Research Report for 2021 to the
Lake Erie Regional Grape Program and NY Wine and Grape Foundation
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Breeding and evaluation of new wine grape varieties with improved cold tolerance and disease resistance

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<u>Overall Goals:</u>

Viticulture in the eastern United States is limited by climatic conditions conducive to disease development and cold damage. We seek to breed and evaluate new grapevine cultivars that combine cold hardiness, disease resistance, superior wine quality and regional adaptation.

<u>Objective:</u>

1. Provide eastern winegrowers with grape varieties of superior wine quality, which are better adapted to our growing conditions and are sustainable in response to climate change. New selections from the Cornell Grape Breeding Program will be screened for cold response and disease resistance. The field performance of new selections from the Cornell program and accessions from other sources will be recorded. The wine aroma and texture profile of new selections is to be comparable to the quality found among vinifera grapes and/or unique and valued by panelists and the wine consumer. Wine flavor/aroma profiles are to be assessed by producing wine samples and characterizing their chemical and sensory properties.

<u>Progress on new grape variety releases to the industry:</u>

Reports indicate that nursery sales of the 2013 wine grape releases, 'Aromella' and 'Arandell', are going extremely well. In 2014, Goose Watch Winery released the first 'Aromella' varietal wine. In 2017, Arbor Hill released its own 'Aromella' varietal. While 'Arandell' is being used in several red wine blends east of the Rockies, the first varietal 'Arandell' wines were marketed by Vinedo del Alamo winery (Fort Scott, KS); Clermont Vineyards, (Germantown, NY), and (Briedé Family Vineyards, Winchester, VA) beginning with the 2017 harvest. A highly disease-resistant red wine selection (NY06.0514.06) is being propagated for inclusion in regional trials, along with other white wine selections and a red found suitable for rosé wine production. Strong interest in the Riesling hybrid, NY81.0315.17, continues and a large-scale yeast strain trial has concluded.

<u>Wine Sensory Evaluations:</u>

Thirty-four lots of wine (23 white, 11 red including a red and a white control) were made from breeding program selections and cultivars in 2021. Brix, pH, titratable acidity, and yeast assimilable nitrogen (YAN) were analyzed at harvest, and musts were chaptalized to 20˚Brix if necessary. Reds were fermented on the skins with yeast strain GRE, and malolactic fermentation induced with LAB culture VP41. Whites were pressed, settled overnight, racked, and inoculated with yeast strain EC1118. All wines are analyzed for pH, titratable acidity, and organic acids (tartrate, malate, lactate, and acetic) via HPLC, and will be screened by a trained sensory panel.

<u>Sensory evaluation</u>: No wines have been evaluated since the 2018 harvest, due to the ongoing pandemic. As soon as it's safe to organize and conduct tastings again, 2019 through 2021 wines will be evaluated by sensory panels. Wines from the multi-year NY81.0315.17 yeast trial were evaluated a cooperative effort with Alina Stelick of the Sensory Evaluation Center, Food Science, Ithaca. An in-home consumer evaluation test was developed to assess customer impressions of wines in a setting typical of normal wine consumption; data from this study indicate that 71B was the preferred yeast strain for NY81.0315.17. 71B samples across all three vintages as well as the 2019 R2 and 2019 GRE samples were found to be significantly different compared to the blind control samples and were rated as "moderately different" compared to the control (yeast strain ECC1118). The differences were primarily

attributed to differences in flavor, which panelists described as "sweeter" and "fruitier" compared to the control in their open-ended comments. Other yeast strains in this study included DV10, 58W3, Allegro and C.

2021 breeding program analyses of vineyard performance:

Field Data Collection: Observations of vineyard performance in 2021 (including prior years) for program selections and varieties, along with cold hardiness evaluations, disease resistance scores, and wine-related data are summarized in the appendices (Tables 1 to 3)[1].

Comparative vineyard performance data are collected annually (Table 1). Six selections were evaluated in second test vineyards with a standard hybrid disease control program in 2021 (Table 1). Evaluation of many others was discontinued due to lack of suitability for commercialization; poor quality due to weather at harvest (e.g., rot); or we now await results from NE1720 cooperative trials. From the second test vineyard used for the disease resistance program, 23 selections were harvested in 2021 (Table 2), of which eight were harvested for the first time. The numbers reflect the focus on the program in recent years on combining disease resistance with wine quality. Many new selections are now making their way from seedling vineyards into these second test vineyards, so they can be further evaluated for viticultural and enological characteristics. Additional data are shown for selections harvested in previous seasons. Selections with low relative rankings (e.g., those with poor wine quality, disease susceptibility, overcropping tendency, susceptibility to cold damage) have been discarded each year. Nearly all harvested selections are tested for degree of midwinter bud hardiness each year, and these data are presented in Tables 1 and 2 as estimates of the temperature at which 50% bud kill is expected.

Please note that where fruit production data have been collected for only 2021, initially the fruit production (kg/vine) is low; these are young vines in their first year of fruit production. Some other seasons have reduced fruit production due to drought, or our effort to convert to high-cordon training. We also have situations where fruit clusters are used in crossing and pollination. So, while we do evaluate vine productivity, we cannot assume that our yields based on a six-vine plot will be representative of fruit production potential on a commercial per acre basis.

Among wine grapes tested under the standard hybrid disease control program (Table 1), there are several of interest, and some more recent hybrids (with vinifera parents) from crosses made in 2008 and 2010 may still hold promise. This latter group descends from vinifera grapes such as Teroldego, Merlot, Tocai Friulano, and Albariño.

Summaries of top selections from Geneva – 2nd Test Vineyards:

NY81.0315.17 – Consistently ranks very high for wine quality; descriptor list inccludes muscat notes, intense floral, peach and citrus, tangerine, grapefruit, apple, pear, and honey. In 2017, 2018, and 2019, a replicated yeast trial was conducted using fruit kindly supply by the FLCC-Cooperative Extension teaching vineyard at Anthony Road Winery. Fruit was subdivided and fermented in duplicate using seven difference yeast strains. Wine evaluations are described in the enology section of this report. Measurements indicate that NY81.0315.17 is 1 to 2 ^{o}F hardier than 'Riesling' (according to temperature of 50% bud kill in mid winter). As a bunch rot resistant alternative to 'Riesling', it will continue to undergo testing in New York and elsewhere. Own-rooted vines are weak and grafting is required. This selection is available for testing via our two cooperating nurseries, Double A Vineyards (Fredonia) and Grafted Grapevine Nursery (Clifton Springs).

A range of other breeding program selections have been chosen for further trials beyond Cornell AgriTech farms, and available cuttings have been collected for propagation. These include the following:

NY01.0609.01 – This red wine grape produced a very highly ranked and unique wine from vintage 2011, characterized as expressing muscat character with notes of rose and violet. Since 2012, it has been fermented "as a white" to investigate the possibilities of producing a muscat rosé style wine. The color of vintage 2012 was more orange than pink, and some tasters found foxy/cotton candy notes while others described floral, pear, cherry and strawberry notes. The 2013 vintage was also well-liked. Panelists detected some pleasant labrusca notes, along with cherries, cranberry, strawberry, and currants. Only one taster (of eleven) noted muscat character. Vines are very

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[1] Tabular reporting of this type of long-term research information has its inherent difficulties. Some breeding selections are tested over a long period of time, while others are discarded after only a few years of testing. Also, as newly produced selections start to fruit, data collection begins and these data are included along with data from selections that have already been tested for multiple years. Since every season is different, accurate comparisons among selections are difficult when the years of data collection differ. However, it is still possible to utilize these tables to understand the basic characteristics of each of these selections: productivity, vine size, winter hardiness, disease resistance, and wine quality. These data help to determine which selections show potential for more advanced, replicated trials.

productive (Table 1), with large clusters and have good resistance to powdery and downy mildews under a hybrid spray program. The predicted temperature for 50% bud kill is -13.2 ºF.

NY03.0207.06 – This white wine selection produces a good canopy with moderate resistance to foliar powdery and downy mildews. Fruit are mostly rot-resistance but some sour rot has been noted in some years. Wines have been highly ranked by tasting panels, with aromas described as melon, pear, spicy and pineapple, while the palate descriptors included good structure and body; and mentions of citrus, pineapple apple and Riesling-like characters. The predicted temperature for 50% bud kill is -17.4 ºF.

Disease Resistance Breeding:

The grape breeding program made a total 21 wine grape crosses in 2021, most targeting combinations of disease resistance with high quality. A central focus of the crossing program was the incorporation of powdery mildew disease resistance from *Vitis amurensis* – this particular gene was recently identified in the "*Vitis*Gen2" project. We also made four crosses between highly disease resistant selections and Saperavi; pollen was kindly supplied by Standing Stone Vineyards. A total of 10,421 seed were produced in 2021, of which 3,802 were stratified for germination in February 2022.

DNA marker technology, combined with in-season evaluation of disease resistance in a no-spray nursery, is markedly improving the efficiency of disease resistance breeding. DNA markers can be detected in DNA extracted from each seedling, and we are using this technology with the national *Vitis*Gen USDA-NIFA funded projects to accurately predict which seedlings harbor important genes and gene combinations for disease resistance. The correlation with field-observed disease resistance is extremely high.

From seedlings grown in recent years, most underwent DNA-assisted selection for multiple disease resistance genes coding for both downy and powdery mildew resistance. Approximately 90% of all seedlings were discarded prior to nursery planting between 2015-2018. After one season in the nursery, remaining vines were planted to the permanent vineyard sites. In 2019-21, ca. 50% of seedlings were retained, but labeled according to presence/absence of desirable genes according to DNA testing results. Resistance to disease is field-assessed each season.

Each year, program selections and seedlings grown under no-spray conditions in both nursery and vineyard plantings are evaluated for symptoms of disease. While **we never recommend no-spray conditions in commercial settings**, we carry out our evaluations under very stressful conditions along with control (resistant and susceptible) vines in every row. Conditions were less favorable for powdery mildew development between 2017 and 2019, and highly favorable for downy in 2021. We rate both diseases, in addition to anthracnose, phomopsis, bunch rot and black rot, on test selections and controls every year.

Thousands of seedlings are grown each year, but one group has been particularly noteworthy. In 2006, crosses were made between selections carrying both the *Run1* gene for powdery mildew resistance and the *Rpv1* gene for downy mildew resistance (from the muscadine grape) and other selections harboring powdery mildew resistance from other species. In these populations, very high percentages of seedlings were saved in the 2007 nursery since they showed minimal amounts of downy and powdery mildew late into the fall. Seedlings harboring *Run1/Rpv1* continue to show promise and more recent efforts have focused on combining these with other genes for powdery and downy mildew resistance to better assure that resistance won't be overcome by the pathogen in the future. NY06.0514.06 is one of the selections arising from our use of *Run1/Rpv1* and has been propagated for further trials beyond Geneva, in cooperation with the NE1720 National Cultivar Trial project.

NY06.0514.06 – a highly disease resistant red wine selection. This selection carries the *Run1 / Rpv1* genes, as well as *Ren2* (for powdery mildew resistance) from *V. cinerea*. Also has excellent resistance to bunch rot, and moderate resistance to black rot. The buds are moderately winter hardy, with expected temperature of 50% bud kill in mid-winter measured to be -15 ºF. Vines are on the small side and grafting on phylloxera-resistant stocks should be tested. Fruit yields seem low (Table 2) due to the use of many clusters for crossing each year; spurs are not fruitful at the base, as well. Wine descriptors are as follows: fruity with notes of blackberry, plum, cherry; slightly herbaceous, with green pepper noted; good body and medium tannin; also, some have detected chocolate notes.

From crosses made in 2015 and 2016, we now have a range of promising **juice grape** seedlings harboring *Run1 / Rpv1*. These are being propagated already for further trials to better assess juice quality. Some are early-ripening as well.

<u>Technology transfer:</u>

On many occasions we discuss the qualities of new grape varieties with members of the wine industry. We respond to extension phone calls and emails frequently. In many of these communications and at visits to wineries and off-site trials, alternative grape varieties are discussed. While on-site field visits have not been possible during the pandemic, we hope to make up for lost time when we can.

<u>Acknowledgments</u>

Special thanks go to Chris Gerling, Mike Colizzi, Steve Luce, Lex Pike, Phil Simmons, Luann Preston-Wilsey, Pam Raes, and Alina Steck for their technical expertise, enthusiasm, assistance, and thoughtful contributions to this project.

Resistant selections in second-test plantings (all with Run1/Rpv1 genes): (some are mentioned in Tables 2 and 3)



NY10.0927.02, from a cross made with 'Aromella' in 2010.	NY12.0107.01 – 2012 cross with a background including vinifera, 'Frontenac', other hybrids.	NY12.0118.01 – complex background includes 'Villaris' from Germany; cross made in 2012.

<u>Some of the Most Recent Seedlings (photographed in 2021):</u>



NY16.0507. – a new disease resistant seedling selection with *Run1* and *Ren4*, from a cross made in 2016,.	NY15.0420. – a disease resistant seedling from a 2015 cross with a *Run1* parent and a 'Cayuga White' grandparent.	NY13.0215.02 – disease resistant seedling descending from 06.0514.06.

Appendix

Impact Statement:
Two new varieties were released in 2013 (‘Aromella’ and ‘Arandell’), and the first commercial wine of ‘Aromella’ (from Goose Watch) went on sale in 2014, while ‘Arandell’ varietals reached the marketplace ca. 2016. In 2020, the ‘Arandell’ wine made by Briedé Family Vineyards won a Silver Medal at the 2020 International Wine and Spirits Competition – Sommelier Challenge, while an ‘Aromella’ wine from Weymouth Winery (Ohio) won a double gold at the 2022 San Francisco Chronicle Wine Competition. Prior releases such as ‘Cayuga White’ (1972), ‘Chardonel’ (1991), ‘Traminette’ (1996), ‘Noiret’ (2006), ‘Corot noir’ (2006), ‘Valvin Muscat’ (2006) and ‘Geneva Red’ (2003) have gained widespread acceptance and account for millions of dollars of wine production annually in New York and in other eastern states.

Publications and presentations resulting from this project:

- Presented a lecture on grapevine breeding (2.5 hr) to a section of the viticulture class at Finger Lakes Community College. 2.5 hours x 25 students. Geneva, NY (online), April 19, 2021. (Reisch)
- Presented on grapevine breeding and genetics to the Viticulture class at the Univ. of Massachusetts, Amherst. (one hour, 20 students, via Zoom.) February 15, 2021. (Reisch)
- “Wine Grape Breeding and the *Vitis*Gen2 SCRI Project”, annual meeting of the Ohio Grape and Wine Conference, remote presentation, February 16, 2021. One hour x 200 attendees.
- Recent extension-oriented outputs from “*Vitis*Gen2” include:
- http://www.vitisgen2.org/webinars/
- http://www.vitisgen2.org/home/popular-press/
- Grape Selections from the VitisGen Projects

See also:

http://www.vitisgen2.org

(End of report; See also Appendix Tables 1-3.

Table 1. Summary of vineyard characteristics of breeding selections and varieties under test.

Selections	Years of Data	PM	DM	Fruit Yield/Vine (kg)	Cluster Wt (kg)	Berry Wt (gm)	50% Bud Kill (°F)	Pruning Wt. (lb)
Reds								
08.0702.01	16-20	1.3	1.3	4.48	0.12	1.34	-15.5	3.12
08.0702.02	16-20	1.0	1.3	3.88	0.12	1.03	-11.0	3.76
08.0702.03	17, 19, 20	1.0	1.3	2.90		1.15	-11.7	
08.0710.01	16-21	1.0	1.0	5.27	0.12	1.88	-16.3	2.05
10.0937.05	20	1.0	1.0	1.6	0.09		-17.5	
Chambourcin	97-02,06-21	3.9	1.1	8.97	0.19	2.11	-13.0	2.63
Red Pressed as White								
01.0609.01	09-15,17-19	1.6	1.1	12.7	0.19	2.49	-13.2	3.27
Whites								
03.0207.06	12-21	1.4	2.0	7.79	0.10	1.24	-17.4	2.23
03.0208.03	10-19	1.7	2.3	6.17	0.11	1.68	-15.9	2.19
04.0303.02	13-17,19	1.4	1.2	6.74		2.58	-15.9	4.75
04.0303.04	13-16, 18,19	2.0	2.0	7.58	0.10		-15.6	3.64
05.0403.01	13-19	1.3	1.8	8.67	0.12	1.92	-16.7	3.36
05.0403.03	13,14,17,18, 19	1.4	2.2	6.86	0.13	1.69	-16.0	4.28
05.0403.09	13-19	1.8	1.8	5.73	0.13	1.73	-18.8	3.90
08.0721.02	18-21	1.7	1.0	4.67			-14.7	
08.0721.03	15-21	1.0	1.4	7.71	0.21	1.31	-11.1	6.62
08.0722.01	17-21	1.2	1.4	4.55	0.16	1.15	-12.7	
08.0722.02	17, 19	0.5	1.5	1.04	0.09		-12.4	
08.0726.01	20	1.0	1.0	2.15	0.07		-16.6	
Cayuga White	10-15, 18-21	2.7	1.8	11.5	0.19	2.74	-11.5	2.63

Key:
Pruning Weight = average kg per vine.
50% Bud Kill = predicted temperature (°F) at which 50% of primary buds would die according to freezing tests run on dormant buds in mid-winter.
DM Ave. and PM Ave. = Average ratings of foliar downy and powdery mildew severity during severe test years between 2000 and 2021.
Disease Rating System: 1 = 1-3% foliar infection, 2 = 3-12%, 3 = 12-25%, 4 = 25-50%, 5 = >50%.
Pruning weights and 50% bud kill data are not yet complete for the 2021 crop year.

Selections	Years of Data	PM	DM	Fruit/Vine (kg)	Cluster Wt (kg)	Berry Wt (gm)	50% Bud Kill (°F)	Pruning Wt. (lb)
Reds								
06.0514.06	13, 14, 15, 16, 17, 18, 19, 20,21	1.0	1.2	4.91	0.15	1.58	-15.3	1.27
06.0514.07	18, 19, 20,21	1.8	1.0	6.57			-15.3	
07.0608.01	14,17, 18, 19, 20,21	2.0	1.2	3.20	0.13	0.94	-19.1	1.59
08.0709.02	20,21	1.7	1.3	6.19	0.10		-17.4	
10.0925.01	20	1.0	1.0	1.89	0.19	—	-13.7	—
10.0925.02	19, 20,21	1.3	1.0	5.86			-16.3	
10.0925.03	19, 20,21	1.3	1.3	8.61			-10.1	
12.0108.01	20,21	1.0	1.0	4.71	0.17		-16.2	
12.0118.01	20	1.0	1.0	1.54	0.16	—	-13.8	—
Arandell	05-12,14,15,17	2.9	1.8	4.10	0.08	1.13		1.53
Whites								
06.0506.02	13,14,15,17, 19,21	1.0	1.0	2.59		1.59	-14.5	1.30
06.0508.02	17, 18, 19, 20,21	1.0	1.0	4.19		1.15	-12.7	3.41
06.0512.04	15,17, 19, 20	2.0	1.0	8.05	—	2.48	-11.3	1.18
09.0815.01	19, 20,21	1.3	1.3	6.83	0.13		-18.6	
10.0927.01	20,21	1.5	1.0	5.45	0.16		-19.9	
10.0927.02	20,21	1.0	1.0	2.21	0.12		-18.4	
10.0934.01	19, 20,21	1.3	1.0	4.97	0.15		-16.3	
10.0934.02	19, 20	1.0	1.0	3.19			-15.3	
11.0010.01	20,21	2.0	1.0	3.33	0.07		-19.1	
11.0013.01	21	3.0	2.0	6.31	0.08			
12.0107.01	20,21	1.5	1.0	2.85	0.15		-14.1	
12.0107.03	21	2.0	1.0	2.36	0.15			
12.0112.01	21	1.0	1.0	5.84	0.12			
12.0114.01	21	2.0	1.0	3.22	0.08			
12.0118.01	21	3.0	1.0	6.35	0.11			
12.0118.02	21	2.0	1.0	5.35	0.14			
13.0205.01	21	3.0	1.0	5.35	0.07			
13.0205.02	20	1.5	1.5	2.57	0.12		-16.4	
13.0206.01	20	1.0	1.0	0.68	0.16		-18.7	
13.0206.02	21	1.0	2.0	1.79	0.07			

Key: Budbreak = relative order of bud break, 1 is late bud break, 5 is earliest bud break.
Pruning Weight = average pounds per vine.
50% Bud Kill = predicted temperature (°F) at which 50% of primary buds would die according to freezing tests run on dormant buds in mid-winter.
DM Ave. and PM Ave. = Average ratings of foliar downy and powdery mildew severity during the indicated years.
Disease Rating System: 1 = 1-3% foliar infection, 2 = 3-12%, 3 = 12-25%, 4 = 25-50%, 5 = >50%.
Pruning weights and 50% bud kill data are not yet complete for the 2021 crop year.

Selections	Years of Wine Data	Average of Harv. °Brix	Average of Harv. pH	Average of Harv. T.A. %	Average of Wine pH	Average of Wine T.A.%	Average of Wine Pleas.
Reds							
02.0101.01	10,12-16, 18, 19	19.6	3.05	1.00	3.13	0.94	5.02
08.0702.01	16-20	19.4	2.97	1.09	3.19	1.09	5.18
08.0702.02	16-20	20.2	2.75	1.85	2.74	2.01	3.67
08.0702.03	17, 19, 20	21.2	2.79	2.10	3.03	1.65	—
08.0710.01	16-21	21.5	2.95	1.18	3.17	1.08	3.24
10.0937.05	20, 21	23.0	2.88	2.01	3.22	1.50	—
Chambourcin	97-12,14-17, 18,	20.4	3.02	1.32	3.21	1.03	5.26
Red Pressed as White (for Rosé)							
01.0609.01	9-15, 17, 18, 19	18.5	3.14	0.99	3.23	1.10	5.35
Whites							
03.0207.06	12-21	19.4	2.93	1.33	2.90	1.36	5.09
03.0208.03	10-19	20.4	3.02	1.10	2.97	1.16	4.85
03.0208.09	11-18	20.2	2.91	1.10	2.86	1.26	4.99
04.0303.02	13-17, 19	18.4	3.08	1.25	3.05	1.37	5.75
04.0303.04	13-16, 18, 19	19.8	3.09	0.94	3.17	1.03	5.65
05.0403.01	13-19	20.2	3.01	1.19	2.94	1.14	4.47
05.0403.02	13-18	21.1	3.12	1.03	3.13	1.12	5.20
05.0403.03	13, 14, 17-19	20.3	3.08	0.95	3.09	1.01	4.43
05.0403.09	13-19	20.5	2.84	1.63	2.70	1.72	3.88
08.0721.02	18-21	18.7	3.02	0.95	3.06	1.05	4.88
08.0721.03	15, 17, 18, 20,21	18.5	2.99	1.10	3.10	1.22	3.52
08.0722.01	17-21	18.9	3.03	1.22	3.07	1.29	4.96

08.0722.02	17, 19	19.0	3.02	1.10	3.02	1.25	4.88
08.0726.01	20	21.2	2.89	1.62	2.95	1.45	—
Cayuga White	96-21	17.5	2.99	1.08	3.00	1.07	4.78
Selections from the Disease Resistance Breeding Vineyard							
Reds							
06.0509.01	15, 17, 18	15.7	3.00	1.17	3.14	1.22	4.98
06.0514.06	13-21	20.1	3.12	0.92	3.42	0.86	5.49
06.0514.07	18-21	19.8	2.88	1.32	3.20	1.21	5.00
07.0608.01	14, 17-21	21.5	2.97	1.30	3.31	1.19	5.00
08.0709.02	19-21	19.4	2.85	1.69	3.11	1.34	—
10.0925.01	20	18.4	2.94	0.97	3.14	1.20	—
10.0925.02	19,21	19.0	3.03	0.97	3.36	1.14	—
10.0925.03	19,21	19.4	2.93	1.18	3.18	1.25	—
12.0107.02	21	18.5	2.83	1.91	3.10	1.48	—
12.0108.01	20, 21	18.5	3.02	1.16	3.55	0.91	—
12.0118.01	20	23.3	2.81	1.13	3.24	1.18	—
Arandell	05-12,14-17, 20	19.7	3.28	1.08	3.81	0.76	4.82
Whites							
06.0506.02	13-15, 17, 19, 21	18.9	2.98	1.37	2.97	1.13	4.99
06.0508.02	20	19.4	3.02	0.98	3.07	0.92	3.73
06.0512.04	15, 17, 19, 20	19.4	2.91	1.13	2.89	1.23	4.14
06.0514.09	15, 18, 19	20.6	3.01	0.97	2.95	0.72	5.17
06.0514.12	15, 17	19.0	2.84	1.54	2.82	1.53	4.43
09.0815.01	20	21.1	2.81	1.52	2.87	1.51	—
10.0927.01	20	20.8	2.99	1.22	3.09	1.30	—
10.0927.02	20	19.5	2.84	1.46	3.01		—
10.0934.01	19	21.0	2.86	1.31	2.98	1.37	—
10.0934.02	19	21.8	3.11	0.95	3.14	1.09	—

11.0010.01	20	21.5	2.85	1.42	2.99	1.54	—
11.0013.01	21	21.8	3.02	1.08	3.17	1.15	—
12.0107.01	20	19.9	2.76	1.49	2.81	1.57	—
12.0107.03	21	19.0	2.73	1.45	2.75	1.75	—
12.0112.01	21	21.8	3.14	0.68	3.22	0.91	—
12.0114.01	21	19.6	3.13	0.81	3.17	1.02	—
12.0118.01	21	19.0	3.09	1.03	3.13	1.12	—
12.0118.02	21	19.8	2.99	0.98	3.10	1.09	—
13.0205.01	21	17.3	2.84	0.90	2.95	1.18	—
13.0205.02	20,21	22.1	2.92	0.99	3.04		—
13.0206.01	20	21.9	2.96	1.04			—
13.0206.02	21	23.2	2.98	0.94	3.00	1.04	—

NOTE: wine pleas. ratings only available through 2018