NYWGF RESEARCH - FINAL REPORT

Funding for fiscal year: 2022

SECTION 1:

Project title: Evaluation of Winegrape Cultivars and Clones on Long Island

Principal Investigator with contact info: Alice Wise, Sr. Issue Educator/Viticulturist
Cornell Cooperative Extension of Suffolk County
423 Griffing Ave., Suite 100, Riverhead, NY, 11901
Ph. 631.727.3595; fax 631.727.3611; avw1@cornell.edu

Co-PI Collaborators with contact info: none

New Research ☐ **Continued Research** ☒

Amount Funded **$** 32,203

SECTION 2:

Project Summary Impact Statement: In 2022, 40 winegrape varieties were evaluated at the Long Island Horticultural Research and Extension Center in Riverhead. Vineyard data was presented to industry via several formats. This information assists growers in the selection of varieties, an important decision given the expense of planting (>$30,000/acre) and the long-term nature of a vineyard. Planting varieties that perform poorly or are not suited to the winemaking or marketing goals of a business can be a costly mistake.

Objectives:
1. Vineyard evaluation of the core varieties – Evaluate 9 Chardonnay and 6 Merlot clones.
2. Evaluate new vinifera cultivars – Explore 33 new and less common selections.
3. Screen disease resistant hybrids - Evaluate degree of disease resistance and fruit quality in 5 hybrids.

Activities/Methods:
In 2022, this vineyard consisted of 1.5 acres of vinifera and 0.28 acres of bearing disease resistant hybrids. It is planted on a well-drained sandy loam soil. Vines are spaced 8x6 with VSP training and drip irrigation. Canopy management practices include shoot thinning to 4-5 shoots/ft. row, cluster zone leaf removal, crop adjustment and canopy hedging. Drip irrigation was used sparingly this season. The area under vines was maintained with a tractor-mounted mower. Young vines were hand weeded and/or weeds were controlled with herbicide. Each vine was harvested individually to determine cluster number, crop weight per vine and average cluster weight. From each variety/clone, 100 berries were randomly sampled to obtain average berry weight, Brix, titratable acidity, pH.

Planting: Four new hybrid varieties were planted in May, 2022 - Merlot Kanthus, Cabernet Volos, Sauvignon Kretos and Sauvignon Rytos. The latter two are hybrids of Sauvignon Blanc. All are VCR hybrids (from Rauscedo nursery in Italy) with resistance to downy and powdery mildew.

Herbicide damage: The vineyard suffered widespread injury due to growth-regulating herbicide drift from a nearby property in late April and again in late May. The situation was addressed via an on-site meeting. The late April incident caused moderate to severe damage on 100% of the rootstock vines. Amazingly, most grew out of the symptoms; only a few suffered season-long effects. The winegrape varieties displayed symptoms ranging from minor to severe (distorted leaves, stunted shoots, disrupted fruit set). Mature, full-size winegrape varieties seemed to tolerate the damage. Young vines, certain varieties such as Grüner Veltliner, and own-rooted vines suffered the most. Many of these vines were cluster thinned heavily; crop was removed entirely on a dozen or so vines. Set was poor on some vines.

Pest management: Diseases were well controlled, though minor Phomopsis occurred in spots in both the vinifera and hybrids. The new hybrids were sprayed with fungicide twice, remaining clean all season. The bearing hybrids (Itasca, NY81, Fleurtai, Soreli, Regent) received 2 fungicides post-fruit set (total of 6) and remained clean all season. No botrycides were used in either block. Insects, including grape berry moth, seemed to be more problematic on the hybrids. The hybrids only were treated with one insecticide due to a heavy Japanese beetle infestation. At veraison, the early ripening hybrids were bombarded by thirsty birds due to the warm, dry conditions in August. We were forced to double net, that is, apply over-the-row nets (3/4” mesh) on top of fine mesh side netting. Birds were mostly not a concern with the vinifera, which had only the fine mesh side netting.

Harvest: Harvest was based on ripeness, fruit integrity and scheduling. *Botrytis* bunch rot (BBR) was virtually non-existent. Minor sour rot occurred in Auxerrois, Grüner Veltliner, Mencía, Pinot Noir, Dornfelder, Saperavi and Zweigelt, overall less than 2021. Varieties that typically struggle with sour rot, Aligoté, Sangiovese, Sauvignon Blanc and Lemberger, were clean. Saperavi and Dornfelder were slightly overripe when picked as fruit was starting to break down. Fruit flies and yellow jackets were common in early varieties such as Pinot Noir, Zweigelt and Dornfelder but dwindled as harvest progressed. Sugars were modest, mostly 20-22°. Acids were lower than the last two seasons, very low in some varieties. The 2022 season produced clean, good quality fruit.

Results/Outcomes/Next Steps:

Yield component results and brief descriptions of performance are included in attached files. These results, along with a more descriptive PowerPoint presentation, will be posted to the CCE-SC grape program website in February, 2023. Photos taken during the 2022 harvest are available upon request.

The installation of one acre of winegrapes starts around $30,000; consequently, a poorly performing variety can be a costly mistake. In a grower survey, 90% of respondents indicated they had used information from this vineyard in their planting decisions. This has

included plantings of Dijon Chardonnay clones, Albarino, Auxerrois, Dornfelder, Lemberger, Malvasia, Muscat Ottonel, Pinotage and Verdejo. Disease resistant hybrids were successfully managed with a 50% reduction in fungicide use. Though currently there are no commercial hybrid plantings on Long Island, several growers have expressed an interest.

Based on extensive discussions with the Grape Research Advisory Committee, the 2023 season will be the final season for the 1.5 a vinifera portion of this trial. No additional funding for the vinifera portion will be requested in the January, 2023 RFP. The 2023 funding request will address only the hybrid block as that block will continue to be maintained. That currently stands at just under 0.5 acres though there is room to plant a few additional selections. Hybrids may well represent the future of viticulture in the eastern US due to their resistance to downy and powdery mildew. In the LIHREC vineyard, they are managed with less than half of the fungicides required for the vinifera. They are earlier ripening thereby reducing the risk of losing fruit to bad weather or animal depredation. Hybrids are slowly being embraced in many wine regions of Europe. With breeding programs in Europe, the US and in fact at Cornell producing new, high-quality selections, these merit evaluation to assess their suitability for use in eastern viticulture.

Technology Transfer Plan:
Articles on the trial appeared in the technical publications Long Island Fruit and Vegetable Update (circ. 220) and will appear in winter, 2023 issues of Suffolk County Agricultural News (circ. 330). The trial was repeatedly referenced in the statewide Veraison to Harvest newsletters (https://grapesandwine.cals.cornell.edu/newsletters/veraison-harvest). Research reports and yield component results are posted annually on our website - http://ccesuffolk.org/grape-program, >2000 hits in 2022. The annual LIHREC Plant Science Day, a vineyard tour/discussion and berry tasting was held Sept. 15, 2022. Fifteen growers attended the vineyard tour (unfortunately for attendance, harvest was already underway). A PowerPoint presentation summarizing the vineyards results is posted annually on the CCE-SC grape program website. A presentation was given at the 2023 Long Island Agricultural Forum Viticulture Session, Jan. 12, 2023 (28 attendees). Finally, the LIHREC Annual Report will be posted on its website late winter (https://cals.cornell.edu/agricultural-experiment-station/research-farms/long-island-horticultural-research-and-extension-center-lihrec). Each researcher writes a synopsis of projects. This is useful to direct viewers to other resources such as the grape program website.

Attachments: The 2022 yield components chart is attached. A sample slide is included, representative of the PowerPoint presentation given at the 2023 Long Island Ag Forum. This presentation will also be uploaded to the CCE grape program website.

SECTION 3:

Project summary and objectives:
In 2022, 40 winegrape varieties were evaluated at the Long Island Horticultural Research and Extension Center in Riverhead. Data and information was collected on all aspects of vineyard performance including growth habit, pest management, yield and quality

characteristics. This information assists growers in the selection of varieties, an important decision given the expense of planting (>$30,000/acre) and the long-term nature of a vineyard. Planting varieties that perform poorly in an eastern maritime climate or are not suited to the winemaking or marketing goals of a business can be a costly mistake.

Importance of research to the NY wine industry:
According to the NY Wine & Grape Foundation, the NY grape and wine industries generate >$6.5 billion in direct economic activity and $2.4 billion in total taxes. Clearly the industry is a critical part of the NY economy. Modest investment in research programs helps to ensure its continued success. The cost of establishing a vineyard on Long Island represents a major investment in time and money (> $30,000/acre). Information generated from other regions is helpful but inadequately address the challenges of grape growing in an eastern maritime climate. Evaluating the suitability of new winegrape varieties is a fundamental component of premium wine production, benefitting winegrowers throughout New York. Data is generated on yield, fruit quality, vine management, susceptibility to pests and nutritional requirements, allowing growers to gauge both vineyard suitability and potential market acceptance.

Project Results/next steps:
With almost 70 varieties evaluated over the last 30 years, this trial has shown growers the advantages and disadvantages of diversifying their variety selection. In a grower survey, 90% of respondents indicated they had used information from this vineyard in their planting decisions including plantings of Dijon Chardonnay clones, Albarino, Auxerrois, Dornfelder, Grüner Veltliner, Lemberger, Malvasia, Muscat Ottonel, Pinotage and Verdejo. There is great interest in several of the newer selections such as Rkatsiteli, Mencía and Tannat. Disease resistant hybrids were successfully managed with a substantial reduction in fungicide use. Continued evaluation is necessary to assess the degree of resistance to downy and powdery mildew under different climatic conditions. After the 2023 season, the vinifera portion of this trial will end; however, the hybrid trial will be expanded, reflecting the interest of both growers and consumers in varieties requiring fewer inputs. It is essential that these varieties demonstrate they are capable of producing vinifera-quality fruit, historically a challenge with hybrids.

Supporting attachments: An example of a slide featuring the northern Italian variety Arneis, from the PowerPoint presentation that will be uploaded to the CCE-SC grape program website.

Evaluation of Winegrape Varieties and Clones, 2022: Yield component results
Progress report to the NY Wine & Grape Foundation, A.Wise, January, 2023

Overall observations: Fruit was clean, ripe and flavorful at harvest. *Botrytis* was minimal. Minor sour rot occurred in a few varieties. Compared to 2021, Brix were slightly higher and acids were similar or lower. Clusters were slightly smaller in 2022 primarily due to lower berry weights. Drift from two growth regulating herbicide applications stunted the growth of younger vines, certain varieties, and own-rooted vines. Where set was profoundly affected, clusters were not included in yield component calculations.

Chardonnay: Chardonnay is valued for its consistency and quality and generally did well in 2022. All clones had yields on a par with previous seasons except for clone 5, a large-clustered clone that had larger than normal clusters due to an increase in berry set. All vines suffered from damage by growth regulating herbicide drift; however, own-rooted vines were more affected than grafted (3309, 101-14). Fruit was thinned or removed entirely on vines with severe damage. This same phenomenon occurred in Merlot.

Table 1. Yield components of Chardonnay clones by rootstock, LIHREC vineyard, 2022

Clone	Harvest Date	Clusters/vine			Crop weight, lbs./vine[1]			Cluster wt., lbs./cluster			
		3309	101-14	Own	3309	101-14	Own	2021 3309	2022 3309	2022 101-14	2022 Own
5	Sept.27	12.8	12.6	12.8	7.6	7.8	7.0	0.50	0.60	0.62	0.54
15	"	19.0	21.8	18.2	6.1	6.2	4.8	0.33	0.33	0.30	0.27
17	"	19.6	18.5	12.6	6.4	6.3	3.3	0.31	0.33	0.34	0.25
75	Sept.28	18.4	▪	18.5	5.8	▪	5.9	0.36	0.32	▪	0.32
76	"	20.9	▪	▪	6.9	▪	▪	0.37	0.33	▪	▪
78	"	20.3	▪	18.5	6.9	▪	4.6	0.36	0.34	▪	0.24
95	"	19.9	▪	14.5	6.5	▪	2.6	0.35	0.33	▪	0.18
96	"	17.3	▪	21.5	7.5	▪	8.1	0.44	0.44	▪	0.38
GS[2]	"	▪	18.8	▪	▪	4.7	▪	▪	▪	0.26	▪

1 – 7 lbs/vine is equivalent to ~ 3.2 tons/acre. 2 – GS = grower (field) selection.
▪ Indicates vines not replicated on that rootstock.

Table 2. Yield components of Chardonnay clones by rootstock, LIHREC vineyard, 2022

Clone	Berries/cluster				Berry weight – grams			
	2021	2022			2021	2022		
	3309	3309	101-14	own	3309	3309	101-14	own
5	153.0	198.3	176.2	165.7	1.82	1.66	1.70	1.74
15	117.4	107.9	104.0	96.6	1.74	1.50	1.64	1.58
17	108.6	106.3	121.5	95.2	1.71	1.47	1.61	1.57
75	▪	126.4	▪	113.1	▪	1.44	▪	1.52
76	▪	124.6	▪	▪	▪	1.62	▪	▪
78	▪	129.0	▪	86.6	▪	1.59	▪	1.50
95	▪	109.2	▪	70.9	▪	1.55	▪	1.52
96	130.0	141.1	▪	123.8	1.75	1.67	▪	1.64
GS[1]	▪	▪	▪	▪	▪	▪	▪	▪

1 – GS = grower (field) selection. ▪ Indicates vines not replicated on that rootstock or data not collected.

Table 3. Fruit ripening, Chardonnay clones /3309, LIHREC vineyard, 2021-2022

Clone	°Brix		TA, g/l		pH	
	2021	2022	2021	2022	2021	2022
5	20.0	20.6	6.75	7.8	3.22	3.42
15	20.7	21.9	6.75	6.6	3.40	3.38
17	19.8	21.1	6.30	6.3	3.38	3.48
75	▪	21.4	▪	6.0	▪	3.48
76	▪	20.9	▪	7.8	▪	3.37
78	▪	21.2	▪	6.9	▪	3.44
95	▪	20.9	▪	6.6	▪	3.38
96	19.9	21.1	5.1	6.3	3.56	3.43
GS[1]	▪	▪	▪	▪	▪	▪

1 – GS = grower (field) selection.
▪ Indicates vines not replicated on that rootstock or data not collected.

White varieties other than Chardonnay: Harvest started with Itasca on Sept. 1. The hybrids are grown in a VSP system, not optimal for yield but our equipment/vineyard spacing is designed for VSP. Fleurtai and Soreli, in their 3rd leaf, were heavily thinned due to herbicide damage. Among the vinifera whites, Brix were modest, perhaps due to the impact of herbicide damage. The stand out performer was Sauvignon Blanc both in terms of yield and fruit quality.

Table 4. Performance of white winegrape varieties, LIHREC vineyard, 2022

Variety	Harvest date	Clust. no./vine	Crop wt. lbs./vine	Cluster wt. lbs./clust.	Berries/ cluster	Berry wt.- g.	°Brix	TA g/l	pH
Albariño /101-14[1]	Sept.21	20.3	6.2	0.31	114.7	1.40	20.9	8.1	3.26
Aligoté 1 /3309	Sept.20	17.2	9.5	0.55	146.8	1.95	19.1	6.6	3.51
Arneis /101-14	Sept.21	13.4	5.9	0.44	144.7	1.73	22.7	5.4	3.29
Auxerrois 45 /101-14	Sept.19	18.6	8.5	0.46	129.7	2.11	20.2	4.2	3.51
Fleurtai /101-14[3]	Sept.8	9.9	3.1	0.32	103.3	1.59	23.4	3.9	3.57
Gewürz 1 /3309	Sept. 20	25.5	7.1	0.27	98.4	1.73	21.1	6.3	3.64
Gewürz 3 /3309	"	24.3	9.0	0.37	113.0	1.69	20.7	5.4	3.51
Grüner Veltliner /14	Sept.19	10.9	7.8	0.74	184.8	2.04	20.8	5.7	3.47
Itasca /own	Sept.1	34.1	5.8	0.17	72.9	1.55	24.2	8.1	3.24

Malvasia Bianca /3309	Sept.20	9.8	6.4	0.65	125.4	3.07	20.9	5.7	3.53

Table 4, continued. Performance of white winegrape varieties, LIHREC vineyard, 2022

Variety	Harvest date	Clust. no./vine	Crop wt. lbs/vine[4]	Cluster wt. lbs./clust.	Berries/ cluster	Berry wt.- g.	°Brix	TA g/l	pH
Moscato Giallo /3309	Sept.19	16.4	7.7	0.47	99.6	2.93	18.0	6.0	3.40
Muscat Ottonel 1/09	Sept.20	22.8	7.5	0.33	77.5	2.90	20.0	4.5	3.74
NY 81 /3309[2]	Sept.20	13.0	6.0	0.46	133.6	1.82	22.9	7.5	3.30
Petit Manseng/14	Oct.19	14.7	6.2	0.42	162.7	1.35	26.3	9.0	2.99
Pinot Gris 146 /3309	Sept.20	21.8	6.5	0.30	105.1	1.35	21.2	5.25	3.57
Pinot Gris 152 /3309	"	20.8	5.5	0.26	98.0	1.40	20.6	5.25	3.60
Rkatsiteli /3309	Sept.21	12.0	7.5	0.63	155.1	2.44	19.2	7.2	3.10
Sauv.Blanc 1 /3309	Sept.19	22.5	8.1	0.36	117.2	1.38	22.2	6.9	3.25
Sauv.Blanc 376 /101-14	"	22.7	8.0	0.35	112.0	1.87	22.4	5.7	3.44
Sauv.Blanc 530 /101-14	"	22.7	7.3	0.32	126.9	1.60	22.3	5.7	3.41
Semillon 2 /3309	Sept.20	19.3	7.6	0.40	102.7	2.01	21.0	6.6	3.33
Semillon 3 /3309	"	19.0	7.8	0.41	105.2	2.54	19.6	5.25	3.44
Soreli /101-14[3]	Sept.8	9.6	4.7	0.48	165.6	1.47	21.2	5.25	3.23
Tocai Friulano 1/14	Sept.20	17.2	5.3	0.31	102.6	1.71	20.1	4.8	3.62
Verdejo /3309	"	15.1	8.1	0.54	112.2	2.42	19.9	5.4	3.52
Vermentino /5BB	Sept.21	15.2	7.0	0.47	75.6	3.77	19.5	7.2	3.44

1 – Leaf roll infected vines. 2 – Riesling x Cayuga White hybrid.
3 – Hybrids with the vinifera Tocai Friulano as a parent. 4 – 7 lbs/vine = ~3.2 tons/a.

Merlot: Merlot clusters have been trending large the last few years largely due to increases in berry set. Berry weight was lower in 2022 compared to 2021. Merlot vines across the board were affected by the herbicide drift with Merlot 8 and 314 particularly sensitive. Certain panels of own-rooted vines were devastated, necessitating the thinning or removal of crop. Overall, Merlot in this block performed reasonably well but we had questions about the impact of herbicide injury as the Brix were much lower than what was seen in industry. Waiting another week or two

to harvest was considered but the canopies were shutting down. Also, acids were already quite low by the harvest date.

Table 5. Yield components of Merlot clones by rootstock, LIHREC vineyard, 2022

Clone	Harvest date	Clusters/vine			Crop weight, lbs./vine			Cluster wt., lbs./cluster			
		3309	101-14	Own	3309	101-14	Own	3309 2021	3309 2022	101-14 2022	Own 2022
1	Oct.10	13.7	13.9	13.0	6.7	6.9	5.8	0.51	0.49	0.50	0.44
3	"	13.8	13.3	13.7	6.3	6.6	5.9	0.51	0.46	0.51	0.44
6	"	13.7	▪	▪	6.5	▪	▪	0.51	0.48	▪	▪
8	Oct.11	14.4	13.5	14.9	6.3	5.8	4.9	0.40	0.44	0.43	0.33
181	"	11.8	▪	▪	7.6	▪	▪	0.61	0.65	▪	▪
314	"	10.0	▪	▪	5.7	▪	▪	0.61	0.58	▪	▪

▪ Indicates vines not replicated on that rootstock. 7 lbs/vine is equivalent to ~ 3.2 tons/acre.

Table 6. Yield components of Merlot clones by rootstock, LIHREC vineyard, 2021-22

Clone	Berries/cluster				Berry weight – grams			
	2021	2022			2021	2022		
	3309	3309	101-14	Own	3309	3309	101-14	own
1	147.3	166.7	166.1	132.0	1.97	1.89	1.93	1.86
3	143.3	▪	▪	137.7	2.03	▪	▪	1.86
6	146.3	148.7	▪	▪	1.90	1.75	▪	▪
8	127.0	133.1	124.5	99.3	1.86	1.73	▪	▪
181	164.7	174.8	▪	▪	1.97	1.31	▪	▪
314	160.3	174.6	▪	▪	1.91	1.83	▪	▪

▪ Indicates vines not replicated on that rootstock or data not collected. 7 lbs/vine is ~ 3.2 tons/acre.

Table 7. Fruit ripening, Merlot clones/C3309, LIHREC vineyard, 2021-2022

	°Brix		TA, g/l		pH	
Clone	2021	2022	2021	2022	2021	2022
1	19.8	20.0	4.8	4.5	3.72	3.69
3[1]	19.8	21.9	5.1	4.35	3.69	3.62
6	19.9	20.6	5.25	4.8	3.55	3.66
8	20.3	20.8	5.1	5.1	3.78	3.61
181	19.9	21.3	4.8	4.5	3.63	3.60
314	20.0	21.2	4.8	4.5	3.57	3.54

1– In 2022, Merlot 3 fruit analysis numbers are from M.3 / own; all others /3309.

Red varieties other than Merlot: Fruit for most varieties was physiologically ripe at modest Brix and low acids. Cabernet Franc 1, for example, had 19.9 Brix and 3.3 g/l acid, unusual numbers (see comments in Merlot section). Dornfelder and Saperavi were slightly overripe at harvest as evidenced by sour rot and flaccid, easily detached berries. Tannat, in 3rd leaf, and Mencía, in 4th leaf, both appear to be large clustered and somewhat susceptible to sour rot. Tannat, Mencía (young vines) and Zweigelt (earliest vinifera to break bud) suffered the most

from the herbicide drift with moderately-severely stunted shoots. More vigorous varieties such as Syrah and Cabernet Sauvignon displayed minimal symptoms. The latter had relatively poor berry set.

Table 8. Performance of red winegrape varieties, LIHREC vineyard, 2022

Variety/clone	Harvest date	Clust./ vine	Crop wt. lbs./vine	Clust.wt. lbs./clust	Berries/ clust.	Berry wt.-g.	°Brix	TA, g/l	pH
Barbera 2 /3309	Oct.18	16.4	7.9	0.48	84.0	3.46	23.1	9.9	3.25
Cab.Franc 1 /3309	Oct.11	15.9	7.2	0.45	145.6	1.82	19.9	3.3	3.78
Cab.Franc 332 /3309	“	13.0	5.9	0.45	141.5	1.86	19.8	3.9	3.64
Cab.Sauv.7 /3309	Oct.19	20.3	4.9	0.24	95.7	1.48	20.3	7.2	3.32
Cab.Sauv.8 /101-14	“	20.2	5.3	0.27	108.0	1.51	20.1	7.5	3.22
Cab.Sauv.11 /3309	“	20.6	5.1	0.27	102.7	1.31	20.6	8.4	3.32
Cab.Sauv.21 /3309	“	17.5	4.3	0.24	88.2	1.34	20.8	6.9	3.35
Dornfelder /3309	Sept.30	13.7	7.7	0.57	119.9	2.83	19.0	4.5	3.60
Lemberger /3309	“	13.7	6.4	0.47	130.1	2.06	20.8	6.0	3.25
Malbec 4 /3309	Oct.11	24.8	5.3	0.22	43.0	2.27	20.4	4.8	3.30
Malbec 6 /3309	“	24.5	4.9	0.19	55.6	2.30	19.5	5.7	3.42
Mencía 4 /101-14	Sept.16	12.1	6.1	0.51	137.4	2.48	19.3	5.4	3.49
Petit Verdot 2 /3309	Oct.18	23.3	5.7	0.24	126.3	1.07	23.3	8.7	3.21
Pinot Noir 4 /3309	Sept.9	19.0	6.5	0.35	118.8	1.59	19.7	6.15	3.40
Regent /101-14	Sept.30	18.3	8.2	0.45	99.8	2.47	22.3	5.1	3.51
Sangiovese 2 /3309	Oct.11	12.3	13.0	1.07	194.5	2.60	20.1	6.3	3.21
Saperavi /3309	Oct.7	12.5	8.1	0.66	169.6	2.23	23.6	8.7	3.40
Syrah 1 /3309	Oct.18	15.3	7.3	0.46	124.8	1.99	19.7	6.0	3.47
Syrah 3 /3309	“	15.5	7.4	0.48	▪	▪	▪	▪	▪
Tannat /101-14	“	7.4	4.1	0.55	159.7	1.94	21.4	7.2	3.25
Zweigelt /101-14	Sept.16	13.6	8.1	0.61	168.9	2.13	19.6	6.3	3.40

7 lbs/vine is equivalent to ~ 3.2 tons/acre. ▪ - Indicates data not collected.