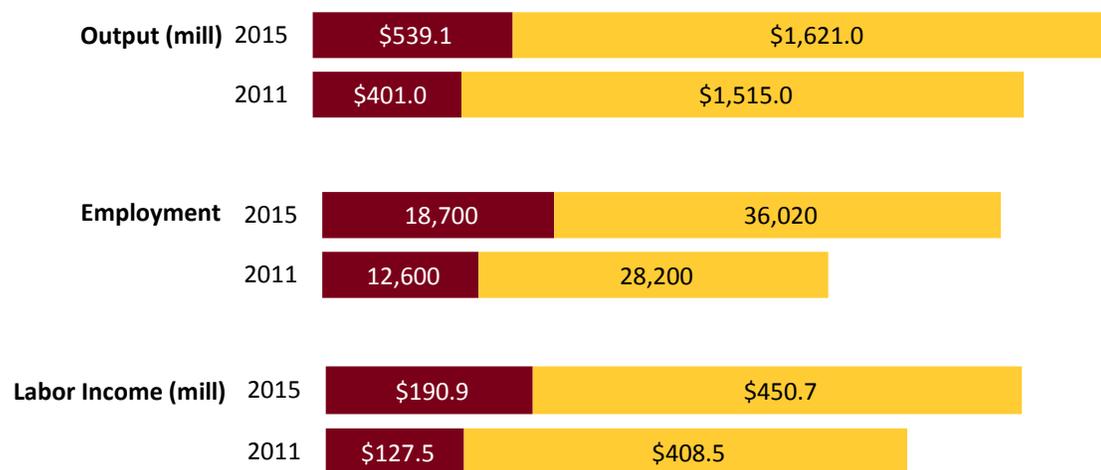
	<b>Wine Grape Vineyards</b>	<b>Locally-Sourced Wineries</b>	<b>Winery Tourism</b>	<b>Total</b>
Output (millions)	\$80.3	\$255.2	\$203.6	\$539.1
Employment	7,800	8,400	2,500	18,700
Labor Expenses (millions)	\$27.9	\$99.7	\$63.3	\$190.9

Estimates by University of Minnesota Extension

Compared to 2015, the economic contribution of the cold-hardy grape industry increased by 34 percent (Chart 5). The contribution attributable to wine grape vineyards experienced the most significant increases. This is largely due to the increase in expenditures per vineyard, which trace back to increases in the vineyard size and use of paid labor. The number of cold-hardy vineyards also increased by 15 percent across all states between 2007 and 2012.<sup>5</sup> Growth in states other than Michigan and New York (where traditional grapes are still the majority) was 33 percent.

The contribution from wineries also increased. Overall, the number of wineries in the participating states grew by 23 percent between 2011 and 2015.<sup>6</sup>

**Chart 5: Total Economic Contribution of Wine Grape Vineyards, Locally-Sourced Wineries, and Winery Tourists, 2011 and 2015** ■ Cold-Hardy Grapes ■ All Grapes



<sup>5</sup> United States Department of Agriculture, National Agricultural Statistics Service. <https://www.nass.usda.gov/>.

<sup>6</sup> Franson, P. (2016). Number of United States wineries reaches 8,702. Wine Business Monthly, February, 76-77. <http://www.winebusiness.com/wbm/?go=getDigitalIssue&issueId=8170>

**Table 8: Total Economic Contribution of Cold-Hardy Wine Grape Vineyards, Locally-Sourced Wineries, and Winery Tourists: Northern Grapes Project States, 2011**

	<b>Wine Grape Vineyards</b>	<b>Locally-Sourced Wineries</b>	<b>Winery Tourism</b>	<b>Total</b>
Output (millions)	\$45.5	\$215.1	\$140.4	\$401.0
Employment	5,900	5,000	1,700	12,600
Labor Expenses (millions)	\$11.8	\$72.2	\$43.5	\$127.5

Estimates by University of Minnesota Extension

## CONCLUSION

In 2015, the production of cold-hardy grapes and wines contributed \$539.1 million to the economy of the Northern Grapes Project states. This includes \$190.9 million of labor income. The industry also supported 18,700 jobs.

Results from 2015 point to an increase from the baseline in 2011. Overall, economic activity attributable to cold-hardy grapes and wines increased by 34 percent. This growth outpaced the increase in economic activity generated by all types of wine grapes and locally-sourced wines (6 percent). The cold-hardy wine and grape industry is currently a key driver of overall industry growth.

Winery tourism remains a critical component of the cold-hardy grape and wine industry. In 2015, winery tourism accounted for nearly 40 percent of the total contribution. Locally-sourced wineries are continuing to draw visitors, with an increase in the average number of tasting room customers since 2011. There continues to be a need to support wineries in tourism development opportunities.

Wineries and vineyards involved in the cold-hardy industry appear to be moving towards more stable, mature operations. There was a marked decrease in the use of unpaid and volunteer labor between 2011 and 2015. Correspondingly, there was an increase in the share of expenditures going to labor and in the number of employees. As vineyard and winery operations continue to become more mature, the shift should continue to increase the economic contribution of the industry.



## **APPENDIX ONE: PARTICIPATING INDUSTRY ASSOCIATIONS**

The following industry associations/councils provided membership lists for the 2016 survey.

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

## **APPENDIX TWO: DEFINITION OF COLD-HARDY GRAPES**

For purposes of this study, researchers classified the following cultivars as cold-hardy. This was done in consultation with the Northern Grapes project advisory team which is comprised of growers in each of the states.

### **Table A-1: Cold-Hardy Red Varieties**

Baltica  
Beta  
Chisago  
Frontenac  
GR-7  
King of the North  
Leon Millot  
Marechal Foch  
Marquette  
Nokomis  
Petite Pearl  
Sabrevois  
St. Croix



Valiant  
Other red Swenson

**Table A-2: Cold-Hardy White Varieties**

Brianna  
Edelweiss  
Esprit  
Frontenac blanc  
Frontenac gris  
Kay Gray  
La Crescent  
La Crosse  
Louise Swenson  
Petite Amie  
Prairie Star  
St. Pepin  
Other white Swenson