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Minnesota Grape Production Statistics: 2013-2016

ESTIMATES FOR THE YIELD, PRODUCTION, AND PRICING DATA OF THE MINNESOTA GRAPE
INDUSTRY

Authored by Matthew Clark and Brigid Tuck



WITH THANKS TO: MINNESOTA GRAPE GROWERS

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ESTIMATES FOR THE YIELD, PRODUCTION, AND PRICING DATA OF THE MINNESOTA GRAPE INDUSTRY

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Minnesota Grape Growers Association provided email contacts to solicit survey responses.

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INTRODUCTION

The Minnesota grape and wine industry continues to expand. Survey results have captured this growth on a state and regional scale, showing significant growth in 2015 compared to 2011 (Tuck & Gardner, 2012; 2016). While these surveys evaluated the economic impact of the industry as a whole, they failed to capture the production metrics associated with yield and grape pricing. Data collected from 2009 to 2012 provided some estimates about the performance of the grape crop, with an estimated value/ton of \$1,448.19/ton (\$0.72/lb) (Nordquist, McCamant, Moynihan, & Kuntz, 2012).

The objective of this project was to collect harvest and pricing data for 2013 through 2016. An online survey instrument (Qualtrics) was developed to capture the current production metrics, as well as estimates of yields and pricing. Additionally, growers were asked to report on the causes and amount of crop loss experienced. Grape growers were invited through email to participate in an online survey during winter 2017. Results from the study are discussed below.

DEMOGRAPHICS

Minnesota does not have a single, centralized grape growing region. For commercial wine production, grape growing primarily occurs in the southern two-thirds of the state. Minnesota is represented by three American Wine Appellations (AVA)—Minnesota (state appellation), Upper Mississippi Valley, and Alexandria Lakes.¹ Participants were recruited by email to participate in the survey during early January 2017. The Minnesota Grape Grower Association provided a list of industry stakeholders (including its members) to contact. Growers from Minnesota, Wisconsin, and Iowa responded to the survey.

In order to identify commercial grape growers, survey respondents were asked if they operated a commercial vineyard between 2013 and 2016. Forty-seven commercial Minnesota grape growers responded to the online survey, providing sufficient data for this report. Respondents were from 33 of Minnesota's 87 counties (Figure 1).

To identify where growers sold their grapes, survey respondents were asked what percent of grapes were sold to the following market channels: own winery, other winery, a broker, or other. Fifty percent of growers reported selling exclusively to their own winery. Thirty-two percent of growers sold their grapes exclusively to other wineries. No growers reported selling grapes to brokers. Other non-winery outlets for grapes included direct farm-to-school sales, other food businesses, table grape sales, or as payment for vineyard help. Of all grapes sold in the state by volume, 73 percent were sold to a grower's own winery, 26 percent to other wineries, 1 percent to other outlets, and 0 percent through brokers (Figure 2).

¹ <http://www.appellationamerica.com/>



Vineyards Reporting in Minnesota by County

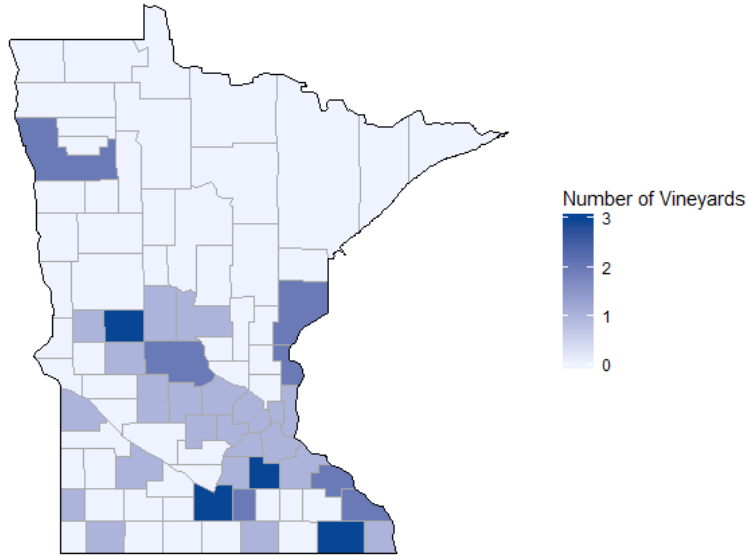


Figure 1. County map of Minnesota showing the survey responses of 47 vineyard operations and their locations in the state

Grape Sales Outlets 2016

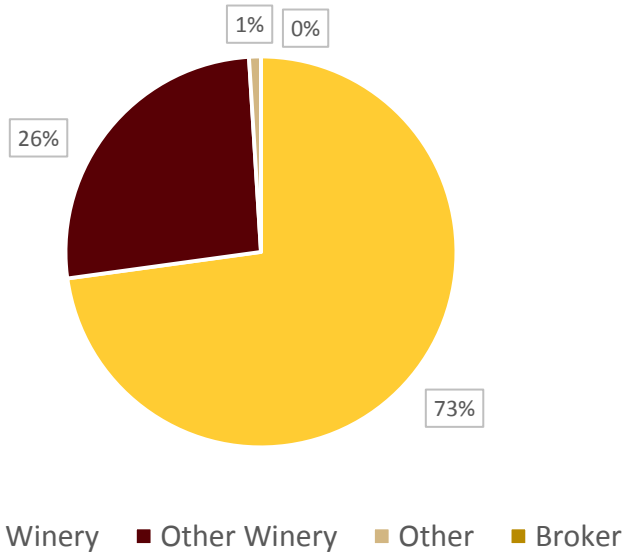


Figure 2. Percentage of grapes sold through various outlets

SURVEY RESULTS

HARVEST 2016

Growers were asked to report their production and sales data for 2016 (Table 1). The smallest vineyard size reported was 0.5 acres and the largest 43 acres. Fifty percent of vineyards in Minnesota are 4 acres or smaller (Figure 3). The mean acreage planted in Minnesota was 6.9. A total of 324.5 acres of grapevines were reported in this survey; however, only 269.5 (83.1 percent) were reported as bearing fruit. It is presumed that non-yield acreage includes young vines, vines damaged by frost in 2016, or retrained, non-bearing vines. The total yield reported was 721,187 pounds, which equates to roughly 2,676 acre or 1.34 tons per acre.

Many vineyards reported crop loss for various reasons. A key issue for producers in 2016 was the late spring frost events May 14-16 that devastated many vines and damaged primary shoots. Growers were asked to provide an average price for their grapes in 2016, and values ranged from \$0.60 to \$2.00 per pound. The average price (of reported averages) was \$0.85 per pound (Table 1).

Vineyard Acreage in Minnesota

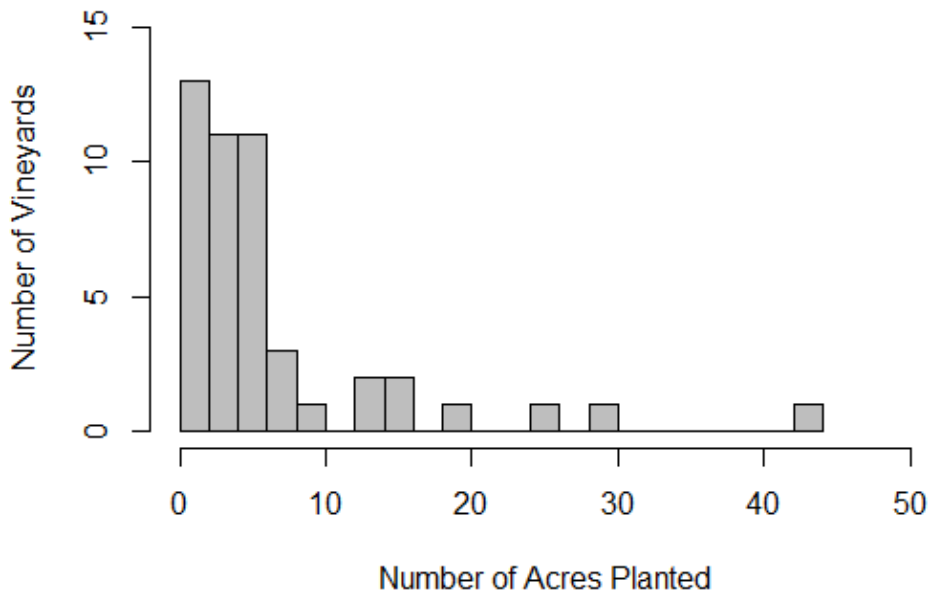


Figure 3. Histogram showing the distribution of Minnesota vineyard sizes by the number of acres

Nineteen grape varieties were grown and sold in Minnesota during 2016. 'Marquette' was the highest produced grape with 112,076 pounds sold (Table 2). This was nearly twice as much as the 'Frontenac' sold (64,834 pounds). Prices ranged from \$0.50 per pound to \$2.00 per pound for the 19 listed varieties (Table 2).

Two averages were calculated to represent the price per pound. First, the average price per pound was based on the amount received by the grower for each variety. Second, the weighted average measured the total volume of grapes sold at each price point and was averaged over the total

volume sold per variety. The weighted average can balance extreme prices received, such as \$2.00 per pound on low volumes. The varieties listed in the “other” category were reported by only a single grower. As a percentage of total reported yield, ‘Marquette’ comprised the largest proportion at 24 percent (Figure 4). This variety was followed by ‘Frontenac’ (17 percent), ‘Frontenac gris’ (13 percent), ‘La Crescent’ (9 percent), and ‘Brianna’ (8 percent).

Table 1. Production and price data reported for the Minnesota 2016 grape harvest

	Total Acres	Bearing Acres	Estimated lbs Produced	Price/lb
Total	324.5	269.5	721,187	NA
Average	6.9	5.7	16,772	\$0.85*
Lower Range	0.5	0.5	500	\$0.60
Upper Range	43	41	86,705	\$2.00
n	47	47	47	47

*Average of the average price received for a vineyard operation

Table 2. Production and price data by variety for Minnesota 2016 grape harvest

Variety	Total Yield (lb)	Sold Yield (lb)	Average Price/lb	Weighted Price/lb	Lower	Upper	n
Brianna	42799	16280	0.80	0.74	0.60	0.90	10
Edelweiss	19549	8712	0.80	0.90	0.75	0.90	5
Frontenac	89685	64834	0.80	0.82	0.60	1.00	19
Frontenac blanc	28821	22622	0.90	1.00	0.72	2.00	13
Frontenac gris	69275	44282	0.80	0.83	0.70	1.00	16
King of the North	6300	5732	0.70	0.65	0.50	0.90	5
La Crescent	51443	36806	0.80	0.82	0.70	1.00	13
La Crosse	12337	12337	0.80	0.71	0.65	0.85	3
Marechal Foch	15234	2273	0.80	0.76	0.75	0.80	2
Marquette	127471	112076	0.90	0.90	0.60	2.00	23
Petite Ami	3419	3021	0.80	0.75	0.75	0.80	3
Petite Pearl	5236	4825	0.90	0.83	0.75	1.00	7
St. Croix	10009	7959	0.70	0.71	0.65	0.80	6
St. Pepin	26667	21860	0.80	0.78	0.75	0.80	5
Other*	NA	27661	0.95	0.86	0.50	2.00	15

*Due to low sample size, the other category includes Sabrevois, Somerset Seedless, Prairie Star, Kay Gray, and Bluebell.

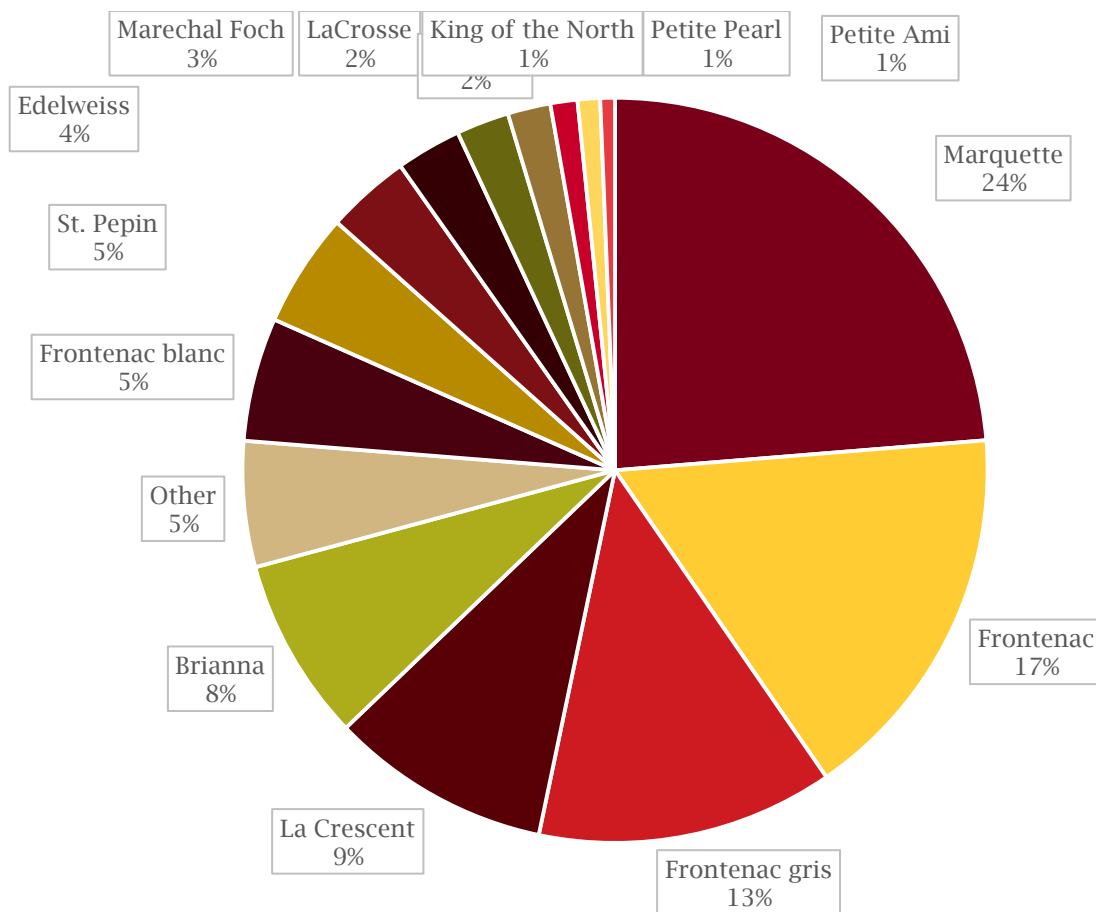


Figure 4. Grape yields reported for Minnesota harvest in 2016 by variety percentage (the “other” category includes varieties Sabrevois, Somerset Seedless, Prairie Star, Kay Gray, and Bluebell)

HARVEST 2015

For many Minnesota vineyards, the 2015 season was a recovery year after 2014’s polar vortex weather event. Yields were lower than in 2016, and some of the more sensitive varieties like ‘Marquette’ suffered severe damage. Results of the 2015 survey can be found in Table 3. Prices ranged from \$0.50 per pound to \$2.00 per pound for the listed varieties.

HARVEST 2014

Survey responses for the 2014 harvest were limited. This is primarily attributed to the polar vortex that limited production. Other factors include the acreage of vines in production, lack of accessible records at the time of the survey, or survey fatigue (Table 4). Price per pound ranged from \$0.65 to \$1.40. ‘Frontenac gris’ received the highest weighted price at \$0.94 per pound, whereas ‘La Crescent’ received the highest price reported from a single grower at \$1.40 per pound.

Table 3. Production and price data by variety for Minnesota 2015 grape harvest

Variety	All Yield (lb)	Sold Yield (lb)	Average Price/lb	Weighted Price/lb	Lower	Upper	n
Brianna	36236	1834	0.79	0.76	0.70	0.90	4
Edelweiss	22808	14619	0.80	0.80	0.80	0.80	2
Frontenac	77860	48660	0.77	0.78	0.65	0.90	11
Frontenac blanc	5476	4434	0.98	1.02	0.70	2.00	5
Frontenac gris	66592	28307	0.77	0.75	0.65	0.90	9
King of the North	8891	5424	0.68	0.63	0.50	0.90	3
La Crescent	42379	15817	0.84	0.79	0.70	1.30	7
Marechal Foch	7920	2004	0.68	0.66	0.65	0.70	2
Marquette	69968	43091	0.90	0.89	0.70	2.00	15
Petite Pearl	1129	1129	0.83	0.76	0.75	0.90	2
St. Croix	7962	2192	0.72	0.73	0.65	0.80	3
St. Pepin	32798	18225	0.77	0.79	0.70	0.80	3
Other*	37749	26199	0.75	0.74	0.65	0.90	9

*Due to low sample size, the other category includes Petite Ami, La Crosse, Prairie Star, Somerset Seedless, Bluebell.

Table 4. Grapevine crush data for harvest 2014 from reporting vineyards in Minnesota

Variety	All Yield (lb)	Sold Yield (lb)	Average Price/lb	Weighted Price/lb	Lower	Upper	n
Brianna	14689	977	0.75	0.75	0.75	0.75	2
Edelweiss	4897	608	0.73	0.71	0.70	0.75	2
Frontenac	32400	21381	0.78	0.77	0.65	1.00	6
Frontenac gris	27379	6771	0.90	0.94	0.80	1.00	4
La Crescent	13122	3792	0.89	0.73	0.65	1.40	4
Marquette	22349	11986	0.83	0.87	0.65	1.10	10
St. Pepin	7769	4368	0.73	0.70	0.70	0.75	2
Other*	47051	11071	0.69	0.67	0.65	0.75	10

*Due to low sample size, the other category includes Frontenac blanc, Petite Pearl, Petite Ami, King of the North, La Crosse, Marechal Foch, St. Croix, Prairie Star, Sabrevois.

MULTI-YEAR DATA TRENDS

Respondents were asked to report 2013 harvest data, but the data were too sparse to include comprehensively in this report. Four-year harvest data (2013 through 2016) for total yield were plotted by variety to show the trends in production reported by Minnesota growers (Figure 5; Table 5). There is a distinct trend showing an increase in yields over time for some varieties (Figure 5). A sharp decline in yields per variety (Figure 5) and for the state (Table 5) in 2014 reflects the post-polar vortex recovery periods. New varieties coming into production, such as 'Frontenac blanc', 'Petite Pearl' and 'Petite Ami' are also represented. 'Edelweiss' and 'St. Pepin' appear stable. The future aim is to compile this data annually so that five and 10-year trends can be reported.

Overall, average grape prices are stable or increasing over time (Table 5). The average three-year yield (2014 through 2016) and price data shows production metrics for the 47 reporting vineyards

(Table 6). Average prices ranged from \$0.68 per pound for 'King of the North' to \$0.87 per pound for 'Marquette.' When weighted, the average price for 'Frontenac blanc' increased to \$0.89 per pound, the same weighted price for 'Marquette'.

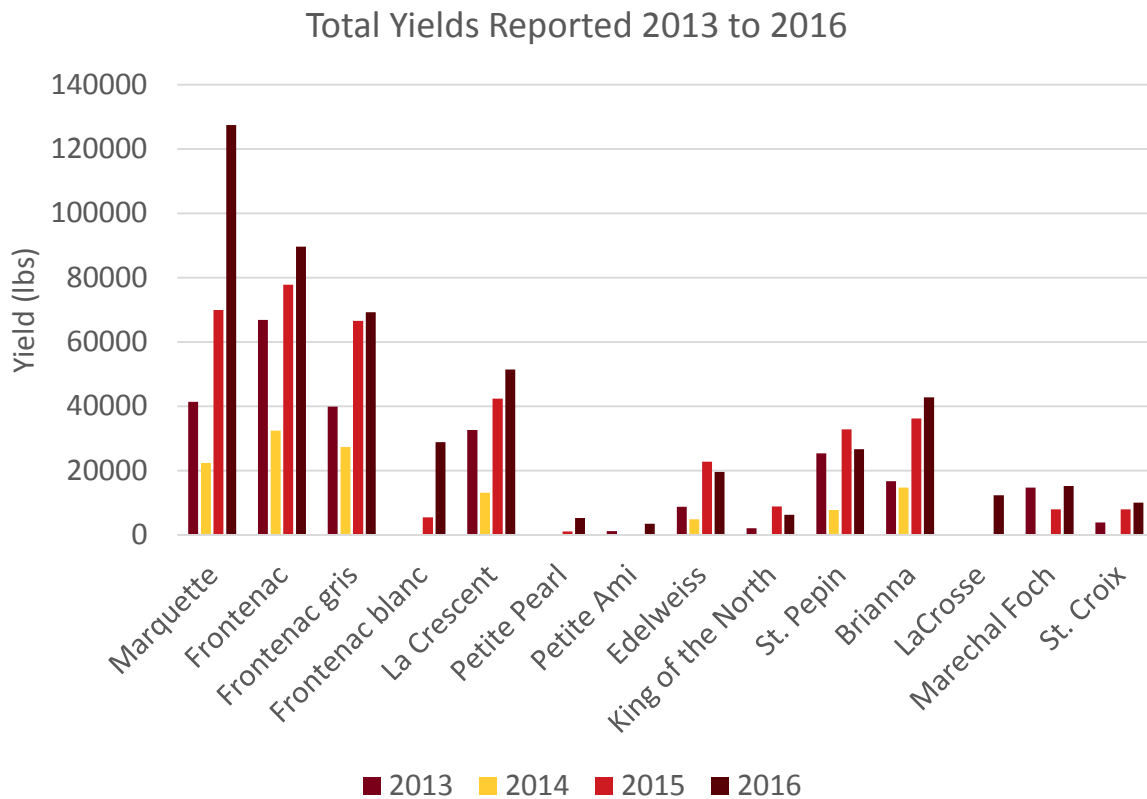


Figure 5. Total grapevine yields reported in Minnesota for years 2013 to 2016 from 47 reporting vineyards

Table 5. Reported yield and price data for years 2013 through 2016 for Minnesota growers

	2013	2014	2015	2016
<u>Yield Data</u>				
Total Yield (lb)	277,936	22,349	558,908	721,187
Average	16,349	1,315	18,029	16,772
Lower Range	100	100	1147	500
Upper Range	43,146	5,000	41,285	86,705
n	17	17	31	47
<u>Price Data</u>				
Average Price/lb	\$0.76	\$0.83	\$0.83	\$0.85
Lower Range	\$0.60	\$0.70	\$0.70	\$0.60
Upper Range	\$0.97	\$1.10	\$2.00	\$2.00
n	9	10	24	47

Table 6. Average grapevine crush data for harvests 2014 through 2016 from reporting vineyards in Minnesota (values represent the average of yearly data)

Variety	All Yield (lb)	Sold Yield (lb)	Average Price/lb	Weighted Price/lb
Brianna	31241.3	6363.7	0.78	0.75
Edelweiss	15751.3	7979.7	0.78	0.77
Frontenac	66648.3	44958.3	0.79	0.79
Frontenac blanc	11742.6	9258.0	0.84	0.89
Frontenac gris	54415.4	26453.3	0.82	0.84
King of the North	5713.3	4118.7	0.68	0.64
La Crescent	35648.0	18805.0	0.84	0.78
La Crosse	5792.3	5792.3	0.70	0.67
Marechal Foch	16023.7	2184	0.71	0.69
Marquette	73262.7	55717.7	0.87	0.89
Petite Ami	3062.3	1540.3	0.77	0.75
Petite Pearl	2209.3	2072.3	0.83	0.78
St. Croix	7021	5075.5	0.71	0.72
St. Pepin	22411.3	14817.7	0.76	0.76

CROP LOSS

Crop loss was reported by most growers for each year. Table 7 summarizes some of the major weather trends during the study years, as observed at the Horticultural Research Center in Excelsior, Minnesota. It is not possible to estimate potential crop loss from events like late spring frost (2016) or a mid-winter polar vortex (2014) that damaged buds, canes, and trunks of some varieties. Some vineyards did report up to 100 percent loss resulting from cold-hardiness, injury-related problems.

The other most commonly reported causes of crop loss included vertebrate and invertebrate pests, disease and rots, weather events (e.g., excessive rain), and spray damage. Vertebrate pests that cause crop loss include raccoons, deer, and birds. Invertebrate pests reported were multicolored Asian lady beetle (Galvan, Burkness, & Hutchison, 2006), Japanese beetle, and wasp/bees (Hoover et al., 2011). Not only can insects directly damage fruit through feeding, but fruit flies are also capable of laying eggs in damaged (and undamaged fruit in the case of spotted-wing drosophila *Drosophila suzukii*). Fruit flies are vectors of the bacteria and disease complexes that lead to fruit rot (Hoover et al., 2011; Rombaut et al., 2017). The presence of multicolored Asian lady beetles in grapes (through crush), and the infections caused by fruit flies, can result in tainted wine products and must be monitored and controlled.

Table 7. Key climate and weather event summary for each harvest year, as documented at the Horticultural Research Center, Excelsior, MN

Harvest Year	Minnesota Climate Summary
2013	Low snow cover leading to root injury
2014	Polar vortex during winter 2013-2014; bloom 2 weeks late, early moist summer, dry late summer, and average heat leading to late maturity
2015	Favorable weather for grape production; mild fall temperatures for season extension
2016	May 14-16 widespread frost events; High rain amounts: 31+ inches reported April-November at Chaska Weather Station.

DISCUSSION

Survey responses provide a snapshot of the overall grape production in Minnesota between 2013 and 2016. General trends show increasing production in terms of yield volume, with the exception of major production setbacks caused by extreme weather events, such as the 2014 polar vortex.

The prices received for grapes ranged from \$0.50 per pound to \$2.00 per pound and varied based on the variety grown and market demands. Average prices in 2016 were \$0.85 per pound, or \$1,700 per ton. Some Minnesota wineries utilize a sliding scale to set prices paid based on quality parameters, such as acid levels or °Brix.

For the 2014 harvest in two New York growing regions, the average yields and prices were given for four main varieties (Gómez, Kanankzadeh, & Oh, 2016). Prices ranged from \$1,500 per ton (Brianna, Frontenac, and La Crescent) to \$1,800 per ton (Marquette) in Thousand Islands, but only \$600 to \$900 in Chautauqua. Yields in Chautauqua were also approximately two times higher than in Thousand islands (Gómez et al., 2016).

In more traditional *Vitis vinifera* growing regions, grape prices ranged from the 2016 California average of \$780/ton (USDA-NASS, 2017), the Virginia average of \$2,097/ton (Wood, Custer, & Swartwout, 2016) and the Washington average of \$1,157/ton (Washington State Wine Commission, 2016).

Although yield as tons per acres was not calculated by variety in this report, the average production estimates of 1.34 ton per acre statewide is well below the 2.55 tons per acre in Virginia (Wood et al., 2016). Oh, Kananizadeh, Gómez, and Martinson (2015) suggest that higher yields and/or higher prices are necessary for growers to break even in the Thousand Islands region of New York. For ‘Frontenac,’ they propose 3.3 ton per acre at \$2,199 per ton is necessary to break even (Oh et al., 2015). Vineyards should be producing ~ 4 tons per acre to close the difference between pricing (at least \$1,500 per ton) and break even (Martinson, 2016). Limitations to crop yield include the crop losses mentioned above. In addition, yield reductions may be the result of improper vineyard layout, cropping practices, and training/trellis systems. Data collected as part of the Northern Grape Project support grower trends to move from mid-wire vertical shoot positioning (VSP) to high wire cordons and divided canopies. This is done to increase yields and reduce labor costs (Martinson, 2016).

Managing crop losses is critical to improve yields. Investment in proper pest control should be used to protect crops throughout the growing season. Bird netting prior to harvest is a very effective way

to manage bird predation. Fencing (including electrified fencing) can help keep raccoons, deer, and other animals out of the vineyard (MGGA, 2016).

The references listed here provide additional information about these invertebrate pests and can help growers with management decisions for multicolored Asian lady beetle (Galvan et al., 2006), Japanese beetle, wasp/bees (Hoover et al., 2011), and fruit flies (spotted-wing *Drosophila*) (Clark et al., 2016; Ioratti et al., 2015). Unprecedented levels of rainfall in summer and fall of 2016 may have contributed to rot, as well as other diseases in the vineyard that went unchecked because fungicide spray regimes were not maintained.

Major diseases that reduce yield include downy mildew, powdery mildew, and black rot. The [Midwest Fruit Pest Management Guide](#) (Bordelon, Beckerman, & Foster, 2016) is an excellent resource for growers to help manage many kinds of pests. Some growers reported crop loss from spray damage, although it was not clear if this was from misapplication or spray drift from an adjacent crop. Growers should enroll with DriftWatch (<https://mn.driftwatch.org>) to improve communication between grape growers and pesticide applicators.

SUMMARY

This is the first comprehensive report of grape yields by variety and year for the state of Minnesota. Survey results showed continued growth within the state's grape industry. Estimates of grape prices and trends can be useful for growers (and winemakers) in budgeting, setting fair prices, establishing contracts, and for other fiscal planning.

Evidence of crop loss suggests a need for ongoing education and Extension activities to improve grower capacity. This will help mitigate loss from pests and diseases. The selection of cultivars is also important, as higher risk to winter injury cultivars like 'Marquette' are fetching the highest price premiums. Additional research is necessary to determine the best management and cropping systems to improve yields in order to make grape growing a profitable business on all scales.

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