Cornell University
Cooperative Extension

Lake Erie Regional Grape Program

PennState Extension

Newsletter July 2019

Concord grapes on the grow- Photo- Jennifer Russo, Viticulturalist, LERGP at CLEREL

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LERGP
2019 COFFEE POT MEETING SCHEDULE

Date	Time	Location	Address
May 1, 2019	10:00am	John Mason Farm	8603 West Lake Rd. Lake City PA 16423
May 8, 2019	10:00am	Sprague Farms	12435 Versailles Rd. Irving NY 14081
May 15, 2019	10:00am	Paul Bencal	2645 Albright Rd. Ransomville NY 14131
May 22, 2019	10:00am	Arrowhead Winery	12073 East Main Rd. North East PA 16428
May 29, 2019	10:00am	Militello Farm Supply	2929 Route 39 Forestville NY 14062
June 5, 2019	10:00am	North East Fruit Growers	2297 Klomp Rd. North East PA 16428
June 12, 2019	10:00am	Thompson Ag - Corner of Hanover & Dennison	Silver Creek NY 14136
June 19, 2019	10:00am	Kirk Hutchinson	4720 West Main St. Fredonia NY 14063
June 26, 2019		NO COFFEE POT	
July 3, 2019	10:00am	Betts Farm	7366 East Route 20 Westfield NY 14787
July 10, 2019	10:00am	Jim Vetter	12566 Versailles Rd. Irving NY 14081
July 17, 2019	10:00am	Trolley Line Vineyards	11480 E. Main St. North East PA 16428
July 24, 2019	10:00am	Brian Chess	10289 West Main Rd. Ripley NY 14775
July 31, 2019	10:00am	Tom Tower Farm	759 Lockport St. Youngstown NY 14174

The Lake Erie Regional Grape Program is a partnership between Cornell University, Penn State University and the Cornell Cooperative Extension Associations in Chautauqua, Erie and Niagara county NY and Penn State Extension in Erie County PA.

Business Management

Kevin Martin, Penn State University, LERGP, Business Management Educator

Crop Thinning: Costs, Benefits, and Decision-Making

Balancing the costs and benefits of crop adjustment is entirely dependent on crop size and production history. Knowing what a block has and what a block is capable of is an essential part of the decision-making process. Fortunately, it is relatively inexpensive to gather that data. Increasing the number of panels cleanly harvested 30 – 40 days post bloom may increase the accuracy of an estimate. Large growers may spend a full day hand or machine harvesting between 4 – 16 panels per block.

Estimation

If crop estimation takes more than one day or the grower has already concluded some crop adjustment is unavoidable, it makes sense to estimate mechanically. If crop size might fall in an acceptable area and samples can be gathered and weighed with about 16 labor hours, hand harvest is likely less expensive. Crop adjustment decisions dramatically change the expected value of a crop. Relative to the value of this information, the $25 cost per block is minimal. If nothing else, annual crop estimation can provide a positive return on investment by altering pest management programs and harvest scheduling.

Brix

Value of brix is market dependent. For vineyards contracted with a minimum brix standard and premium payments for higher brix, it is easier to justify thinning. Severely over-cropped vineyards that are thinned will see an improvement in net income due to the improvement in brix. This means that cash flow will actually improve by November. Defining “severely over-cropped” is best left to the grower. Tonnage alone isn’t going to do it. That definition is primarily driven by the fruit weight to leaf area ratio. Determining that ratio takes a lot of data, or boots on the ground. So, know your vineyard.

For growers with access to early start programs the decision for some acreage is actually easier. The best outcome is then not a question of whether one should thin or not, it’s just how much. For a grower with this market 20% - 25% of the acreage will see positive cash flow quickly even if the vineyard is only slightly over cropped. Basically any vine size with less than 2.5 pounds of pruning weight (on standard spacing) has an opportunity to benefit. In these areas growers can aim for an average brix of 15.5 on the first day of harvest. We can guess that will be 105 days after bloom. Reaching that brix just 105 days after bloom on a year like this is no small feat.

Many growers have already resigned to cancelled loads and a late start. I’m here to remind you that with thinning you might be able to increase your 2020 vine size and yield, while also increasing the amount you’re paid per acre on 20% of your acreage. Using an early start program, a grower could get paid $1,512 for a six-ton crop and $1,530 for an 8.5-ton crop. If fall weather is poor, payment for the 8.5-ton crop could easily fall to $1,300.

This hypothetical does not entertain any must-thin scenario where loads are rejected, late season shelling reduces crop size, or late season ripening prevents harvest (or substantially increases the cost of harvest). Thinning to avoid these scenarios can be yet another motivation.

Return Crop

With excellent crop estimation and good vine health potential return crop from thinning is 1:1. The value of a potential return crop is reduced by three factors: price, time value of money, and probability of crop loss.

There is little reason to assume price will be higher in 2019 than it is in 2020. When Concord prices are very high, compared to historical trends, this can be a consideration. The probability of a price increase in 2020 probably outweighs the probability of a decrease for most acreage.

The time value of money will depend on your individual situation. Growers with no debt should discount no more than 3%. Growers with moderate debt should discount at a rate of their highest interest payment. This is usually not more than 7% right now. Growers with high debt that may have trouble accessing additional credit can discount at 20%. Discounts higher than 15% are possible but likely indicate severe financial distress and a need to revisit vineyard operations.

The big discount is the probability of crop loss. The probability of a spring frost or other disaster is about 7.5%. This assumes a 50% crop loss one in ten years. Assumptions may vary based on site and management. This disaster discount could be offset by crop insurance and/or the reduced risk to the 2019 crop. Mistakes in thinning that result in over-thinning can also reduce total crop for 2019 and 2020. One should work really hard at crop estimation to lower this risk to 20%.

In total, the return crop discount should be no higher than 30% this year. We might assume a price of $180 per ton for a 15.0 brix Concord in 2019 and a price of $270 for a 16.5 brix Concord in 2020. We could discount the value of that 2020 Concord to $190.

Fuel and Maintenance

Costs will vary by machine as such these estimates could be off by 20%. Newer self-propelled machines should see fuel and maintenance costs in the area of $18.25 per acre. This would be lower than harvest costs due to conditions and practices. Lower engine RPMs, less fruit weight and higher ground speed all contribute to a modest decrease in cost per acre. Older pull-types, such as Mecca, represent the opposite end of the spectrum. Maintenance costs should be slightly lower because these harvesters have less equipment to maintain. Along with less equipment comes a lower fuel cost, with one operator using just a 75hp tractor. Costs are still above $10 per acre, with the effectiveness of crop adjustment somewhat questionable. Lots of skepticism about thinning with older style machines remains. Growers are in the best position to decide the risk associated with canopy damage and their machine. An accurate crop estimation of existing fruit, an accurate crop estimation of removed fruit and visual canopy inspection should improve results dramatically.

Depreciation

A typical harvester sees more than $10,000 in deprecation per year. Often this is expensed over 200 acres, or $50 per acre. While currency fluctuations complicate the situation, the important take away is that a lack of use results in inefficient deprecation, use for thinning purposes is fairly low. For some growers it could be as low as $13 per acre.

The average grower does not realize any depreciation from additional machine use. The average harvester accumulates 100 – 150 harvesting head hours per year. Accumulation of an additional 50 hours per year would only result in minimal depreciation. A few growers do depreciate their machine through heavy use. Their depreciation costs are approximately $7 - $10 per acre.

Reduced Crop

The reduction in crop is the large cost that makes many growers nervous. It is important to think of this practice as analogous to pruning. The willingness to reduce crop later allows for aggressive pruning practices that allow for higher yields in poor years.

The value and economics of mid-season crop load management are directly related to probability. In this case, probability is both weather and market dependent. The role of the secondary market will also be dependent on the weather and crop size. An over abundance of low brix grapes during harvest could depress secondary market prices or eliminate demand for some acreage all together. The most probable outcome for 2019 will be the inability to harvest low brix Concords during the harvest season. While the secondary market might be robust, the market's ability to process grapes by the time grapes are released will significantly limit yield and profitability.

A crop estimation and bloom date provide the grower with a wealth of information to help make decisions regarding crop reduction. The ability to ripen crop will heavily depend on weather in the two weeks following veraison. While that's impossible to predict we do know a later verasion, on average, will push these two weeks further into September and increase the likelihood of less than ideal weather. Managing that risk across an entire 200-acre vineyard operation is a complicated decision.

Market Impact on Outcomes

Current markets and the adjustments made to brix should also weigh in the decision-making process. In many markets the incentive to produce maximum tonnage at minimum quality has been reduced substantially. Alterations in standards and release practices may also change the practicality of field releases and access to secondary markets.

Incentives to produce higher brix have not impacted the entire Concord market. Increases in wine production, for those with established contracts, may allow flexibility in heavily cropped vineyards. However, even those with access to specific markets have to be mindful of the potential to significantly decrease the expected value of the 2020 crop. Economically speaking, it would be important to avoid cropping vines so heavily that vine size is reduced by more than 30%.

Generally speaking, the bulk wine market is not as healthy as it was 5 years ago. As a market it isn't doing poorly. However, it's capacity to absorb large amounts of low brix surplus is questionable.

Risk Seeking Decision Making

Once you have completed your crop estimation the next step is to use your experience. With the experience you have on an individual block, you are in the best position to think about the probability of what ripening that crop is. The grower is also in the best position to determine the impact on return crop. Finally, thinking about your financial situation and crop insurance program, the grower can determine how much risk they're willing to take. Most growers have a risk-seeking decision making strategy. With that in mind, it may be acceptable to seek a riskier path. It is just important not to get carried away.

IPM

Tim Weigle, NYSIPM, Cornell University, LERGP Team Leader

Grape Berry Moth and NEWA

As shown in the table on next page, by the time many of you read this article it will be too late to use any of the insecticides that need to be ingested (Altacor, Intrepid and Bt products) according to the GBM model found on NEWA http://newa.cornell.edu. But, depending on where your vineyard is located, a contact insecticide (like most all the others labeled in grapes) can be applied prior to 920 DD. This application is automatic for vineyards rated as being at high risk for grape berry moth damage. Vineyards rated as being in the low or intermediate risk category should be scouted to determine if they have damage above the 6% damaged cluster threshold.

The model results that presented in the table were obtained using the estimated wild grape bloom date provided by the model. Wild grape bloom date is used as the biofix, the date when the model starts accumulating Degree Days. The GBM model found on NEWA provides the user the opportunity to input the observed wild grape bloom date that can significantly improve the accuracy of the model. While the estimated wild grape bloom date has been pretty good in past years, 2019 is showing to be a bit of an outlier. There have been reports that observed wild grape bloom was as much as 4 days earlier than the model predicted. Plugging that into the model gives results of accumulation of 810 DD up to 2 days earlier than if the estimated date is used.

If this is the first time you are seeing this table in 2019, I would encourage you to sign up for the Crop Update, our weekly electronic update, as this table is a regular update. You can contact any member of the LERGP extension team to sign up. If you are signed up for the Crop Update but do not read it on a weekly basis, I urge you to at least skim it each week when it comes out. There is a lot of good information there from production practices, IPM, disease management, insect management and business management that you can put to use in your vineyard operation during the growing season.

And finally, the best way to get the information you need to manage your pests is to visit the NEWA website on a frequent basis. Not only can you access information on where grape berry moth development is during the season but information on infection periods for powdery mildew, black rot, Phomopsis and downy mildew is available.

If you have any questions on how to implement NEWA into your vineyard IPM program, please get in touch at thw4@cornell.edu or 716.792.2800

NEWA Location	Wild grape bloom date*	DD Total on July 14, 2019	Forecasted DD for July 19, 2019	Forecasted date 810 DD	Forecasted date 920 DD
Versailles	June 7	793	943	July 15	July 19
Hanover	June 8	791	941	July 15	July 19
Sheridan	June 6	845	997	July 13	July 17
Silver Creek	June 8	792	931	July 15	July 19
Dunkirk Airport	June 9	790	934	July 15	July 19
Forestville	June 8	792	941	July 15	July 19
East Fredonia	June 9	764	917	July 16	July 20
Fredonia	June 9	736	887	July 17	**
Brocton Escarp.	June 9	760	911	July 16	July 20
Portland Escarp.	June 7	817	966	July 14	July 18
Portland	June 8	797	947	July 15	July 19
East Westfield	June 9	764	909	July 16	July 20
Westfield	June 9	765	911	July 16	July 20
Ripley	June 8	812	964	July 14	July 18
Ripley Escarp	June 8	786	940	July 15	July 19
Ripley State Line	June 8	808	961	July 14	July 18
North East State Line	June 9	764	908	July 16	July 20
North East Escarp	June 7	818	964	July 14	July 18
North East Sidehill	June 8	794	940	July 15	July 19
North East Lab	June 8	822	966	July 14	July 18
Harborcreek	June 8	802	950	July 15	July 19
Harborcreek Escarp	June 9	749	901	July 16	July 20
Lake City	June 7	832	985	July 13	July 17
Ransomville	June 11	754	910	July 17	July 20
Burt	June 19	569	719	**	**
Corwin	June 13	706	865	July 18	**
*** Estimated date provided by NEWA website** **** Not in current time frame of model results**					

Table 1. Phenology-based Degree Day model results for Grape Berry Moth by NEWA station location in the Lake Erie Region on July 14, 2019.

Viticulture

Jennifer Russo, Viticulture Extension Specialist, LERGP

How Much Fruit is Hanging on Your Vines?

This season was off to a rough start with cold temperatures, rain, and looming fog. Our bloom date at CLEREL was officially on June 20, 2019, which is 6 days after the historical average. Dr. Terry Bates' Juice Quality Project research gave us the Rule of Thumb that for every three days earlier than the average historical bloom date, your vines can ripen an extra ton per acre due to the longer growing season and available limiting factors. Growers love to adhere to this Rule of Thumb. However, the reverse holds true as well; for every three days after the average historical average bloom date growers should thin and aim for one ton below their historical average per acre. Now, this is a rule of thumb, and we are here to provide you with research-based information for you to make management decisions in your vineyards. This is where it is crucial to crop estimate.

I have heard from many growers that they do not crop estimate, or they eye-ball their vines and have a pretty good guess as to how much fruit is hanging which is a method that becomes more difficult with heavy crops. The process of collecting information and doing the math can be daunting and there are so many other management decisions that have to occur during the growing season, but crop estimation can improve your understanding of the vineyard blocks, vine health, and future fruit quality. There is simply too much at stake financially to rely on "eyeballing" this season.

Since we are six days late on bloom, that means that we will be six days late on veraison. The research has shown that the first two weeks after veraison is when most of the ripening occurs in Concord fruit. The best case scenario to ripen grapes in those two weeks is to have great weather that is warm and sunny and low crop load. The worst case scenario is when there is cold and cloudy weather and high crop load. This is where knowing what size crop is hanging on your vines can benefit your management decisions; knowing that one block you can let the fruit hang longer and another block you may need to crop thin is valuable information.

Crop load can also affect vine health. Overcropping a vine has many well documented negative impacts on fruit and vine quality including reduced and delayed fruit ripening, potential vine stress that may lead to increased susceptibility to winter injury, disease problems especially late season rots and other significant problems. Undercropping can also affect quality as well as cheat you of valuable revenue. For this reason, I am including the Crop Estimation article that Dr.Terry Bates wrote for our 2003 Newsletter. The research and science has not changed; we still use this information.

What has changed is the that now we have more tools in our toolbox to aid in a more accurate crop estimation. With the use of our Loaner Sensor Program and early adoption of the sensor technology, growers are able to take crop estimation samples from data-driven management zones increasing accuracy. No one has more knowledge of the vineyard or a greater incentive to achieve maximum sustainable production of ripe grapes than the vineyard owner and manager. A grower is usually familiar with variability in a specific vineyard block and knows that different portions could be categorized as "high," "moderate" or "low" producing. Randomly sampling your blocks may not capture the variation that occurs in your vineyards, however, stratified samples from known areas of high, medium, and low-vigor vines will increase your accuracy. Use the maps that were created from your scans to direct you to the areas of variation so that you can then employ the manual crop

estimation technique provided in the included Concord Crop Estimation Guide, or pick a region that represents all variation patterns and use the mechanical crop estimation portion of the guide.

Concord Crop Estimation Guide

Collecting a little bit of information from the vineyard during the growing season can greatly improve your prediction of final yields with better accuracy than the eyeball method. Know your Bloom Date, Space between Vines, & Space between Rows. Calculate how many vines equate to 1/100th of an acre, and know how many Days After Bloom (DAB) samples were collected.

Example:

- **Row & Vine Spacing**. If 9' between rows the table provides the 1/100th acre calculation for you which equals **48.4 feet.**

- How many vines are in **48.4 feet** if vines are spaced **8** feet apart? **48.4/8 = 6.05 vines (round down to 6)**

- **Use Spatial Map to direct Sample locations to capture vineyard variation.**

- **Clean Pick Fruit from Calculated 1/100th Acre (In this example it equals 6 vines from 48.4/8).** Clean pick fruit from 2 vines from high vigor zone, 2 vines from medium vigor, and 2 vines from low vigor.

- **Total Weight of lbs of Fruit Collected.** Weigh each sample taken above, be sure to subtract the weight of the bucket or bin used from total weight sum weights from all 6 samples to get total weight.

- **Consult Table on Back to Find Corresponding Crop Estimation.**

Mechanical Crop Estimation

Cut a length of rope to guide your sampling lengths, lay it down along the row, clean pick with the harvester the length of the rope, weigh lbs of fruit collected. Walk behind afterwards to assess how many grapes are still on the vine/or that are on the ground.

Using the Chart:

Once you have the sample, the chart does the rest of the work for you. Follow the corresponding DAB down and the respective weight over and you have the estimated tons/acre at harvest. For example, let's say it's July 25th or 40 DAB (bloom on June 15th) and the fruit weighs 100 pounds. Crop estimated 8.3 ton/acre potential crop.

Dr. Terry Bates: Crop Estimation and Thinning Table: 7/16/2003

	Time of Season														
	20DAB			25DAB		30DAB			40DAB	50DAB		Veraison			Harvest
	% of Final Berry Weight														
Pounds of Fruit Removed in 1/100th of an Acre	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**90**	**100**
10	2.5	2.0	1.7	1.4	1.3	1.1	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5
20	5.0	4.0	3.3	2.9	2.5	2.2	2.0	1.8	1.7	1.5	1.4	1.3	1.3	1.1	1.0
30	7.5	6.0	5.0	4.3	3.8	3.3	3.0	2.7	2.5	2.3	2.1	2.0	1.9	1.7	1.5
40	10.0	8.0	6.7	5.7	5.0	4.4	4.0	3.6	3.3	3.1	2.9	2.7	2.5	2.2	2.0
50	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2	3.8	3.6	3.3	3.1	2.8	2.5
60	15.0	12.0	10.0	8.6	7.5	6.7	6.0	5.5	5.0	4.6	4.3	4.0	3.8	3.3	3.0
70	17.5	14.0	11.7	10.0	8.8	7.8	7.0	6.4	5.8	5.4	5.0	4.7	4.4	3.9	3.5
80	20.0	16.0	13.3	11.4	10.0	8.9	8.0	7.3	6.7	6.2	5.7	5.3	5.0	4.4	4.0
90	22.5	18.0	15.0	12.9	11.3	10.0	9.0	8.2	7.5	6.9	6.4	6.0	5.6	5.0	4.5
100	25.0	20.0	16.7	14.3	12.5	11.1	10.0	9.1	8.3	7.7	7.1	6.7	6.3	5.6	5.0
110	27.5	22.0	18.3	15.7	13.8	12.2	11.0	10.0	9.2	8.5	7.9	7.3	6.9	6.1	5.5
120	30.0	24.0	20.0	17.1	15.0	13.3	12.0	10.9	10.0	9.2	8.6	8.0	7.5	6.7	6.0
130	32.5	26.0	21.7	18.6	16.3	14.4	13.0	11.8	10.8	10.0	9.3	8.7	8.1	7.2	6.5
140	35.0	28.0	23.3	20.0	17.5	15.6	14.0	12.7	11.7	10.8	10.0	9.3	8.8	7.8	7.0
150	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5	11.5	10.7	10.0	9.4	8.3	7.5
160	40.0	32.0	26.7	22.9	20.0	17.8	16.0	14.5	13.3	12.3	11.4	10.7	10.0	8.9	8.0
170	42.5	34.0	28.3	24.3	21.3	18.9	17.0	15.5	14.2	13.1	12.1	11.3	10.6	9.4	8.5
180	45.0	36.0	30.0	25.7	22.5	20.0	18.0	16.4	15.0	13.8	12.9	12.0	11.3	10.0	9.0
190	47.5	38.0	31.7	27.1	23.8	21.1	19.0	17.3	15.8	14.6	13.6	12.7	11.9	10.6	9.5
200	50.0	40.0	33.3	28.6	25.0	22.2	20.0	18.2	16.7	15.4	14.3	13.3	12.5	11.1	10.0

Row Spacing determines length of 1/100th of an acre
10.0 feet row spacing = 43.5 feet = 1/100th of an acre
9.5 feet = 45.9 feet = 1/100th of an acre
9.0 feet = 48.4 feet = 1/100th of an acre
8.5 feet = 51.2 feet = 1/100th of an acre
8.0 feet = 54.45 feet = 1/100th of an acre
7.5 feet = 58.1 feet = 1/100th of an acre

Calculation
43, 560 square feet per acre
Divide by row spacing and then
divide by 100 to get 1/100th of an acre

Example:
A grower has 9 foot row spacing and clean picks 48.4 feet at 25 days after bloom. The fruit weighs 80 pounds and the grower estimates that the berries are between 35% and 40% of final berry weight. According to the table, the crop estimate is between 10.0 and 11.4 tons per acre.

Disclaimer:
This table gives the relationship between time of season and % final berry weight on an average year. Year to year variability in weather related berry growth adds error to this table. Information on current year berry growth can be obtained from the Fredonia Vineyard Lab (or) it is strongly suggested that individual growers start collecting berry weight information from their own individual vineyard blocks.

Clear and accurate knowledge of vineyard conditions can result in long-term sustainable cultivation of grapes for juice and wine production. As you are all aware, these conditions vary due to inconsistent weather from season to season and within seasons, especially in the eastern viticultural regions of North America. Predicted climate change may increase this variability through increased chances of late spring and early fall frost events; increased and variable summer heat accumulation (or GDD); and increased frequency of rain and drought events. The future economic survival and success of the grape and wine industries depends on the ability to understand the variability of these conditions, and to take them into account when making management decision to maintain economic yields and continue to improve fruit quality. Important: Follow up your crop estimates with accurate harvest estimates to confirm your accuracy. To further help guide you through this process, there are many LERGP podcast videos located on YouTube. I have listed many of them below:

Berry Curve - a vital piece of the Crop Estimation puzzle - LERGP Podcast #81
Jackie talks about how knowing how the berries develop through the season will help you to predict what your final yield will be at harvest.

Crop Estimation at 30 Days After Bloom in Concord Grapes - LERGP Podcast #77 - youtube.com
It's approximately 30 days after bloom for Concord grapes in the Lake Erie Region. Terry encourages growers to go out and get an estimation of your crop. Here's how! For more information visit ...

Crop Estimation Financials - LERGP Podcast #27
Kevin and Tim discuss the financials of Crop Estimation

Terry Crop Estimation - LERGP Podcast #25 - YouTube
Terry explains the process of crop estimation.

Please visit our website www.lergp.com for more information, or feel free to call at (716)792-2800, or email me at jjr268@cornell.edu.

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PENNSTATE

LAKE ERIE VINEYARD NOTES

Vineyard Notes #6 June 13, 2003

IN THIS ISSUE:

CONCORD CROP ADJUSTMENT: THEORY, RESEARCH, AND PRACTICE

Dr. Terry Bates
Viticulture Research Associate
Cornell University

Mechanical crop adjustment or "thinning" of Concord fruit has gained popularity in the past decade for various reasons, one being the integration of mechanical crop load management into mechanical pruning. In the past five years, we have conducted several research projects at the Cornell Vineyard Laboratory in Fredonia and in cooperating grower vineyards investigating the physiological and practical aspects of mechanical crop adjustment. Many area growers have tried thinning for themselves with varying degrees of success. The following article covers the theory behind crop adjustment, the information we have learned from our Concord research projects, and the practical method for in-the-field mechanical crop adjustment.

Theory

Sustainable productivity of both ripe fruit and mature wood depends on the appropriate ratio of exposed leaves to retained fruit, otherwise known as crop load. An undercropped vine (one with a lot of exposed leaf area to retained fruit) will have ripe fruit and excess vegetative growth. An overcropped vine (one with little exposed leaf area relative to retained fruit) will have delayed fruit and wood maturity leading to a decrease in vine size and future fruiting potential. There have been extensive arguments over the definition of vine balance. Most likely because the definition is different depending on the individual grower, processor, winery, grape variety, intended purpose for the fruit, or maturity characteristic being measured. For the purposes of this article, let's assume that a "balanced" vine reaches a desired Concord fruit maturity of 16°brix by the middle of a typical harvest season while maintaining 2.5 to 3.0 pounds of cane pruning weight.

Since we can measure exposed leaf area, fruit weight, and juice soluble solids, we can determine the effect of crop load on fruit maturation in Concord (Figure 1). We conducted a series of crop and leaf thinning experiments to create a range of leaf area to fruit ratios in Concord vines pruned to 120 nodes. The vines were harvested during the middle of a normal harvest season and the crop load / °brix curve shows that desired fruit maturity was achieved when there was 15 square centimeters of exposed leaf area per gram of retained fruit. Undercropped vines (on the right side of the curve) did not have greater fruit maturity but tended to

increase in pruning weight. Overcropped vines (on the left side of the curve) had lower fruit maturity and tended to have decreased pruning weight.

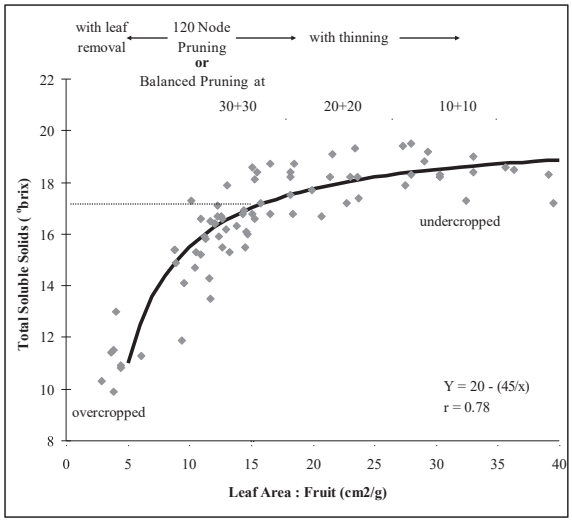

Figure 1. The effect of crop load (exposed leaf area to fruit ratio) on juice soluble solids in Concord.

For reference sake, in this particular vineyard block and growing season, 120 node unthinned vines yielded between 11 and 12 tons/acre, had a leaf area to fruit ratio of 10 and a fruit maturity of about 14.5-15.0°brix. Therefore the unthinned vines were slightly overcropped and either needed to be crop adjusted or needed an extended growing season to reach our desired fruit maturity of 16°brix. Thinning the vines down to 8-9 tons/acre increased the leaf area to fruit ratio to 15 and fruit maturity to 16-17°brix.

When I went back and looked at some of the old balanced pruning experiments by Dr. Nelson Shaulis and recalculated the leaf area to fruit ratio based on pruning weight data, I could illustrate why 20+20 pruning was so popular with Dr. Shaulis. Going back to figure 1, 10+10 balanced pruning had high leaf area to fruit ratios, were well undercropped, and tended to be over vigorous. In contrast, 30+30 pruning put the vines on the shoulder of the crop load / °brix curve. In good growing seasons, 30+30 vines were ideal with high yield, good fruit maturity, and adequate vegetative growth. However, in poor years, 30+30 pruning ran the risk of overcropping. A good option would be to crop adjust the 30+30 vines in poor years to increase the leaf area to fruit ratio and more appropriately match the crop load with the growing season. Dr. Shaulis used 20+20 pruning in many of his experiments and we still used 20+20 pruning in many of our current experiments that we do not intend to crop adjust. We do this because 20+20 pruning keeps us on the "safe" side of the crop load / °brix curve. In good years, the vines tend to be undercropped and will gain pruning weight and in poor years the vines will be balanced without going off the crop load cliff.

Research

The data from Figure 1 indicated that balanced pruning and fixed node pruning with crop adjustment can both be used to manipulate crop load in Concord vineyards. Research over the past five years has attempted to address issues that put that theory into practice. Balanced pruning (especially to 20+20) is rare in commercial Concord vineyards because it can be labor intensive and it does not take advantage of the good growing seasons where a larger crop can be harvested without sacrificing wood maturity. Fixed node pruning is more common but can easily create an overcrop situation, especially where crop adjustment is not being considered. Machine assisted pruning with or without hand pruning follow-up also lends itself to fixed node pruning but again raises questions about appropriate node number and crop adjustment. Following our crop load theory and the goals of the Concord industry,

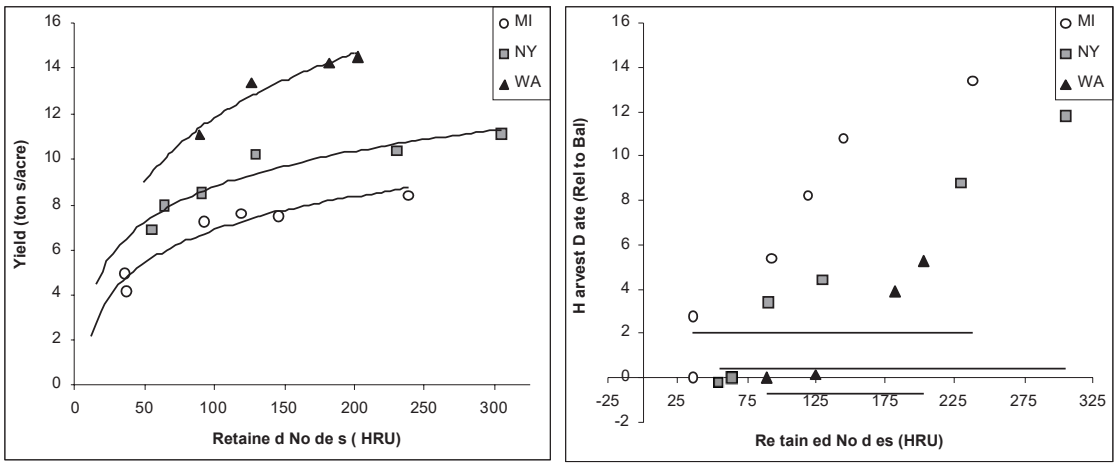

Figure 2A and B. The effect of retained nodes on yield (A) and relative harvest date (B) of small (circles), medium (squares), and large (triangle) vines. Data are from the three-state Concord juice quality project on single wire trained vines. Harvest date in (B) is the number of days it took a treatment to reach 16°brix relative to balanced (20+20) pruned vines

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efficient crop load management requires pruning for maximum crop for the best possible growing seasons and then crop adjusting down to match the vineyard potential with the particular growing season.

Surprisingly, pruning for maximum crop does not mean not pruning at all and it also does not mean leaving the same number of buds on all the vines in a particular vineyard. In a cooperative research project between NY, MI, and WA, Concord vines were pruned to a range of bud numbers and harvested at a pre-determined fruit maturity level. Interestingly, the plot in MI tended to have small vine size, the one in NY had medium vine size, and the one in WA had large vines (1.5, 2.5, and 3.5 pounds/vine, respectively). In each state, yield increased with increasing retained nodes to a point which I refer to as the yield plateau. The small vines reached a yield plateau at approximately 90 buds, medium vines at 120 buds, and large vines at 150 buds (Figure 2A).

Pruning to a lower bud number decreased yield and increased the rate of fruit maturity – this simply follows our crop load discussion. Leaving more buds with hedge pruning or minimal pruning did not increase yield further because of yield compensating factors such as lower cluster and berry weights; however, excess buds further delayed fruit maturity presumably because of canopy inefficiency (Figure 2B). Therefore, when pruning for maximum crop it is important to prune to a bud number that gives maximum crop potential for a given vine size level but not to prune beyond that number.

At the Fredonia Vineyard Laboratory, we have been researching the physiological effect of crop adjustment on 120 node pruned vines at 30 days after bloom. We prune to 120 nodes because we target 2.5-3.0 pound vines and our node number experiment (from figure 2) indicates that the yield plateau is reached at approximately 120 nodes. Each year we have recorded an inverse relationship between yield and °brix (figure 3A).

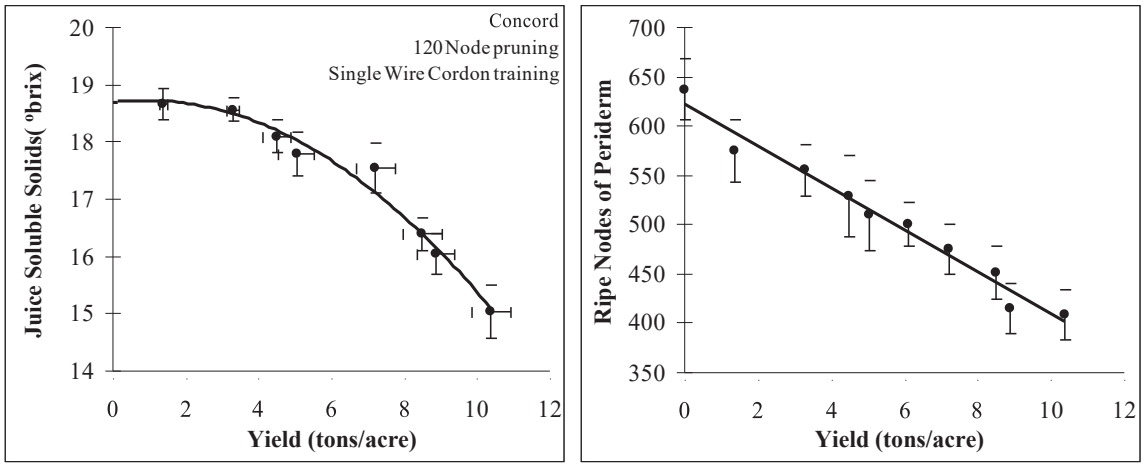


Figure 3A and B. The effect of yield on juice soluble solids (A) and ripe nodes of periderm (B) on 120 node pruned vines at the Cornell Vineyard Laboratory in Fredonia. Each point is the mean of 10 vines, bars=standard error.

Below 5 tons/acre, the vines are undercropped and there is no further increase in juice soluble solids with further fruit thinning (i.e. the vines are on the top of the crop load / brix curve in figure 1). From 5 to 11 tons/acre, juice soluble solids decrease as yield increases. Although growing season conditions will influence the slope of this curve from year to year, the general trend is that for every 2 to 3 ton/acre increase in yield there is a decrease in one degree brix. In practical terms, if you have a 10 ton/acre crop that is going to be 15°brix at harvest and you thin the crop down to 7-8 tons/acre, the crop will reach 16°brix at harvest.

In addition to, and probably more important than, the increase in juice soluble solids with thinning is the response of wood maturity to thinning. There is a direct inverse relationship between yield and ripe nodes of periderm (figure 3B). Periderm counts are a mature bud measurement that is proportional to pruning weight. In our experiment, as the crop decreased from 11 tons/acre down to 0 tons/acre the number of mature buds increased (and the pruning weight increased).

Other studies have shown that increasing vine size increases crop potential; therefore, thinning in year one not only influences fruit maturity in year one but also influences crop potential in year two by increasing vine pruning weight.

In the specific example in figure 3A and B, our goal was to harvest between 16 and 17°brix and maintain the vines between 450 and 500 ripe nodes of periderm (roughly 2.5 pounds of pruning weight) – our own specific vineyard balance definition. At 11 tons/acre, the fruit was harvested at 15°brix and periderm counts were around 400. Fruit thinning down to 7-8 tons/acre increased the fruit to 16.5°brix and 475 ripe nodes of periderm, thus achieving our goal for vineyard balance. Thinning below 7 tons/acre turned out to be excessive thinning in that particular vineyard and growing season.

I am always drilling home the importance of vine size on Concord productivity. It is no surprise that vine size also influences the thinning response in Concord. In 2002, we repeated the 120 node thinning experiment on small, medium, and large vines.

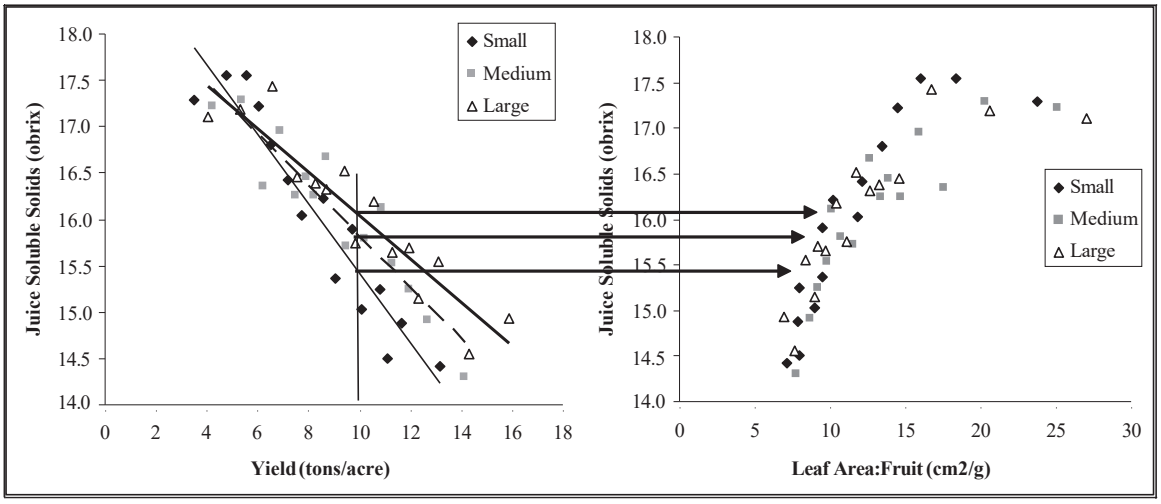


Figure 4 A and B. The effect of crop level (yield-A) and crop load (exposed leaf area to fruit ratio-B) on juice soluble solids of small, medium, and large Concord vines pruned to 120 nodes.

The yield/brix regression lines in figure 4A show that small vines were more responsive to thinning than medium or large vines. Calculated exposed leaf area to fruit ratios (Figure 4B) also show that the crop load / ^{o}brix curve is the same for all vine size categories; however, at a given yield level the vines will be at a different points on the crop load / ^{o}brix curve. Or, the vines will reach similar leaf area to fruit ratios at different crop levels.

What about timing? Typically, commercial Concord vineyards are mechanically crop adjust at 30 days after bloom; however, other thinning times have been tested or considered. Dr. Shaulis used manual flower cluster thinning in the West Tier back in the 1960's. Unfortunately, thinning prior to fruit set can increase the percent of florets that set fruit leading to some degree of yield compensation. In theory, the earliest that the crop can be adjusted after fruit set, the more efficient the vine response will be because the vines have invested few resources into the crop. In practice, the berries have little mass right after fruit set and it is difficult to accurately fruit thin with a machine when the berries are that small.

Dr. Pool investigated Concord berry growth in relationship to both calendar days after bloom and growing degree days. His research showed that Concord berries reached 50% of final fresh berry weight approximately 30 days after bloom and more specifically at 1200 growing degree days. The "50% final berry weight/30 day after bloom" timing has been adopted by several growers as a convenient time to both estimate the crop and mechanically crop adjust.

Growers have also asked about thinning later in the season (50 days after bloom) when berry growth slows down during the lag growth phase (Figure 5). At 30 days after bloom, fresh berry weight is rapidly changing and a few days in either direction can cause large errors crop estimation. At 50 days after bloom, the rate of fresh berry weight change is smaller when compared to the rate of change at 30 days after bloom, potentially providing added flexibility and accuracy to crop estimation. However, there

should also be a resource cost associated with leaving an excessively large crop on the vine for an extended time period.

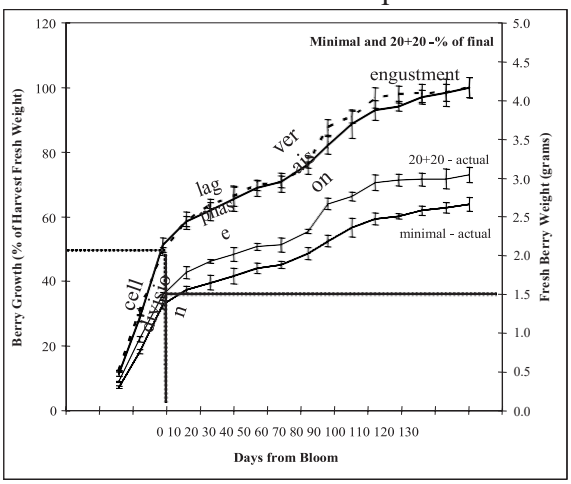


Figure 5. Typical Concord berry growth curve showing both actual and % of final berry weight for balanced (20+20) and minimal pruned vines.

In 2002, we conducted another thinning experiment in 120 node vines at the Fredonia Lab where we manually crop adjusted at 20, 30, 50 days after bloom, immediate pre-veraison, and 2 weeks post-veraison. In terms of juice soluble solids accumulation, all of the pre-veraison thinning times led to a similar increase in °brix at a given crop level. Fruit from all treatments in the experiment started at approximately 7°brix at veraison (figure 6). The rate of soluble solids accumulation in vines with 50% crop was greater after veraison than on vines with 75% or 100% crop. Vines thinned two weeks after veraison had a slow initial rate of soluble solids accumulation (similar to vines with 100% crop). After thinning 2 weeks post-veraison, the rate of soluble solids accumulation increased until harvest (similar to vines with 50% or 75% crop). The post-veraison thinned vines were unable to catch up to the earlier thinned vines by the selected harvest date (figure 6B). In theory, all data curves in figure 6A would eventually merge into one line if the growing season were long enough. The practical problem is that an extended harvest season is a rare luxury in the Lake Erie grape belt.

As discussed earlier, crop adjustment is important for both fruit maturation and wood development.

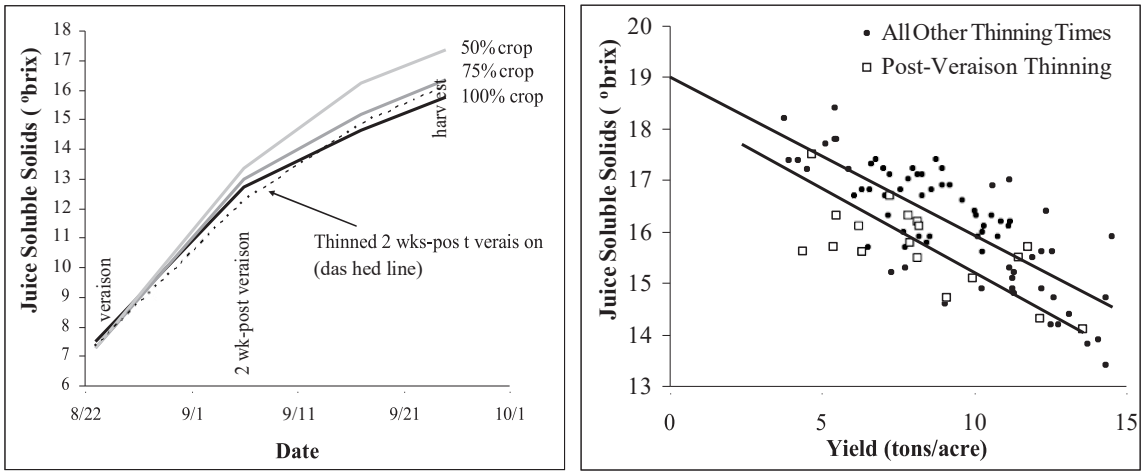


Figure 6A and B. Juice soluble solids accumulation from veraison to harvest on vines with different crop levels prior to veraison and on vines thinned 2 weeks post-veraison (A). The effect of yield on final harvest juice soluble solids of vines thinned at various times pre-veraison and 2 weeks post-veraison.

Concord growth analysis research that we have done shows that perennial grapevine tissues accumulate starch approximately one month after bloom until the end of the growing season. It could be argued that delaying crop adjustment later than 30 days after bloom would infringe upon early wood development through the partitioning of resources, such as carbon and nitrogen, into the crop.

Pruning weight data from different sized vines thinned to 75% crop level at five different timings during the growing season brings our whole discussion of crop adjustment together. On already large vines, thinning time did not have an effect on final vine size (figure 7).

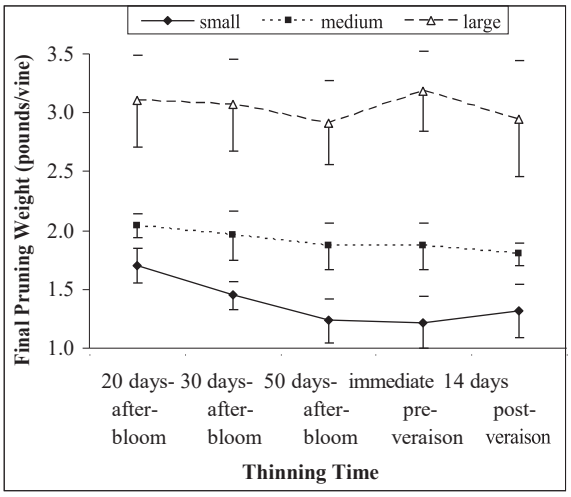


Figure 7. The effect of thinning time on final vine pruning weight of small, medium, and large vines.

The large vines had a relatively high leaf area to fruit ratio at a given crop level when compared to medium or small vines (as seen in figure 4); therefore, the large vines in our experiment could mature both the fruit and wood well within the limit of the growing season. In contrast, small vines with relatively low leaf area to fruit ratios (higher crop load) at a given crop level had lower juice soluble solids accumulation rates (figure 4) and were affected by thinning time (figure 7). In general, delaying crop adjustment decreased vine pruning weight and this response was measured as early as 30 days after bloom.

Conclusions:

1) Vine response to crop load is the same whether crop load is manipulated by pruning, thinning, or a combination of the two.

2) In an average growing season with average vine size, Concord vines require 15 square centimeters of exposed leaf area per gram of fruit fresh weight for balanced production. Vines with a lower leaf area to fruit ratio need crop adjustment or an extended growing season to maintain a balance between vegetative and reproductive growth.

3) In overcropped vines, thinning increases both juice soluble solids and vine pruning weight. The response is more pronounced on small vines than on large vines because small vines have a higher crop load than large vines at a given crop level. On small vines, thinning approximately 2 tons/acre leads to an increase in one degree brix. On large vines, thinning approximately 3 tons/acre leads to an increase in one degree brix. On undercropped vines (below 5 tons/acre), there is no effect of thinning on juice soluble solids.

4) In terms of thinning time, thinning can be done any time before veraison to increase the juice soluble solids accumulation rate in the remaining fruit. In terms of wood maturation, thinning time impacts small vines more so than large vines. In commercial vineyards with lower than optimum vine size and/or with a variety of biotic and abiotic stresses, crop adjustment

should be done as early as practically possible so that the crop load change can have a larger increase on wood development. On large healthy vines, thinning time did not impact the resultant vine size (although I question if this statement remains true if the same vines are pushed and thinned late for several years in a row).

Many growers have reported that they have beat up their vines with mechanical thinning and it is certainly possible to cause significant canopy damage when thinning. However, we have found that with some common sense and a little machine operation experience that this damage can be avoided. Some useful tips are. . .

Practice

Everyone is always asking me how our research translates to commercial vineyards. In-the-field mechanical thinning research has been going on in the Lake Erie region since the early 1990's. I have been involved with several growers, especially Bob and Dawn Betts, Joel Rammelt, and Dave Vercant, for the past five years evaluating on-farm mechanical thinning.

Our research shows that mechanical crop adjustment, if done correctly, gives the same results as thinning at the Fredonia Lab (figure 8). We have used different harvesters and thinning heads with straight rods and bow rods and at different thinning speeds.

1) Bring your common sense. If it looks like you are taking off more leaves than fruit or causing significant canopy damage, you probably are. Adjust your thinning machine.

2) Avoid having to thin off more than 3-4 tons. If you have a vineyard that can yield 8 tons/acre in an average year, use dormant pruning to target 10 tons/acre in the prospect of a good growing season. Then thin off a few tons if the year is less than perfect. Avoid hanging 15 tons/acre and then having to thin off 7 tons/acre – it always leads to poor results.

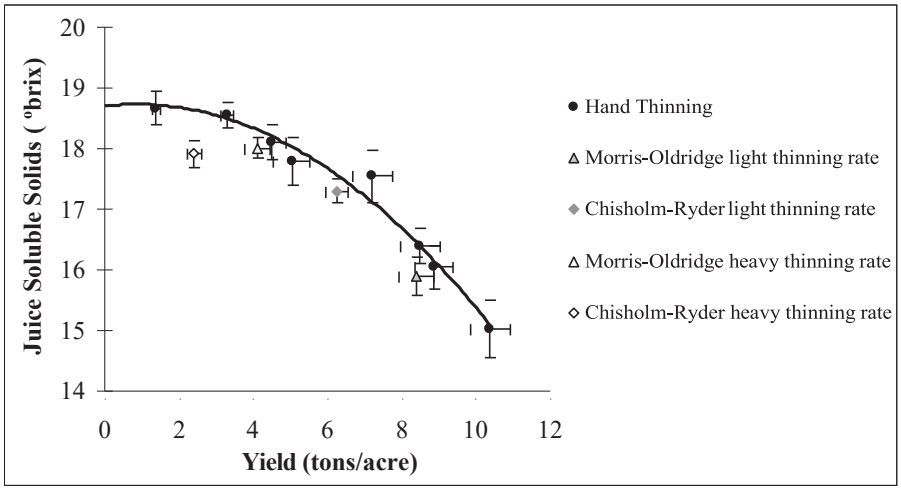


Figure 8. The effect of yield on juice soluble solids of hand thinned 120 node vines (same as figure 3A) compared with two thinning machines at two thinning rates. Canopy damage only impacted fruit maturity when we tried to thin approximately 8 tons/acre.

3) Shake - don't slap! Machines that grip and shake the canopy tend to cause less canopy damage than those that slap the foliage and break shoots. Floating picking heads and bow rods are nice features to some new machines but they are not mandatory. We have had excellent results with the correct set up of old machines and straight harvester rods.

4) Some like it Hot! We have found much less shoot breakage on Concord when thinning is done during a warm afternoon. First thing in the morning, the shoots are pumped up with water and tend to break during thinning. At 30 days after bloom in mid-July, the warm afternoon temperatures cause the shoots to relax and become more flexible later in the day resulting in less shoot breakage.

5) Talk to your fellow growers that have thinned successfully. They are a wealth of practical information.

<u>How to Mechanically Crop Adjust: The Easy Method</u>

The following method considers mechanically crop adjusting at 30 days after bloom with "playing all the averages." The easy method takes less thought but can also be less accurate because it takes into account several assumptions.

To successfully crop adjust; a grower needs to know what the balanced cropping potential is for a particular vineyard block in an average growing season. For example, a grower knows that Block A is in a poor spot and can only handle 5 tons/acre and that Block B is in a good spot and can run 8 tons/acre in an average growing season without loosing significant pruning weight. Next, all the grower needs to do is measure what crop is hanging in the vineyard and adjust the harvester to take off the excess crop to reach the target crop level.

To crop estimate using the easy method, 1% of an acre is clean picked and weighed at 30 days after bloom. At 9 foot row and 8 foot vine spacing, there are 605 vines in one acre. A row of 605 vines at 8 foot spacing would be 4840 feet long. $1/100^{th}$ or 1% of that row would be 48.4 feet. An easy way to pick $1/100^{th}$ of an acre is to measure and cut a piece of rope 48 feet long, lay it down on the vineyard floor, and clean pick the vines in that rope length with a harvester.

The picked green berries are then sent across the harvester shoot to a barrel on a scale (many growers use a milk scale on a trailer). Weight the picked fruit. In the easy method, simply read the weight of the fruit picked off of $1/100^{th}$ of an acre (in pounds) and move the decimal point over one place to the left to get the harvest estimate in tons/acre.

For example, in Block X, Bob lays out his 48 foot crop estimation rope (roughly two post lengths) and clean picks it. Dawn, on a trailer in an adjacent row, places a barrel on a milk scale, tares (or zero's) the scale, collects the berries from the harvester shoot into the barrel, and weighs the green fruit. The scale reads 100 pounds. Dawn moves the decimal point one place to the left and estimates that the block will have 10 tons/acre at harvest. Bob and Dawn repeat the procedure in a Block Y and the scale reads 50 pounds. They estimate that they will harvest 5 tons/acre from Block Y.

Bob and Dawn decide that Block Y with the 5 tons/acre estimate does not need thinning and they leave it alone. Block X, on the other hand, has a 10 tons/acre estimate and they want to thin it down to 8 tons/acre by taking off a harvest equivalent of 2 tons/acre. Working backwards and moving

the decimal point one place to the right, Bob and Dawn must set up their harvester to remove 20 pounds of fruit in the same 1/100th of an acre (48 feet). After a couple trial runs at different beater speeds, they are comfortable that they are taking an average of 20 pounds of fruit off of a 48 foot section. Bob then runs over the rest of the block with the determined machine set-up.

How to Mechanically Crop Adjust: The Advanced Method

The easy crop adjustment method assumes that thinning is done at 30 days after bloom, that the berries are at 50% of final berry weight at 30 days after bloom, and that there is an average growing season. The actual physical activity in the vineyard between the easy and advanced methods is the same – pick 1/100th of an acre and make some decisions about thinning. However, the advanced method takes into account actual berry weight and growing season conditions to make more educated decisions in the vineyard and to decrease error in the thinning process.

The way I like to calculate % final berry weight in crop estimation is to weigh a berry sample at the time I am thinning and make a prediction on what the final berry weight is going to be. I do this for three reasons: 1) the berry weight at 30 days after bloom and at the end of the season is different every year (is there such a thing as an average year?); 2) the berry weight is changing very fast in the 30 day after bloom / 1200 GDD period (see figure 5); 3) I am not always crop adjusting at exactly 50% of final berry weight in any one vineyard or any one area in the Lake Erie Belt.

1. Clean pick 1/100th of an acre (as in the easy method) and weight it.
   Example: 142 pounds of green fruit is picked from 48 feet.

2. Measure average fresh berry weight at thinning time. Typically I weigh a couple different 100 berry samples to get a reliable average berry weight at thinning time.
   Example: Average berry weight measured at 1.8g.

3. Predict what you think the final berry weight will be at the end of the season. This can be tricky but I feel that it is more accurate than automatically assuming that the berries are at 50% final berry weight.
   Rules of thumb: Final berry weight changes with crop level, pruning method, and growing season. Balanced pruned vines with relatively light crops average 3.0g berries at harvest. 120 node vines average 2.75 g berries and Minimal pruned vines average 2.5 g berries at harvest (see figure 5). Excellent growing conditions with adequate water during the cell division phase of berry growth lead to larger than average berries. Lack of water post-veraison can lower final predicted berry weight. Predicting final berry weight is a guess at best and will always add error to the crop estimation (however, cluster and berry counts are old crop estimation errors that are now removed from the procedure).

4. Calculate % final berry weight.
   Example: If average berry weight is 1.8g when I am going to thin and I predict that the final berry weight is going to be 2.75g then I calculate that I am at 65.4% of final berry weight (1.8/2.75 = 0.654 or 65.4%).

5. Calculate the multiplication factor for crop estimation.

Example: If I am at 65.4% of final berry weight then I should multiply my 1/100th of an acre sample by 1.53 (100/65.4 = 1.53) to get what the sample will weigh at harvest.

6. Calculate the per acre crop estimate.
Example: 142 pounds of green fruit multiplied by 1.53 = 217.3 pounds of fruit in 1/100th of an acre at harvest. This is equal to 21730 pounds of fruit per acre at harvest (217.3 x 100 = 21730) or 10.87 tons/acre (21730 / 2000 pounds per ton).

7. Determine the desired crop level for the vineyard block. As in the easy method, if the grower knows a vineyard block is balanced at 8 tons/acre then that yield can be targeted each year. However, at the vineyard lab we look at the growing degree days at thinning time and make a judgment on how much crop to leave based on how many days we are ahead or behind average. The rule of thumb: For every three days ahead of average we are at thinning time we can ripen one ton/acre more than average. This "3 day per ton" rule comes from a Concord pruning experiment where vines with a range of crop levels were harvested based on juice soluble solids and not on a single date.
Example: If a vineyard can ripen 8 tons/acre on an average year and we are a week ahead of average at 30 days after bloom then we would predict that the same block can potentially ripen 10 tons/acre. In contrast, if we are a week behind average at 30 days after bloom then we would predict that the same vineyard block may be better balanced at 6 tons/acre. The only downfall to this rule of thumb is if the weather drastically changes between thinning time and harvest. However, I am more comfortable making weather related crop load decisions one month after bloom than I am in the middle of January when crop load is being decided with pruning alone.

8. Work backwards to determine the machine set up for thinning.
Example: To shake off 2 tons/acre harvest equivalent when the berries at 65.4% of final berry weight. (2 tons/acre x 2000 pounds/ton = 4000 pounds/acre = 40 pounds in 1/100th of an acre at harvest. 40 pounds / 1.53 berry weight multiplication factor = 26.14 pounds of green fruit to remove from 1/100th of an acre at thinning time).

9. Set-up machine to take off desired amount of fruit. Unfortunately, with all the different machines and harvester configurations out there, this is still a trial and error process. The set-up with a Chisholm-Ryder with straight rods is different than a Morris-Oldridge thinning head or a Korvan with bow rods.

PA Update

Andy Muza, LERGP Extension Educator, Penn State University

2019 Grape Disease Update for the Lake Erie Region

We are only about 3 weeks after bloom, so depending on the weather and disease inoculum levels in your vineyard blocks, the potential for disease problems up to harvest is difficult to predict. But an update on the current disease situation in the region can provide a guideline for disease management for the remainder of the season.

Phomopsis – Numerous shoot infections over the last two seasons (2017 & 18), resulted in plenty of Phomopsis inoculum at the start of the 2019 season. Considering the rainy weather throughout May and June, the potential for Phomopsis infections were high. However, in blocks that I have scouted, the amount of shoot, rachis and pedicel lesions observed are far fewer than expected. (I'll chalk this up in part to growers' application(s) of protective sprays).

Considering that vineyard blocks have low-moderate levels of Phomopsis lesions and that the majority of Phomopsis spores are depleted by about pea-sized berry stage, I do not expect this disease to be of concern from this point on.

Black Rot - Inoculum levels in 2018 increased compared to the previous 2 seasons but were still only at low – moderate levels at most sites. However, there were enough sites where infection levels were high and had crop loss, to cause concern going into the 2019 season.

Scouting this season revealed that by 6/20/19 black rot lesions increased in typical high risk areas and by 7/8/19 berry infections were evident (Figure 1). Since Concord berries are susceptible to infection up to 5-6 weeks after bloom there is still a 2-3 week period for berry infections to occur in the Lake Erie Region.

Although I still consider black rot inoculum levels to be low in most vineyards across our region this disease still poses a potential threat: in areas near wood lines; blocks that have a history of black rot problems; and blocks where more than a scattering of symptoms can be found.

Figure 1. Concord berries with black rot. Photo – Andy Muza, Penn State.

Downy Mildew - inoculum levels have been low in the region over the last few years. I found a few leaves with downy mildew infections on wild grape on 7/1/19 and Bryan Hed has observed some downy in a Vidal block. At this point, I have not found any downy mildew in any Concord or Niagara commercial vineyards. The threat of any downy mildew problems in Concord vineyards this season is minimal but Niagara, Catawba and other highly susceptible wine varieties could still experience problems if the weather pattern changes (i.e., frequent thunderstorms, rainy) later in the season.

Powdery Mildew – Concord berries are susceptible to infection for about 2 weeks after bloom so berries are beyond that stage at this point (Figure 2). However, leaves can be infected throughout the season.

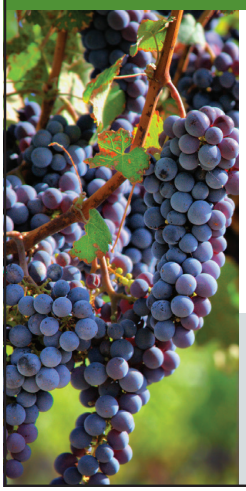
Figure 2. Powdery mildew on Concord berries. Photo – Andy Muza, Penn State

At this point only low levels of leaf infection have been observed but infection levels normally increase as the season progresses. It is still too early to predict the severity of powdery mildew across the region as this will depend on: weather conditions for the remainder of the season, inoculum levels in a particular block and your management of powdery so far and later in the season. Other factors to consider also include: bloom was about a week later than long term average which means that harvest will also be later; and the potential for a large crop.

Research by Wayne Wilcox showed that good control of powdery mildew leaf infections is particularly important in blocks with large crops in years with cloudy, rainy weather conditions. The reason is that cloudy, rainy, high humidity conditions are ideal for powdery mildew development but poor for fruit ripening. So, the need for additional fungicide applications in Concord vineyards will depend on the amount of PM leaf infections in **your** vineyard(s) and crop load. It is important to continue scouting vineyards and to conduct crop estimations to determine potential crop size. Ideally, crop estimations should be conducted starting at 30 days postbloom. (See **Concord Grape Crop Estimation How-To Guide** by Jennifer Russo in this newsletter.)

Let's hope for warm, sunny conditions for the rest of the season.

FROM JUICE TO WINE...
AND EVERYTHING INBETWEEN



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2019 New York Vineyard Acreage Survey

The New York Wine & Grape Foundation (NYWGF), Cornell Cooperative Extension (CCE), members of the New York grape industry, and Cornell University's Survey Research Institute (SRI) are cooperating to conduct a new vineyard acreage survey for New York State.

Until 2012, the New York office of the National Agricultural Statistics Service (NASS) conducted a vineyard acreage survey approximately every five years. Unfortunately, NASS has indicated that they will no longer be conducting these surveys due to a lack of funding. The information being requested in this survey is very similar to that collected by NASS in previous surveys, in hopes that growers will find it to be a familiar exercise and therefore increase participation.

The results of this survey will help us to better understand the current state of the grape industry in New York. This information will be important in the development of new programs and initiatives, research projects, outreach to media and consumers, and much more over the next several years. The hope is that this survey can be conducted every 3-4 years in order to document how the industry is changing over time.

Please know that all data received through this survey will be kept confidential by the SRI. Data will only be published after it is aggregated, and no personally identifiable information will be made public.

How to submit your information

Did you receive an email from Cornell's Survey Research Institute to fill out the survey (be sure to check your spam or junk email folders)?:

The SRI sent out email invitations to New York growers last week, along with a reminder email this week. This invitation was sent to all growers (about 550) for whom we had an email address on the master list we are using for the survey. If you received this invitation from the Survey Research Institute, please take a few minutes to fill out and submit your information. By using the email link you are sent, you help to reduce the need to print and mailing paper versions of the survey, saving us some funds. **If you receive an email about the survey from somebody other than the SRI, DO NOT USE THE LINK IN THAT EMAIL**. Each grower receives a unique link for the survey, and should only use that link.

If you did not receive an email from the Survey Research Institute:

Don't fret, hard copies will be mailed shortly to those for whom we did not have email addresses, as well as those who did not respond to the initial email invitation to complete the survey.

When you receive your paper copy, there will still be an opportunity to enter your information online rather than using the form. Instructions will be included on the survey. If you prefer to submit your information with the paper survey, instructions will also be included, along with a postage-paid envelope to return it to the Survey Research Institute.

Responding to this survey is completely voluntary. However, this is intended to be a complete census so we need a response from every grower, and therefore your cooperation is very important to the accuracy of the report. The amount of time to complete the survey will depend on the size of your vineyard operation, but should not take a significant amount of time for most growers. **The survey will remain open until August 15, 2019.**

If you are unable to complete the questionnaire either online or by mailing in your response, or have any questions about the survey, a staff person from Cornell's Survey Research Institute can assist you. You can call the Survey Research Institute at (607) 255-3786 or (888) 367-8404.

Preventing Sexual Harassment on Farms - Tools for Employers

Cornell Cooperative Extension's Southwest New York Dairy, Livestock & Field Crops Program is collaborating with regional agriculture specialists across the state to bring together agricultural labor experts to discuss New York's new laws regarding workplace sexual harassment. The training will help agricultural employers understand the new requirements and decide what steps they will take to meet the new standards before the October 2019 deadline. Trainings will take place on July 29th and July 30th from 10am – 1pm.

On July 29th, 2019 a training will be held at Cornell Cooperative Extension of Chautauqua County's office, 3542 Turner Road, Jamestown, NY 14701. On July 30th, the event will be held at Cornell Cooperative Extension of Steuben County's office, 20 East Morris Street, Bath, NY 14810. The cost to attend is $10/person payable at the door.

Speakers located across the state will connect virtually to share their presentations. Each workshop location will project the virtual meeting and provide a light lunch. Participants will be able to ask real time questions and engage with other farmers.

This training is designed for employers and human resource managers, not employees. For more information and to register visit https://forms.gle/duASeZ35oqP1e28M9 by July 26th. For questions or to register over the phone, contact Katelyn Walley-Stoll, Business Management Specialist, at 716-640-0522 or kaw249@cornell.edu.

The agenda for the meeting will provide an information overview and opportunities for discussion:
10:00-10:15- MARY-KATE WHEELER: Introduction to the New Rules: Overview, deadlines, and dates.
10:15-11:00- RICHARD STUP: Resources Available from Extension: How to use reviewed case studies.
11:00-11:30- KELSEY O'SHEA: Legal Concerns: Compliance, implications, and risks.
11:30-12:00- Lunch/Break
12:00-12:30- LIBBY EIHOLZER: Outside Materials: Other agencies resources, risks and concerns.
12:30-1:00- NICOLE TOMMELL: Closing Remarks: Summarizing action items, updates on other labor research.

Cornell University Cooperative Extension provides equal program and employment opportunities. For accommodations, please contact your viewing location at least one week prior to the event.

6592 W. Main Rd.
Portland NY 14769

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This publication may contain pesticide recommendations. Changes in pesticide regulations occur constantly, and human errors are still possible. Some materials mentioned may not be registered in all states, may no longer be available, and some uses may no longer be legal. Questions concerning the legality and/or registration status for pesticide use should be directed to the appropriate extension agent or state regulatory agency. Read the label before applying any pesticide. Cornell and Penn State Cooperative Extensions, and their employees, assume no liability for the effectiveness or results of any chemicals for pesticide usage. No endorsements of products are made or implied.
Cornell University Cooperative Extension provides equal program and employment opportunities.
Contact the Lake Erie Regional Grape Program if you have any special needs such as visual, hearing or mobility impairments.
CCE does not endorse or recommend any specific product or service.

THE LAKE ERIE REGIONAL GRAPE PROGRAM at CLEREL
6592 West Main Road
Portland, NY 14769
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