VERAISON TO HARVEST

Statewide Vineyard Crop Development Update #4



Cornell University Cooperative Extension September 20, 2013 Edited by Tim Martinson and Chris Gerling

Around New York ...

Statewide (Tim Martinson).

Ripening proceeded at a moderate pace (see table p. 4-6), with gains of 0.5 (Chardonnay, Lemberger, Pinot noir) to 2.4 °Brix. (Niagara), with most gaining about 1°brix. Acids dropped by a modest 0.7 to 1.8 g/l. Minnesota cultivars at from our plots in Clayton (Table p8) gained 1 °Brix and titratable acidity dropped about 1 g/l, though still characteristically high at 13 and 18 g/l for Marquette and Frontenac, respectively. Welcome warm, sunny weather following our sampling on Monday should move things along for next week's samples.

Lake Erie (Luke Haggerty).

Early this past week we had a bit of a cold/frost scare with temperatures dipping as low as 34°F, however

the Cornell Lake Erie Research and Extension Laboratory did not receive any reports of frost damage. The extended forecast looks promising with highs in the upper 60s, lows only in the 50s, and only a slim chance of rain one day early in the week. Hopefully the dry and sunny conditions will hold down the higher pressure of *botrytis* bunch rot and downy mildew that has been showing up around the region.

Here in the Lake Erie Region nearly all of the hybrids have been picked and the focus has turned to the anticipated bulk juice grapes. The Niagara harvest is only days away with National Grape Cooperative planning to open the North East, PA location on Monday the 23 of September. The region's roadways are busy with the staging of boxes, bins, and harvesters. Boxes and bins are expected to fill fast due to the heavy crop load and large cluster and fruit size. The Concord harvest expected to start some time later next week.

Sugar accumulation has started to slow down in the Concords, but brix levels are still climbing and have increased about 1°Brix since last week. In thinned vineyards the soluble solids average around 14.5°Brix with some blocks in the 16°Brix range. The area Concord average is around 13.2°Brix. Along with sugar accumulation berry size is still on the rise as well. Adding to the size of this year's crop the average berry weight is higher than average with an approximate weight around 3.2 grams per berry.



Pinot noir on Seneca Lake. Ready to harvest, this Pinot noir block at Sawmill Creek Vineyards on East Seneca Lake is dead-on ripe, uniformly clean and free of visible fruit rots, and has great cluster exposure. Photo by Tim Martinson

Long Island (Alice Wise and Libby Tarleton).

Harvest is in full swing on Long Island with blocks of Chardonnay and Sauvignon Blanc picked this week. It is a real pleasure to pick clean, flavorful fruit in sunny, dry weather. This is what all vineyard managers live for. There is a touch of botrytis in these blocks but it is not robust and usually limited to a couple of berries. In the Cornell research vineyard in Riverhead, we picked the following:

Muscat Ottonel - 21.2° Brix, 5.85 g/l TA, pH 3.43

Malvasia Bianca - 20.7, 9.15, 3.35

Pinot Gris – 21.7, 7.65, 3.32

Sauvignon Blanc – 23.2, 9.9, 3.13

Dornfelder - 18.5, 6.75, 3.44

The Dornfelder was almost falling off the vine, bordering on overripe. The other varieties may have lasted another few days but we have to schedule to allow for the timely harvest of other varieties. Sauvignon Blanc fruit was tasty and delicious, probably some of the best SB that has come out of the research vineyard. Hopefully other NY regions are experiencing the same wonderful harvest conditions.

Hudson Valley (Steve Hoying).

Harvest continues to go well here in the Hudson Valley. The weather has calmed down with lower daytime temperatures perfect for pickers and cool nights without frost. This past week sported a high of 71 on Wednesday and a low of 42 Thursday. This pattern should continue through Saturday afternoon when showers are expected to form and remain through Monday.

Some growers are still in Chardonnay and are reporting excellent yields and high quality. All is well so far according to everyone we spoke to.

Here at the lab we have completed picking Marachel Foch, Leon Millot, Chardonnay, Pinot noir, Pinot gris, Vignoles, and Gewürztraminer. Traminette, Seyval blanc, Merlot, La Crescent, and Landot noir are all on the radar now. After we get through this rainy weekend we will reassess and begin our next harvest.

After a brief respite from bird pressure, the turkeys are back!

Finger Lakes (Hans Walter-Peterson).

The pace of harvest has picked up in recent days. Niagara, Seyval and Cayuga White have been coming off the vines this week. Crop size for all three was looking pretty big earlier this year, so it will be interesting to hear if that was still the case come harvest.

Other hybrids and bulk varieties like Geneva Red, Baco noir and Aurore have been picked with larger than average crops as well. A couple of growers have mentioned that early Concords were picking higher than their crop estimates earlier this year. Growers around Keuka Lake have been moving into Concord harvest for Constellation.

Students from the FLCC viticulture program picked the small crop of Chardonnay from second year vines in our teaching vineyard this week. I expect that commercial vineyards will start picking Chardonnay, Pinot gris and Pinot noir for still wines in the next several days. A couple of vineyards have done some selective picking of these three in areas where botrytis and/or sour rot was starting to become a concern. There still aren't massive amounts of bunch rots out there, but this will be one of those years where some fruit will need to be picked a bit earlier than ideal in order to avoid losing too much to late season rots.

Frost warnings were issued for the entire area this past Monday night and Tuesday morning, but thankfully, temperatures stayed in the mid to upper 30s according to the NEWA weather stations located in vineyards around the Finger Lakes. Rainfall has been modest so far in September (1.22" at our vineyard on Seneca Lake), which is exactly what we have been hoping for...

2013 LAKE ERIE CONCORD UPDATE

Terry Bates

Lake Erie Concord continues to progress at a relatively normal pace for the time of season. The berry curve and juice soluble solids data indicate a slightly above average increase in berry weight the past week leading to a less than predicted increase in juice soluble solids (dilution effect). Juice soluble solids from a cross section of vineyards in the Lake Erie Region average 14.6 °Brix with a range from 13.3° to 15.7° depending on the site. Niagara harvest is scheduled to start next week with Concord to follow.





Concord berry weight (top, red line) and brix (bottom) compared to long term average for standard concord vines at the CLEREL laboratory in Portland, NY.

PROJECT FOCUS: BEYOND TITRATABLE ACIDITY: ORGANIC ACID PROFILES OF VERAISON TO HARVEST SAMPLES

Chris Gerling

Each week, the *Veraison to Harvest* data table reports pH and titratable acidity (TA) as measures of the relative acidity in each grape sample. As a refresher, pH corresponds to the "strength" of the acid while TA is a quantity, reported as grams per liter, or g/L. The TA calculation that we use reports the acidity "as tartaric," meaning we pretend that all of the acid in the sample is tartaric acid. Other parts of the world report TA as different acids, but the numbers can be easily converted (just like converting gallons to liters).

People frequently wonder why we need both pH and TA. If they are both measures of acidity, shouldn't we also be able to convert one of those to get the other? Why can't we just assume that higher TA (more acid) means lower pH (remember that the pH reading lowers as the strength of acidity increases)? If all the acid really were tartaric- or any one acid- things would be simpler. The fact of the matter is that there are a few different organic acids in every grape, and we're measuring a few of the more important ones this season.

Magic Box. Using a high pressure liquid chromatograph (HPLC), we are able to separate and quantify tartaric, malic, lactic, acetic and succinic acids (Figure 1). You may have seen an HPLC on one of the crime letter shows (CSI, NCIS, QED, OU812, etc.), where the lab is able to use it to determine that some small blotch is from the tire of a 2003 Ford Focus (candy apple red) that has only been driven in the summer months in a three-county section of western Maryland.

While an HPLC is extremely useful, we still have to have a pretty good idea of the types and quantities of compounds we're looking for. If we were to receive the blotch from CSI: Parking Enforcement (top-rated show on the Ithaca campus), our current set-up would be able to tell if that blotch had gone through malolactic fermentation or whether the tannin profile looked more like hybrid or vinifera because that's what our columns, solutions and standards are designed to look for. Now that you know what we can and can't do with the HPLC, let's talk further about our applications and what they may mean.

Conventional Wisdom. While all organic fruit acids are "weak" acids, tartaric and malic are the strongest and most prevalent in grapes. These acids contribute the lion's share of the TA and the ratio between them



The HPLC equipment in the Extension Enology lab. The lighter gray and darker gray boxes actually represent two different HPLCs- one currently set up to look at acids and sugars, the other for phenolic compounds, especially tannin.

Photo by Chris Gerling

will also play a large role in determining pH, with proportionally more tartaric suggesting lower TA.

Previous research suggests that tartaric acid is mainly fixed during the growing season while malic acid is consumed as harvest approaches. As we monitor the pH and TA during sampling, the measured reduction in TA and increase in pH is primarily due to the loss of malic acid. Lactic and succinic acids are not produced by the grapevine, but are instead products of conversion by bacteria, yeast or enzymes. Grape metabolism after harvest can create succinic acid during carbonic maceration and this conversion may also occur when berries are stored intact. Lactic acid is, of course, the



Figure 1. An organic acid profile (blue line) from one juice sample in this week's Veraison to Harvest. The sample is compared against known quantities (the standards in red) so the peaks can be identified.

Figure courtesy David Manns

product of malolactic fermentation/ conversion. Acetic acid (aka volatile acidity) is also created primarily through enzymatic or bacterial activity and is an indicator of rot at the grape sampling stage.

What we're digging for. You may be wondering why we haven't been doing this all along, and the truth is that we most often look at wines as opposed to juices. The wine stage is where we often have the most interest- whether ML has finished, is acetic acid (VA) developing, etc. This year we have a few specific questions besides our basic curiosity regarding New York grapes and always wanting to know more about them:

- 1. *Malic/ tartaric ratio in hybrids*. We have a lot of new varieties in the mix, and we want to know how the malic/ tartaric ratio evolves as the grapes ripen and where things stand at harvest. We have heard differing ideas about what is "normal" in the recently released cold climate hybrids in particular, and these differences may just relate to location.
- 2. Succinic acid development. We have been seeing some really high succinic levels in wines, and we wonder if there might be a relation to initial levels of malic acid. Malic and succinic acid are basically a couple of train stops apart in the Krebs cycle, and the right conditions may push malic toward succinic. We're also wondering about the effect of factors as simple as time in the plastic bag before crushing and analysis.
- 3. Acetic acid as a proxy for rot. Fairly self-explanatory, unfortunately. This has been a challenging season for some varieties and some locations, so there may be some indicators that trouble is brewing.

As you have probably already noticed, we have chosen not to report the organic acid breakdowns each week. There are a whole lot of numbers and we imagine that you don't have large amounts of extra time in September and October. The plan is to have one major report at or near the end of the V to H cycle unless a breaking news story develops that we just have to share.

One other note about organic acids vs. TA is that it's not possible to add up the OA g/L and get a TA. We refer to TA as titratable acidity and not total acidity because the TA is nothing more or less than the amount of sodium hydroxide needed to make the pH of the sample 8.2.



Samples vials before/after being loaded onto the sample changer. At just under 50 samples and 30 minutes per analysis, the Veraison to Harvest run takes the HPLC about one entire day to complete.

Photo by Chris Gerling

Things that are not measured by the OA profile may be contributing to or taking away from that equation (for example, acids not quantified, potassium, other buffering species, etc.), not to mention that we are considering all of that amount tartaric acid while we just discussed how that's not the case. So this is just one more acidity measure that is not directly convertible to either of the other two. We think it's useful, however, and we hope you also get some more insight into your grapes, nascent wines and the 2013 growing season.

Stay tuned.

Fruit Maturation Report - 9/20/2012

Samples reported here were collected on **Monday**, **September 16**. Where appropriate, sample data from 2012, averaged over all sites is included. Tables from 2012 are archived at <u>http://grapesandwine.cals.cornell.edu/cals/grapesandwine/veraison-to-harvest/2012.cfm</u>.

We are again reporting berry weight, brix, titratable acidity and pH, and yeast assimilable nitrogen (YAN), as part of a joint project with Anna Katharine Mansfield and Lailiang Cheng. Graduate student Mark Nisbit is running the YAN assays as part of his Ph D project, and other students from the Enology lab are running samples . - TEM

Cabernet Franc

Region	Harvest Date	Description	Ber. W	t. g. % Bri	x pH	TA g/L	YAN (ppm)
Finger Lakes Finger Lakes Finger Lakes	9/16/2013 9/16/2013 9/16/2013	E. Seneca W. Seneca Cayuga	1.69 1.46 1.70) 19.4 5 18.5) 17.9	3.01 3.03 3.08	7.8 8.1 7.6	25 35 69
Finger Lakes Hudson Valley Lake Erie Long Island	9/16/2013 9/16/2013 9/16/2013 9/16/2013	W. Seneca HVL Portland LI-05	1.49 1.50 1.64 1.96	17.9 18.8 15.0 18.0	3.08 2.31 3.21 3.38	7.9 8.2 9.4 7.0	47 136 155 47
Long Island Average Prev Sample '12 Average	9/16/2013 9/16/2013 9/9/2013 9/17/12	LI-07	1.34 1.60 1.54 1.47	20.0 18.2 17.3 20.3	3.26 3.05 3.13 3.29	7.3 7.9 9.7 6.6	39 69 93 70
Catawba							
Region	Harvest Date	Description	Ber. Wt. g	g. % Brix	рН	TA g/L	YAN (ppm)
Finger Lakes Prev Sample '12 Sample	9/16/2013 9/9/2013 9/17/12	Keuka Keuka Keuka	2.13 2.21 2.07	13.4 14.2 18.0	2.77 2.74 2.92	16.7 18.6 10.2	134 95 0
Cayuga White							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes Finger Lakes Average Prev Sample '12 at Harvest	9/16/2013 9/16/2013 9/16/2013 9/9/2013 9/5/2012	Keuka Cayuga	3.05 2.59 2.82 3.00 2.52	16.7 20.3 18.5 16.9 18.8	2.99 3.11 3.05 3.08 3.18	9.8 8.3 9.0 9.7 8 7	166 175 170 160 284
Chardonnay	0/0/2012		2.02	10.0	0.10	0.1	
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	pН	TA g/L	YAN (ppm)
Finger Lakes Finger Lakes Finger Lakes	9/16/2013 9/16/2013 9/16/2013 9/16/2013	Cayuga W. Seneca W. Seneca	1.48 1.63 1.55 1.65	17.8 18.9 15.3	3.06 3.15 3.13 3.44	9.9 8.7 7.8 6.8	174 97 132 181
Average Prev. Sample '12 Average	9/16/2013 9/16/2013 9/9/2013 9/17/2012	LI-05	1.58 1.51 1.48	18.0 17.5 20.7	3.20 3.13 3.60	8.3 9.6 6.1	146 171 245
Concord							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes Finger Lakes Lake Erie	9/16/2013 9/16/2013 9/16/2013	Keuka W. Canandaigua Portland	2.93 3.17 3.42	14.2 14.7 15.7	3.05 3.06 3.33	9.2 9.0 9.9	176 90 136

3.17

3.06

3.36

14.9

13.8

17.4

3.15

3.07

3.43

9.3

10.9

7.0

134

184 240

9/16/2013

9/9/2013

9/17/2012

Average Prev Sample

'12 Sample

Lemberger

_							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes	9/16/2013	Keuka	1.76	20.7	3.00	7.5	29
Prev Sample	9/9/2013	Keuka	1.81	20.2	3.01	9.3	24
'12 Sample	9/17/12	Keuka	1.75	23.5	3.17	5.9	46
Malbec							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Long Island	9/16/2013	LI-06	2.40	19.1	3.33	9.0	146
Prev Sample	9/9/2013	LI-06	2.25	18.1	3.25	8.7	168
'12 Sample	9/17/12	North Fork S	2.49	18.4	3.46	8.8	242
Merlot							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Hudson Valley	9/16/2013	HVL	1.37	19.2	3.49	6.3	115
Long Island	9/16/2013	LI-04	1.91	20.1	3.51	5.7	77
Long Island	9/16/2013	LI-08	1.74	19.4	3.45	6.1	76
Average	9/16/2013		1.67	19.6	3.48	6.0	89
Prev. Sample	9/9/2013		1.60	18.7	3.36	8.8	127
'12 Average	9/17/2012		1.89	19.7	3.58	4.9	120
Niagara							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Lake Erie	9/16/2013	Portland	3.23	15.3	3.37	7.7	153
Prev Sample	9/9/2013	Portland	4.48	14.2	3.22	10.4	269
'12 at Harvest	9/5/2012	HARVEST 2012	3.84	16.6	3.26	7.2	205
Noiret							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Hudson Valley	9/16/2013	HVL	1.65	17.6	3.25	8.1	155
Lake Erie	9/16/2013	Fredonia	1.93	16.1	3.14	12.0	173
Average	9/16/2013		1.79	16.9	3.20	10.0	164
Prev Sample	9/9/2013		1.71	15.5	3.20	11.0	239
'12 Sample	9/17/12		1.59	18.7	3.39	7.2	294
Pinot Noir							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm
Finger Lakes	9/16/2013	E. Seneca	1.45	19.6	3.18	6.7	50
Prev Sample	9/9/2013	E. Seneca	1.46	19.0	3.11	8.8	54
'12at Harvest	9/10/2012	HARVEST2012	1.46	20.9	3.52	6.4	222
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Riesling

Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes	9/16/2013	E. Seneca	1.37	16.8	2.89	9.9	44
Finger Lakes	9/16/2013	E. Seneca	1.42	17.7	2.86	9.5	19
Finger Lakes	9/16/2013	W. Seneca	1.30	17.1	2.91	10.2	16
Finger Lakes	9/16/2013	E. Seneca	1.36	16.7	2.93	10.8	64
Finger Lakes	9/16/2013	CL 90 Cayuga	1.53	16.0	2.93	11.8	109
Finger Lakes	9/16/2013	Keuka	1.45	16.6	2.86	11.1	71
Finger Lakes	9/16/2013	W. Seneca	1.40	18.0	2.90	10.2	118
Finger Lakes	9/16/2013	W. Seneca	1.41	17.0	2.89	11.2	43
Finger Lakes	9/16/2013	W. Canandaigua	1.57	14.9	2.98	12.4	188
Hudson Valley	9/16/2013	HVL	1.43	16.4	3.31	8.5	150
Lake Erie	9/16/2013	Fredonia	1.71	15.1	3.01	9.0	86
Long Island	9/16/2013	LI-01	1.29	18.2	3.23	8.1	114
Average	9/16/2013		1.44	16.7	2.98	10.2	85
frev Sample	9/9/2013		1.42	16.1	2.96	12.1	111
	9/17/2012		1.49	19.0	5.07	7.9	04
Sauvignon B	lanc						
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Long Island	9/16/2013	HARVESTED					
Final Sample	9/9/2013	LI-02	1.23	22.1	3.23	8.1	141
'12 at Harvest	9/10/2012	HARVESTED	1.70	20.2	3.40	7.5	141
Seyval Blanc	;						
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes	9/16/2013	Harvested					
Final Sample	9/9/2013	Cayuga	1.77	19.9	3.22	6.4	126
'12 at Harvest	9/10/2012	HARVESTED	1.71	19.4	3.39	6.3	194
Traminette							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes	9/16/2013	Keuka	1.93	19.4	2.83	9.8	74
Hudson Valley	9/16/2013	HVL	1.73	17.8	3.28	8.1	103
Lake Erie	9/16/2013	Fredonia	1.95	17.1	3.06	9.5	61
Average	9/16/2013		1.87	18.1	3.06	9.1	79
Prev Sample	9/9/2013		1.85	17.1	2.98	10.8	79
'12 Sample	9/17/2012		1.76	20.6	3.13	7.3	102
Vignoles							
Region	Harvest Date	Description	Ber. Wt. g.	% Brix	рН	TA g/L	YAN (ppm)
Finger Lakes	9/16/2013	VSP Keuka	1.72	22.6	2.94	13.8	162
Finger Lakes	9/16/2013	W. Seneca	1.80	22.9	3.07	12.4	185
Average	9/16/2013		1.76	22.8	3.01	13.1	173
Prev Sample	9/9/2013		1.67	22.3	3.05	15.7	175
'12 at Harvest	9/10/2012	HARVESTED	1.32	24.5	3.27	8.8	163



Marquette Training Study

	9/10/2013				9/16/2013			
Treatment	berry weight	pН	° Brix	TA (g/L)	berry weight	pН	° Brix	TA (g/L)
High cordon	1.21	2.97	22.4	14.42	1.24	2.93	23.68	13.53
VSP	1.08	2.97	24.18	14.73	1.2	2.96	24.3	13.36
Umbrella	1.21	2.95	22.08	14.74	1.23	2.92	22.7	13.73

Frontenac Training Study

	9/10/2013				9/16/2013			
Treatment	Avg. berry weight	рН	° Brix	TA (g/L)	Avg. berry weight	рН	° Brix	TA (g/L)
High cordon	1.21	3.03	19.18	18.11	1.15	3.01	20.1	17.74
VSP	1.19	3.21	18.7	18.16	1.24	3.03	19.73	18.2
Umbrella	1.2	3.02	18.83	18.66	1.19	3.01	20.1	18.26

Frontenac Crop Load Study

	9/10/2013				9/16/2013			
Treatment	Berry Wt	рН	° Brix	TA (g/L)	Berry Wt	рН	° Brix	TA (g/L)
Control	1.14	3.03	18.9	17.3	1.13	3.03	20.4	17.4
Green harvest	1.09	3.03	21.0	16.6	1.07	3.03	22.5	16.0
Thin to 1 cluster/sht at fruit set	1.15	3.08	19.8	16.8	1.14	3.02	21.1	15.9
Thin to 1 cluster/sht pre bloom	1.13	3.05	20.0	16.6	1.14	3.02	21.0	16.2
Remove 6 clusters/ vine fruit set	1.17	3.06	20.0	16.6	1.12	3.04	20.9	16.9
Remove 6 clus/ vine pre bloom	1.16	3.02	19.3	17.1	1.18	3.02	20.5	16.6



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