LAKE ERIE REGIONAL GRAPE PROGRAM

Vineyard Notes

February 2015

2015 Winter Grape Grower Conference
Monday, March 16, 2015
SUNY Fredonia William's Center
8:00am-4:00pm

"Knowledge is Power"
By implementing one tactic learned, you will realize cost savings above and beyond the cost of attending this conference!
And...get DEC credits at the same time!
We have applied for 2 credits for NYSDEC and 4 Credits for PDA

Topics to include: Thinning and Return Crop, GIS Mapping, The Art & Science of Crop Estimation, Economics of Crop Estimation, Managing Crown Gall, Grape Berry Moth Management, Disease Management Updates, Grape Rootworm.
Full agenda available at this link:
http://lergp.cce.cornell.edu/event.php?id=164
Register on-line or print the form and mail it in.
http://lergp.cce.cornell.edu

Cornell University
Cooperative Extension

Lake Erie Regional Grape Program

2015 Lake Erie Regional Grape Program Growers' Conference
March 16, 2015
Williams Center
SUNY at Fredonia Campus

6:30 AM **Tradeshow set up begins**

7:30 AM **Registration and Tradeshow open**

8:20 AM **Welcome**

8:30 - 9:00 AM **Thinning and Its Effect on Return Crop**
Luke Haggerty, LERGP, Cornell University

9:00 – 9:30 AM **Thinning Grower Panel**
Luke Haggerty, moderator, grower panelists to be determined

9:30 – 10:00 AM **NDVI & GIS Mapping – the basics**
Rhiann Jakubowski, LERGP, Cornell University

10:00 – 10:30 AM **Break**

10:30 – 11:30 AM **The Art & Science of Crop Estimation**
Terry Bates, LERGP, Cornell University

11:30 - Noon **Weighing a Bunch to Save a Bunch**
Kevin Martin
Perhaps because of the integration of science, the art of crop estimation increases net return to growers. Recent advancements in crop estimation techniques will improve reliability and reduce costs associated with crop estimation. At first blush it may seem counterintuitive but the decline in tonnage contracts and grape price increases the value of crop estimation.

Noon- 1:30 PM **Lunch and Visit Tradeshow**

1:30 – 2:00 PM **Managing Crown Gall**

Tom Burr, Cornell University

Dr. Burr will instruct growers on the latest research on grape crown gall and how it can be implemented in vineyards that were hit hardest during the bitter cold temperatures during the winter of 2013 -2014. Growers of wine grapes and Niagara juice grapes will be interested in how crown gall can become established after a cold event and what can be done to combat this pest.

2:00 – 2:30 PM **Grape Berry Moth Management**

Mike Saunders, Penn State University

Dr. Saunders will cover the new phenology-based degree day model for timing grape berry moth management strategies. Dr. Saunders will cover the history of the model, what has been learned during the implementation phase of getting the model in the hands of growers, and how the model can be used by local growers in their vineyards to manage grape berry moth.

2:30 – 3:00 PM **Disease Management Update**

Bryan Hed, Penn State University

Mr. Hed will provide growers an overview of where the Lake Erie region stands in the way of disease potential in 2015 for the four main diseases of grapes; powdery mildew, downy mildew, black rot and Phomopsis. Bryan will also provide a look at what new, and existing, materials are available for use in a vineyard disease management strategy.

3:00 – 3:30 PM **Grape Rootworm**

Tim Weigle, NYS IPM Program, LERGP, Cornell University

Mr. Weigle will provide an overview of grape rootworm, once considered to be primary pest of grapes in the Lake Erie region, and what management strategies are available against this resurging pest, both chemical and biological.

3:30 PM **Adjourn**

LAKE ERIE REGIONAL GRAPE PROGRAM

2015 GRAPE GROWERS' CONFERENCE REGISTRATION FORM

to be held at SUNY Fredonia Williams Center

on Monday,March 16,2015

Deadline for registration is March 10, 2015.

Name (1st attendee) _____ **$**_____

Farm Name _____

Address, City, State, Zip Code _____

_____

Phone_____ **E-mail**_____

Are you enrolled in Lake Erie Regional Grape Program (LERGP)? **Yes**_____**No**_____

REGISTRATION FEES	
LERGP Member 1st attendee	$ 50.00
Additional attendee on same farm	$ 35.00
Non- member	$100.00

Additional Attendees:

	$
	$
	$
	$
	$

*Please add a **$25.00 late fee** for each reservation received after March 14, 2014

TOTAL $_____

Please make check payable to **LERGP (Lake Erie Regional Grape Program)** and mail to:

Kate Robinson
LERGP
6592 W Main Rd
Portland NY 14769

Name _____NY DEC/PA PDA NUMBER_____

Name _____ NY DEC/PA PDA NUMBER_____

Name _____ NY DEC/PA PDA NUMBER_____

Date Ck. Rec'd	**Amount**

Call Kate at 716-792-2800 ext 201 with any questions.

Business Management

Kevin Martin
Penn State University, LERGP,
Business Management Educator

Cost and Benefit Analysis of NDVI and other sensors

NDVI research has been going on for decades and for 5 – 10 years in grapes. Benefits of NDVI rely on the ability of the data to alter production practices in a meaningful way. The history of the internet began in the 1950s. Forty years later it became commercially relevant and valuable. Development and discovery is one thing, useful commercial application is another thing entirely. We would like to see the use of NDVI find commercial benefit in vineyards much more quickly. Borrowing research and technology from previous agricultural commodities makes the prospect of commercial development far simpler than it was for prior industries.

Costs

The costs of the technology are simple. Once Research and Extension complete this project, growers that adopt this technology will have a variety of sensors at their disposal. NDVI sensors and data loggers require an investment of less than $4,000. Yield monitors range from $12,000 - $15,000. Experimental brix monitors are not yet commercially available. Data processing in other industries is affordable. University based, and grant funded development, would push those costs even lower, though that work has not yet been funded.

Reduced sampling costs

The primary benefits of NDVI as demonstrated by cooperation with commercial growers have been reducing sampling size to gain viticulture data. Reliable pruning weights can be gathered at a rate of 10 to 20 acres per hour. This actually adds a cost to commercial grape growing, as vine size sampling was not widely adopted by the industry because of sampling time costs.

The information to use NDVI to reduce destructive crop size sampling is not yet commercially available. However, the research is very promising. Two years of results indicate that growers could begin to follow recommended sampling guidelines and dramatically increase the confidence in their yield estimations. In cooperation with a commercial grape grower, fruit loss was decreased $3.70 per acre. Sampling labor costs were reduced from $1.60 per acre to $.45 per acre. Furthermore, accuracy and confidence in the crop estimate increased substantially. Final results revealed a margin of error, on all sites, at less than 5%. In 2013 this actually resulted in an increased yield that the grower would have otherwise thinned. While this benefit would be dependent on conditions in this case it resulted in an increase in net profit per acre of $139.85 per acre.

Reduced sampling costs will allow growers to conduct on-farm trials inexpensively and quickly. This sampling extends beyond yield estimation and into vine size estimation. In doing so, NDVI and yield sensors single handedly capture all of the variables of crop load. Fertilizers, spray materials and experimental production practices are all designed to manipulate crop load in some way. These sensors allow one to measure that effect and compare it to a check and/or alternative practice. The commercial value is hard to estimate but limited only by a grower's curiosity and intuition.

Identifying potential of a uniformly undersized vineyard.

When NDVI reveals undersized vines the benefits are clear. Extension has worked with growers to identify drainage needs, fertilizer management plans and yield recommendations. GIS mapping and NDVI sensors enables Extension to give drainage and yield recommendations with much more confidence. Fertilizer plans and soil samples offer incremental improvements. Thus far, allowing growers to save additional fertilizer applications. Eventually NDVI could identify fertilizer needs that result in increased use of fertilizer. Such recommendations will be unusual, but will dramatically improve vine size and yield. Growers that simply use NDVI to reduce the number of soil samples taken, stand to save $2.50 - $3.00 per acre every year.

Variable rate management

In order to adopt automatic variable rate management, growers will need to invest between $10,000 and $20,000 in tractor computers, flow meters, and other related GPS technology. It is expensive enough so that further research will be necessary to determine what acreage is necessary to justify this investment. Given the dramatic variability we have seen in our region, we are confident that this research will yield results for, at least, most large growers. Further research will reveal what pieces of machinery are most important in variable rate management. These results will give us the ability to make recommendations to growers, in order to minimize upfront cost, based on the specific issues in their vineyards.

Given what we know now, the best investments in variable rate management remain unclear. NDVI and other sensor maps do not follow patterns of elevation or soil type that one might expect. Without sensor technology I do not expect variable rate management to increase profitability. With NDVI or other sensor technology data, variable rate management may increase profitability for some growers. Given the high levels of variation in Concords, relative to grapes in other regions, if there is a benefit, we will see it here first. Between the large upfront costs, the price of grapes, and the current state of VRM research, it is not an investment that would make sense in the next couple of years.

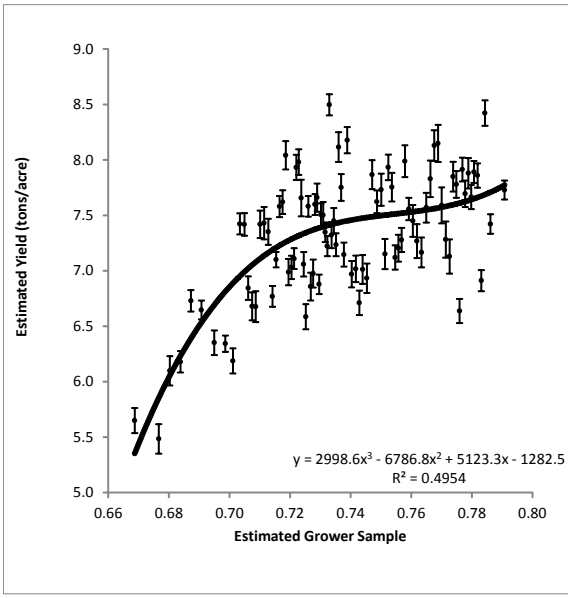

Figure 1: This represents the relationship between NDVI and yield estimated by growers using practices common today. This estimation was gathered using grower reported data and very conservatively estimates the expected error in crop estimation. The variability is explained by sample size and errors calculating berry size. Applying this error over 200 acres, a grower would need to schedule an additional 22 loads. The grapes would mature 2-3 days later than estimated. While NDVI does not represent actual yield, see figure 2 for the relationship between NDVI and actual yield. Researchers were slightly better at predicting yield but it requires significantly more samples than growers are accustomed to taking.

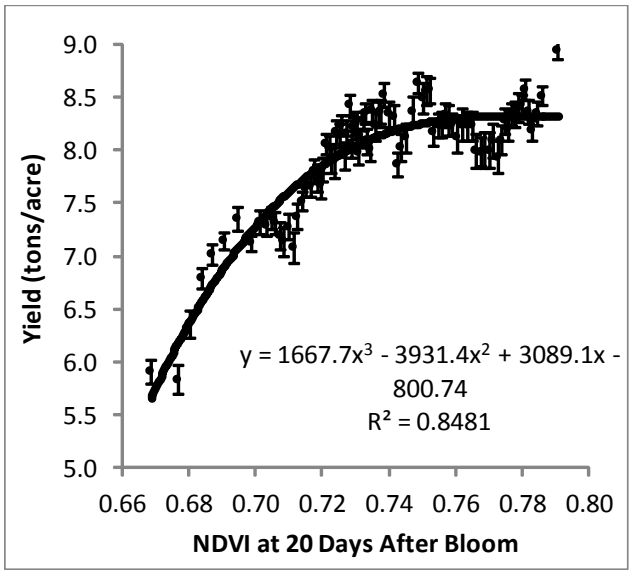

Figure 2: The close correlation between early season NDVI and actual final yield allows for a more accurate crop estimation by correlating weight samples at 30 days post bloom with 20 day NDVI. Further development of this tool has the potential to be accurate enough to eliminate estimate inaccuracies that result in significant economic costs during the busy harvest season. For further information, refer to recent articles that have detailed those costs, which are incurred by harvesters, processors, and growers.

Concord Market Update

I have every faith that the grape industry will continue to march on and survive this challenging market just as well as it has historically. That does not mean it will necessarily be easy, or that all growers have the financial strength and marketing contracts to survive. As a whole, I do not yet believe the industry has entered a new era of production challenges that it has not previously faced. Therefore, I do not yet believe the outcome will be any different.

As such, we will continue to provide sound Extension information, based in research, to enhance the long-term sustainability of the industry. I will not be presenting that information in a vacuum, but it is important to realize that the business plans and financial conditions of growers will vary greatly throughout this challenging time. While some growers lock up their checkbook and throwaway the key, others look to position themselves to have continually large crops. Still others balance the delicate precipice of minimal cost and maximum production. The temptation to save sometimes leads to a stumble off that edge.

Currently the bulk market is packed. Prices of single strength, in particular, shock the conscience. That's not to say the concentrate market has fared well. The patience of buyers in this buyer's market has led to yet another round of cancellations. Committed marketing contracts in the Lake Erie Region, based on tonnage, have now fallen below 15,000 tons. It is likely that these tonnage contracts now provide marketing agreements for less than 10% of acreage currently in production.

Obviously, this has removed all slack from the Concord grape market. Processors have what they want and if anything happened they have avenues to get considerably more. The strengthening US dollar might result in cheap fuel, but it is going to make exporting inexpensive commodities nearly impossible.

The latest round of cuts, approximately 50% of Cott's tonnage contracts, is significantly less than last year. With the reductions impacting all growers and little slack in the industry, those cuts will be much more challenging to react to. It is the kind of cut that radically changes a business model and takes an efficiently sized farm (potentially) and makes it unsustainably sized. Given the number of acreage contracts Cott is committed to, severe decline impacts relatively few tons. Unfortunately for those growers, any meaningful cut requires a substantial percentage from each individual grower.

While it will vary from grower to grower, some growers will be better off exiting the industry. Depending on the size of the farm and the contract, it could be less expensive to abandon the vineyard than make an attempt to produce two tons per acre at low prices.

The demographics of the impact population make any action particularly challenging. Part time and older growers are typically not in a position to make investments that require long payback periods or learn new skills requiring similarly long payback periods.

Along with a lack of marketing contracts, the rest of the industry will likely have to struggle with lower prices. How low, will be partially processor dependent and the markets those processors are exposed to. With bulk concentrate down between 45% and 70% of recent highs, prices will inevitably decline across processors. Depending on crop size and demand going forward, some growers may not be in a position to maintain vineyards at low prices. The ability to do that will be based on historical performance, current strategies and future planning. More so than cancelled contracts, this is an area where research based extension information can prolong survivorship.

Cultural Practices

Luke Haggerty
Viticulture Extension Associate
Lake Erie Regional Grape Program

2015 Bud Outlook

For some growers 2015 has been another cold year. During the 'polar vortex' in 2014, the region, as a whole, endured similar low temps between -10 to -13 °F. The two cold fronts that passed through the region on January 14th and 28th of this year had much more variation across the belt. Table 1 shows that the northeastern part of the belt received the coldest temps with Versailles at -16.4°F and Sheridan at-12.4 °F, where many other locations did not fall below 0 °F. Although there is a large variation of low temps, the outlook for next year will be determined by the vines bud hardiness and bud fruitfulness.

Winter injuries can be determined by cutting open buds to assess the damage or by tracking bud hardiness through a method called "differential thermal analysis". Differential thermal analysis (DTA) is used to estimate the temperature a bud can withstand before death by recording the 'Low Temperature Exotherms' (LTE). For example, DTA is used to predict the lethal temperature that would kill 50% (LT50) of the buds of a specific cultivar.

Lake Erie Grape Region NEWA Weather Data	
Location	**Low (F)**
North East Lab, PA	-4.6
Harborcreek, PA	0.8
North East Escarpment	1.1
Ripley	-4.4
Portland Route 5	-4.5
Portland CLEREL	-4.0
Portland Escarpment	2.3
Dunkirk Airport	-9.9
Silver Creek	-9.4
Sheridan	-12.4
Versailles	-16.4
Appleton	-7.9
Somerset	-4.0
Lockport	-5.0

Table 1. NEWA weather data form 1/14/15

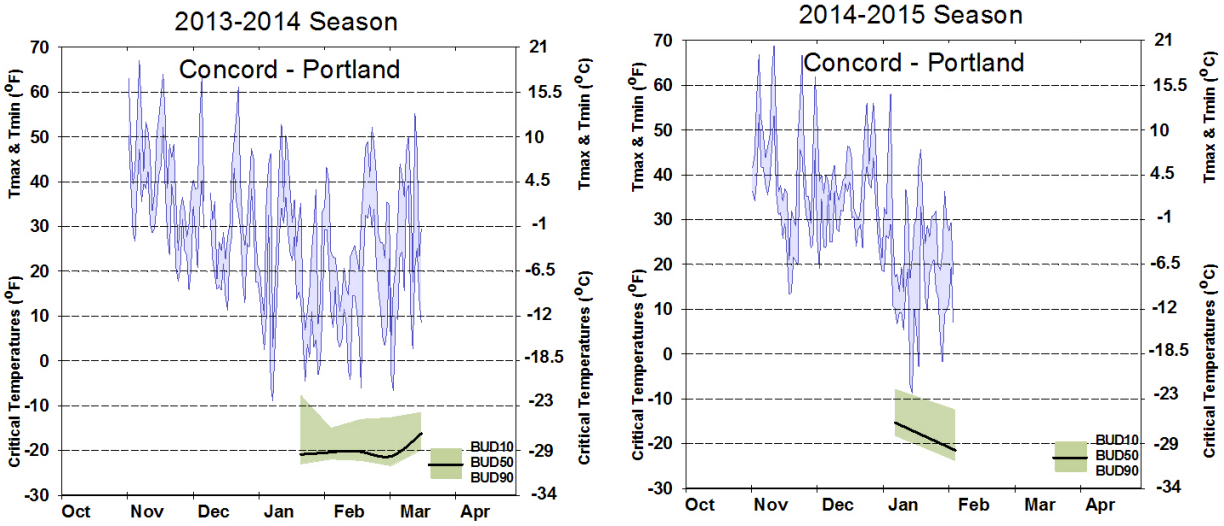

Figure 1. 2014(left) and 2015 (right) LTEs for 'Concord' sampled at CLEREL. Graphs by Bill Wilsey

Bi-monthly cane and bud samples are sent from the Cornell Lake Erie Research and Extension Laboratory in Portland, NY to the NYSAES in Geneva, NY as part of the 'Seasonal Bud Low Temperature Exotherm' Project. Figure 1 shows LTEs for Concord (grape) for the 2013-2014 and 2014-2015 season. The temperatures in purple shading show the temperatures throughout the winter seasons. In January 2014 there were three points where temperatures dropped below zero. The 2013-2014 graph shows how buds become less tolerant to cold temperature as the season warms up and the buds progress out of dormancy. As we can see from the graph, bud hardiness for Concord has been able to dip below damaging temperatures here at CLEREL. To follow bud hardiness LTEs for the Lake Erie or other New York grape regions go to: http://grapesandwine.cals.cornell.edu/cals/grapesandwine/outreach/viticulture/weather.cfm.

Buds are protected by a process called supercooling, which is the ability of cell content in the buds to remain liquid at sub-zero temperatures. We refer to this as bud hardiness. Ultimately, the genetic makeup of specific cultivars will determine hardiness, which varies between cultivars. With the variation in temperatures this year I would expect to see the bud damage isolated to the more tender varieties in the colder areas. Having healthy vines can help withstand colder temps. Last year's environmental conditions, vine health, and crop load have contributed to this year's bud hardiness and, more importantly, bud fruitfulness.

Vines self-regulate the balance between vigor and crop load (fruitfulness). When the vine becomes un-balanced so will vigor and crop load. Most Concord growers are returning from back-to-back larger than average crops. This leads us to believe the vines are unbalanced and crop load should be down and vigor will increase this following season. Before any assumptions are made, the environment is another factor that needs to be calculated into the equation.

The majority of the 2014 growing season was wet and cloudy. Environmental conditions during or around bloom is what sets the stage for the following years fruitfulness. Being that last year's weather during bloom was fair at best, bud fruitfulness should be down in 2015. However, during late summer and early fall we received sunshine and heat which helped ripen the grapes and the wood. Many comments have been made about how ripe the wood looks his year. Yes, most Concord vineyards have very dark canes, but taking a closer look, there are a few notable observations. On good growing sites there is no shortage of wood, an abundance of nice long canes for pruners to choose from. As we reported last year, the growing conditions contributed to the large berry size we saw, but it also contributed to vigor leaving these long canes. The canes also have long internodes and past research suggests that long internodes indicate decreased bud fruitfulness. This does not mean there are not going to be any grapes, but cluster and berry numbers may be lower than average in 2015.

Variety	Range of Bud Damage (%)	Average % Primary Bud Damage
Native		
Concord	0-20%	9%
Niagara	0-30%	10%
Hybrid		
Seyval	0-30%	10%
Traminette	0-40%	17%
Vignoles	0-30%	13%
V. vinifera		
Riesling	0-30%	14%

Table 2. Bud damage at CLEREL 2-3-15

Bud injury and fruitfulness can be determined in the dormant season by cutting and examining them. I have completed my first round of bud cuttings for 2015. Table 2 shows bud injury for varieties inspected as of February 2, 2015 here at CLEREL. As of now, there is no real notable damage at our site, but I would expect more damage in the eastern part of the belt. Determining bud fruitfulness is more challenging than evaluating injury. Premature cluster can be seen with a microscope when the buds are cut at certain depth. Most of the Concord buds I looked at had one and two clusters. Compared to last year, the Concord buds I cut this week seemed smaller, not as fleshy (drier), and I found more yellow (chlorotic) cells within the buds. Again, this does not mean there are not going to be any grapes next year, but it indicates cluster and berry numbers may be lower than average in 2015.

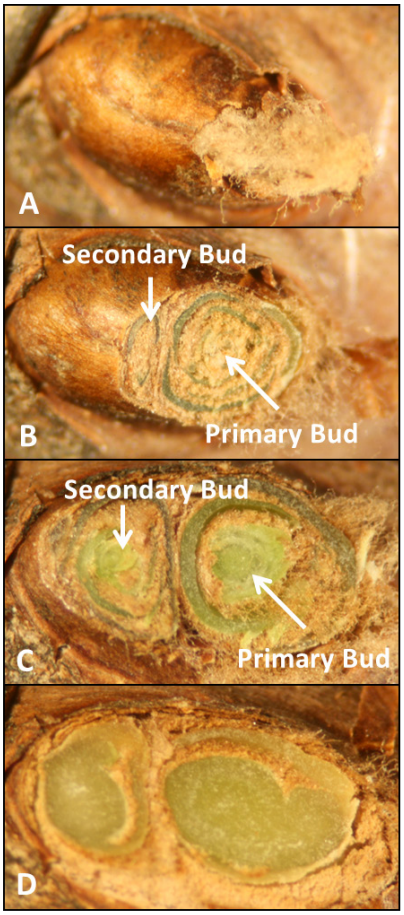

Figure 2. Cross sections of healthy 'Concord' bud. Photos by Luke Haggerty

Bud Assessment Procedure:
Bud assessment can be an easy process. Collect healthy, pencil-sized canes that should have viable buds (canes that would be saved when pruning). Collect approximately 100 buds (10-15 canes) from different areas within a vineyard block. Do not assess canes that have evidence of disease (phomopsis), bully canes, or laterals off bull canes. Canes should be stored at room temperature and kept moist for 24 to 48 hours. Using a razor blade cut buds at an appropriate depth (Fig. 4C) and record the results. Bright green tissue signifies a viable/healthy bud, and brown and black tissue indicates the bud is dead.
Tips: Make several cuts when evaluating buds. To evaluate the primary bud cut off the top ¼ of the bud (Figure 2B). To examine the secondary and tertiary buds, shave off a bit more until the half-way point is reached (Fig. 2C). The tertiary bud cannot be seen in this picture. Avoid cutting too low and exposing the bud cushion, (Fig. 2D) this may give you a false positive, as this area usually stays green even when there is bud damage. It helps to be in good lighting and use some sort of magnification (reading glasses or magnifying glass).

For more information on how to assess winter injury to buds or to see a video tutorial visit: http://www.fruit.cornell.edu/grape/pool/winterinjurybuds.html.

Preview of Thinning and Its Effect on Return Crop

There are many factors that contribute to thinning such as crop estimation, crop load, vine size, and timing. All of these factors are important and they all effect the decision on whether or not to thin and or the amount that should be taken off. The big question that should always be asked is "is the vine size and crop load compatible"? If the answer is no, then it is time to take action, and in 2013 many growers did.
In an effort to avoid over cropping in 2013, between 30 to 50% of the Concord acreage was thinned. Although it was one of the largest crops the belt has harvested there was still mixed reviews on thinning attempts. It may be a coincidence that the 2014 crop was also well above average, or there could be a correlation between the two.
First on the schedule for the upcoming winter conference I will be presenting on "Thinning and Its Effects on Return Crop". In this presentation we will be comparing 2013 and 2014 yield data from commercial operations from thinned and un-thinned blocks. Within this data set there is variation in both the treated (thinned) and control (un-thinned) leading to why there may be mixed reviews for the 2013 thinning efforts. With the presentation, data set, and thinning grower panel discussion we plan to highlight what went well in the 2013 thinning efforts and discuss possible reasons for disappointing results.

Thinning our 2013 Concord at CLEREL. Photo by Bates

eNEWA – A New Way to Access Weather and Grape Pest Model Information

Working in conjunction with Keith Eggleston of the Northeast Climate Center, and Juliet Carroll, NYS IPM Program, an eNEWA-grape alert was developed that would provide participants with current weather and pest model information found on NEWA on a daily basis. This daily email contained 1) high, low and average temperatures, rainfall, wind speed and relative humidity 2) the 5-day forecast for these weather parameters, 3) Growing Degree Day (GDD) totals (Base 50F), 4) 5-day GDD (Base 50F) forecast and 5) model results for powdery mildew, black rot, Phomopsis and grape berry moth. The weather information was provided for not only the current day, but for the past two days as well.

A project to beta-test the eNEWA grape alert was started on April 19 with participants from across the Lake Erie region, as well as the other major grape growing regions of New York State. Forty-seven participants took part in the beta testing in the following regions; Lake Erie NY (27), Finger Lakes (7), Hudson Valley (1), Long Island (10) and University faculty and staff (2). The daily emails continued through the growing season and concluded on September 10 when grape harvest began.

An end of season survey was conducted with 24 of 47 participants completing and returning the survey for a return rate of 51%. Overall, participants were very positive about their experience with the eNEWA-grape alert. When responding to the survey, participants could rate their experience as Great (the highest rating), Above average, Average, Below Average or Terrible. Respondents found that eNEWA-grapes, overall, was useful with 62.5% giving it a great rating while 25% found it Above average. One participant commented that the total rain fall and wind forecasts were the most helpful in their spray program.

When asked if eNEWA-grape was helpful to their IPM Practices, just over 90% of responses gave it a Great (50%) or Above average (42%) rating. These types of ratings continued for the question on whether the disease model information contained in eNEWA-grapes was easy to understand with over 90% giving it a Great or Above average rating. One respondent reported that they based their sprays on the information and had good results with it. The grape berry moth model information found in the eNEWA-grape alert had the most comments and suggestions on needed improvements but still had 87% of respondents giving it a Great (52%) or Above average (35%) rating. Comments provided by users ranged from “Berry moth is still very hard to pin down” to “I looked at it every day, followed the guidelines, sprayed accordingly and had no grape berry moth”.

From survey input and conversations with growers throughout the season, it appears that eNEWA-grapes is another tool that growers can use to assist them in the implementation of their vineyard IPM strategy. Some participants followed up with their local grape extension specialist on how best to use the information, while others used it as a trigger to visit the NEWA website to get information from additional sites, or for information on the potential for downy mildew infections. While a downy mildew model has been developed, and is displayed on NEWA, it requires too much user input to be made available through a daily email specific to individual station locations.

Participants had the opportunity to provide any additional comments and provided some good constructive criticism on how to improve the disease and grape berry moth models along with some very positive comments.

- “Overall, I think it was a good program. I found the delivery of information to be timely and the content helped me with my management decisions. I liked that it came to my email and the information was already compiled for me.”
- “NEWA is a great source of information; it gives you a great road map to follow and still allows you to make your own decision based on the information”.
- “Very useful, we hope it can continue”.

It is interesting that while the overall reaction of users was positive, when asked if they would be willing to pay a $5/month subscription fee for the eNEWA-grape alert email service, only 36% responded yes. Comments such as “Small price to pay for valuable information” to “If you can just pay for the months you want” to “not sure, $60 is pretty high for an email service”.

Grower training on the implementation of NEWA resources was conducted at the Lake Erie Regional Grape Program Growers’ Conference (110 participants), small grower meetings in the Lake Erie region specific to NEWA (9 participants), at 17 Coffee Pot meetings held across the Lake Erie grape belt during the growing season (227 participants) and at two twilight meetings in the Lake Erie region (310 participants).

We are hoping to be able to continue the availability.

Grape Rootworm – Looking at Alternatives for Managing an Old Foe.

Grape rootworm, *Fidia viticida (Walsh)* , was once considered to be the primary insect pest of grapes in the eastern United States. Feeding on the roots of the vine by the larval stage can lead to significant reductions in vine vigor, and even death of the vine, in as little as three years in heavy infestations. The introduction of the pesticide DDT has been credited with bringing this pest under control in the vineyards of the Lake Erie Region of New York and Pennsylvania. Even after the use of DDT was banned in the United States in 1972, its persistence in the soil is thought to have kept grape rootworm populations down to levels low enough as to not be a concern to commercial grape growers. However, in recent years, we have seen grape rootworm making a comeback in Lake Erie vineyards, reducing vine size and yield. Having dropped from the designation of a primary pest, NYS grape growers find they do not have the tools they need to effectively manage the reemergence of this pest. This is primarily due to the pesticide regulations in NYS requiring both the pest and the crop to be on the pesticide label. In 2014, only one insecticide was labeled for use against grape rootworm in NYS, raising concerns that the pest will develop resistance to that material in a short amount of time. The Lake Erie Regional Grape Program processor’s group has identified finding alternative management strategies for grape rootworm as a priority for the 30,000 acres of grapes in their region.

Adult Grape Rootworm

In conjunction with Greg Loeb, Professor, Department of Entomology, NYSAES, two replicated spray trials using 4 insecticides currently registered for use on grapes in New York State were conducted in two grower vineyards with grape rootworm populations. The materials in these trials were chosen in part, due to their mode of action being different from the material currently labeled for grape rootworm. This helped to ensure that materials will be available for use in a resistance management program, with the result being that by rotating materials, they will all be effective against the pest for a much longer time. The spray trials consisted of 4 replications per site with 5 treatments (including a control where no materials were applied) per replication. Members of the Cornell Lake Erie Research and Extension Laboratory applied the treatments and assisted the Lake Erie Regional Grape Program extension team in collecting data. Shaking the top wire of count vines, and collecting grape rootworm adults on a catching frame as they fell, was used to determine the effectiveness of treatments. This sampling occurred just prior to the treatments being applied, immediately following the application, and two weeks later.

All four materials used in the spray trials were found to be effective against grape rootworm. Armed with this information, an application for a FIFRA 2(ee) recommendation was applied for, and approved, for the use of Admire Pro, Danitol 2.4 EC, Leverage 360 and Sniper against grape rootworm in New York vineyards. The FIFRA 2(ee) recommendation allows grape growers to use a material against an unlabeled pest (in this case, grape rootworm) in NY vineyards. The FIFRA 2 (ee) recommendations will provide access to materials needed to effectively manage this pest for years to come, by implementing a resistance management strategy of rotating effective materials with different modes of action.

Grape Rootworm's chain like feeding on the grape leaves

This is extremely important as grape rootworm has only one generation per year and spends the majority of its life underground, limiting the opportunities to expose it to multiple modes of action each year. By being better able to control this pest, grape growers will see vine size in infested vineyards increase, leading to a higher fruiting capacity and more tons per acre resulting in increased profits.

The FIFRA 2(ee) recommendation must be in the possession of the user at the time of application. A copy of the FIFRA 2(ee) recommendation for Admire Pro Systemic Protectant, Danitol 2.4 EC Spray, Leverage 360 Insecticide and Sniper can be obtained from the LERGP offices at CLEREL or on the LERGP website under Current Projects at [FIFRA 2(ee) recommendations]

Update on the Nine-Site Pruning Study in the Lake Erie AVA

Terry Bates

Nine Concord pruning plots were established in 2011 transecting the Lake Erie AVA (**Fig 1**). At each site, vines are pruned to 60, 90, and 120 nodes/vines with three replicate blocks per site. Weekly fruit samples are collected from two-weeks pre-veraison to harvest at each site and pruning level and measured for berry weight, juice soluble solids, titratable acidity, pH, and color. Pruning weights are collected during dormancy and yields are collected at harvest.

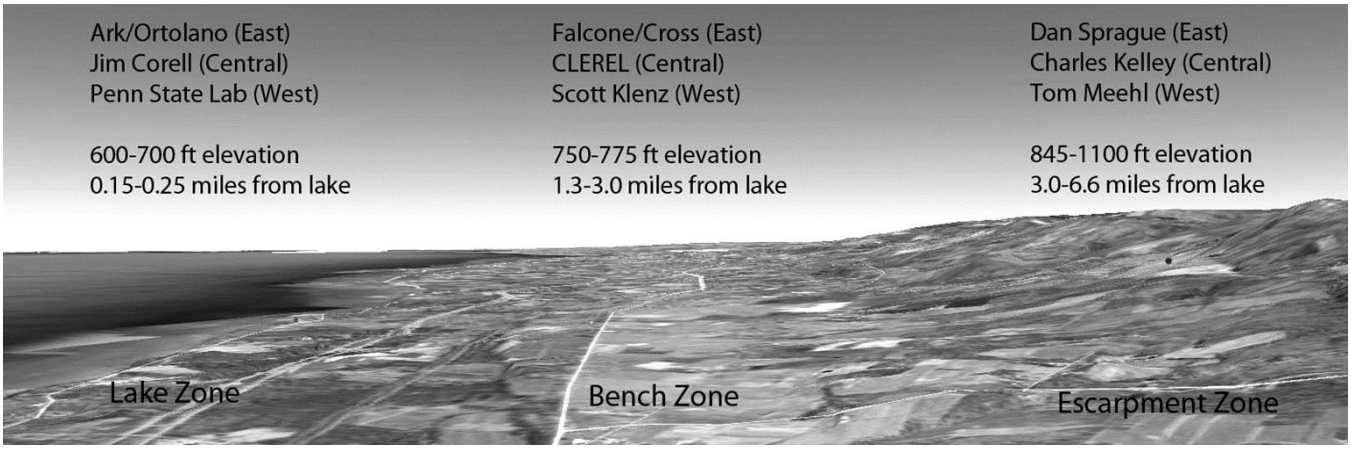

Figure 1: Elevation profile of Lake Erie AVA indicating the zones where pruning plots were established and the cooperating growers.

Three seasons (2011, 2013, 2014) were similar with respect to moderate bloom date, veraison date, and mean crop size. A damaging spring frost in 2012, reduced crop potential across all sites and treatments. 2012 also had earlier bloom and veraison dates.

Investigating juice soluble solids (JSS) across seasons and locations, there appeared to be a small effect of the distance from the Lake Erie shoreline on the rate of fruit ripening (**Fig 2)**. The route 20 gravel bench vineyards had the earliest ripening followed by the escarpment vineyards and then the lake vineyards. However, soil type also influenced average berry weight, presumably by influencing vine water status. Well drained gravel-loam soils tended to have smaller berry weight than heavier silt-loam and clay-loam soils. If JSS was normalized for berry weight (JSS/berry or JSS/acre) there was little to no difference in absolute fruit sugar production between the sites. Therefore, all the sites had similar ripening potential. Two minor exceptions to this were the far east and far west lake vineyards which recorded lower "late season" sugar accumulation, possibly attributed to cooler late season air temperature close to the lakeshore.

Other juice attributes followed seasonal and JSS factors more than location. As expected, titratable acidity decreased while juice pH and color increased with increasing JSS. The 2013 growing season was relatively warm and dry for the region causing lower juice TA, higher pH, and lower than expected color at the same harvest JSS (**Fig 3**). The 2014 juice samples are still being analyzed but it is expected that juice TA and color will both be higher at a given harvest JSS than in 2013.

What this study lacks is a late bloom-low GDD season which would possibly exaggerate any ripening difference between sites. Given the seasonal characteristics from 2011-2014, we conclude from this trial that there is little to no difference in ripening potential between any of the sites tested – "everything else being equal" (i.e. vine size and yield). If vine size (potential light interception) and crop size were similar between locations (similar crop loads), there was not enough of an environmental difference in solar radiation, temperature, or precipitation to cause a difference in total fruit sugar production.

What is the basis for both perceived and actual ripening differences across the Lake Erie AVA? We argue "everything else is not equal" from vineyard to vineyard. Crop load is not equal between sites either because of vine size variation, crop size variation, or both. Vine size is influenced by soil water and nutrient availability and uptake through the root system. Our sites spanned a range of soil types from excessively well drained gravel-loams to poorly drained clay-loams. This led to variation in vine vegetative growth potential, vine light interception, and crop production potential. We collected spatial vegetative measurements (NDVI) at the nine vineyard locations and recorded a wide distribution in canopy growth both within and between vineyards (**Fig 4**). Our current research efforts on mapping and responding to vineyard spatial variation aim to address the need of managing limiting vineyard factors.

The nine-site study has also identified the confounding influence of soil type on berry weight and the effect of berry weight on JSS (a measure of sugar concentration). Soils with excess water tended to have larger berries and lower JSS, but the same sugar content. Droughty soils had the opposite effect. In viticulture regions with low precipitation, berry weight can be manipulated though vine water management (controlled irrigation). This is a bigger challenge in high precipitation regions, like the Lake Erie AVA. We propose to address Concord berry weight in 2015.

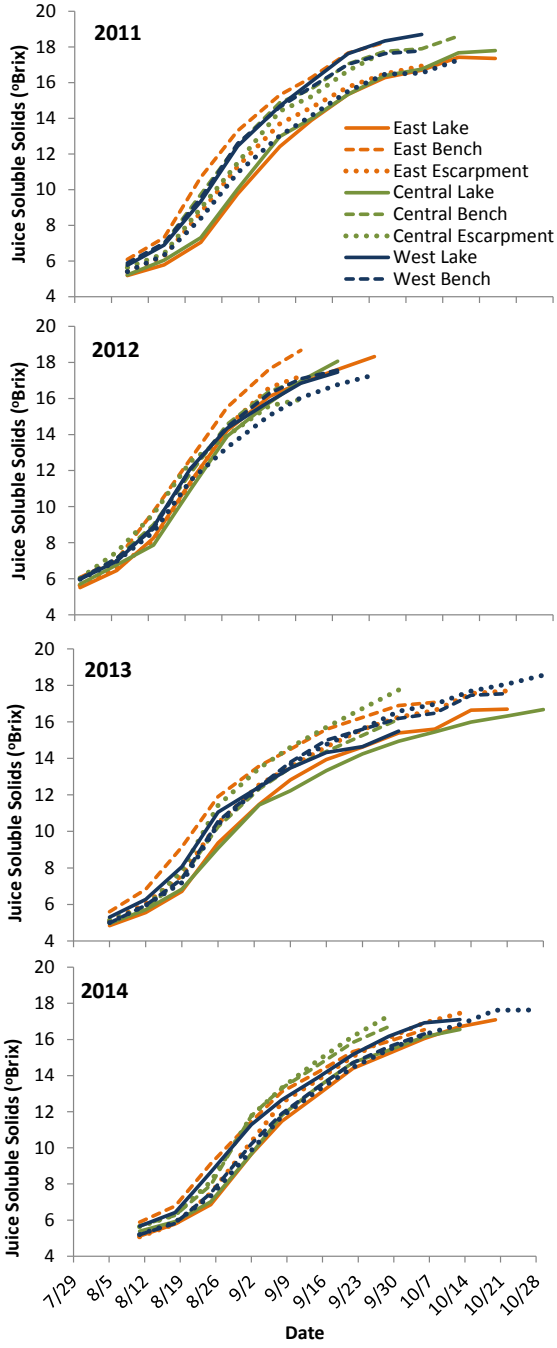

Figure 2: 2011-2014 Juice soluble solids accumulation from the nine vineyard locations. If this JSS data is normalized on berry weight, the lines become closer. When comparing vines of similar vine size and yield, there is little to no difference in ripening potential between sites.

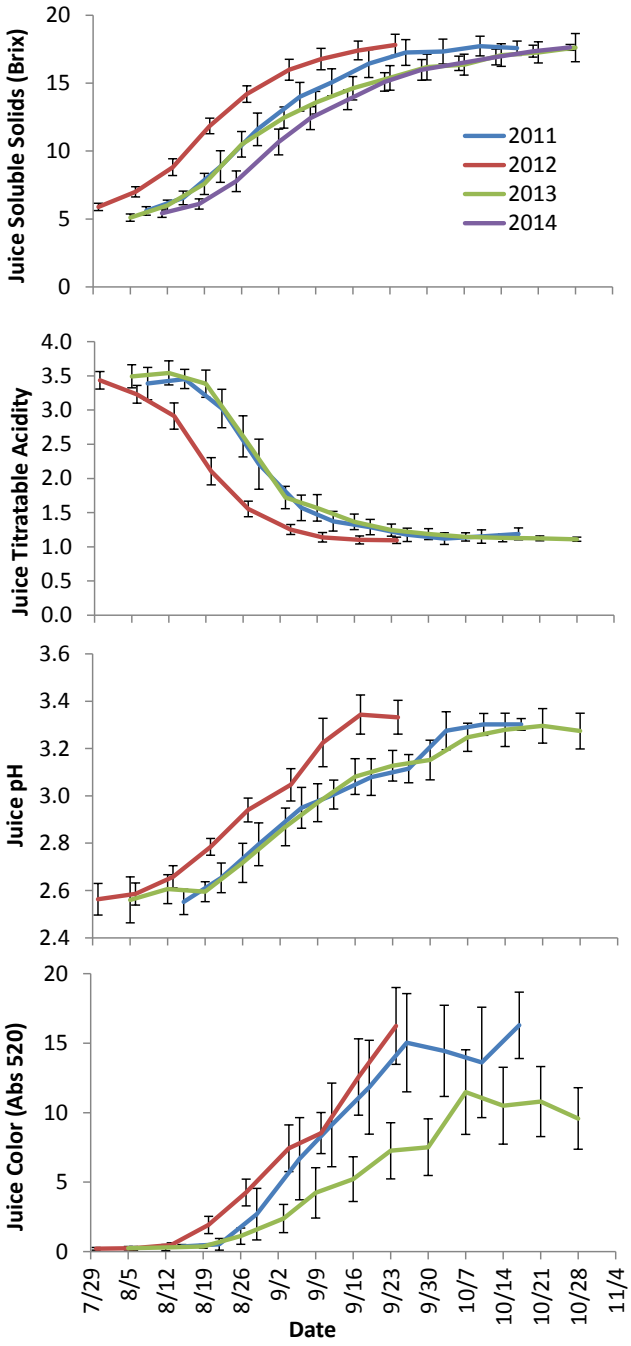

Figure 3: Mean Juice soluble solids, TA, pH, and color across nine vineyard sites from veraison to harvest. 2012 was a frost year with low crop and early bloom. 2013 had lower color at a given JSS level. 2014 juice TA, pH, and color are still being analyzed.

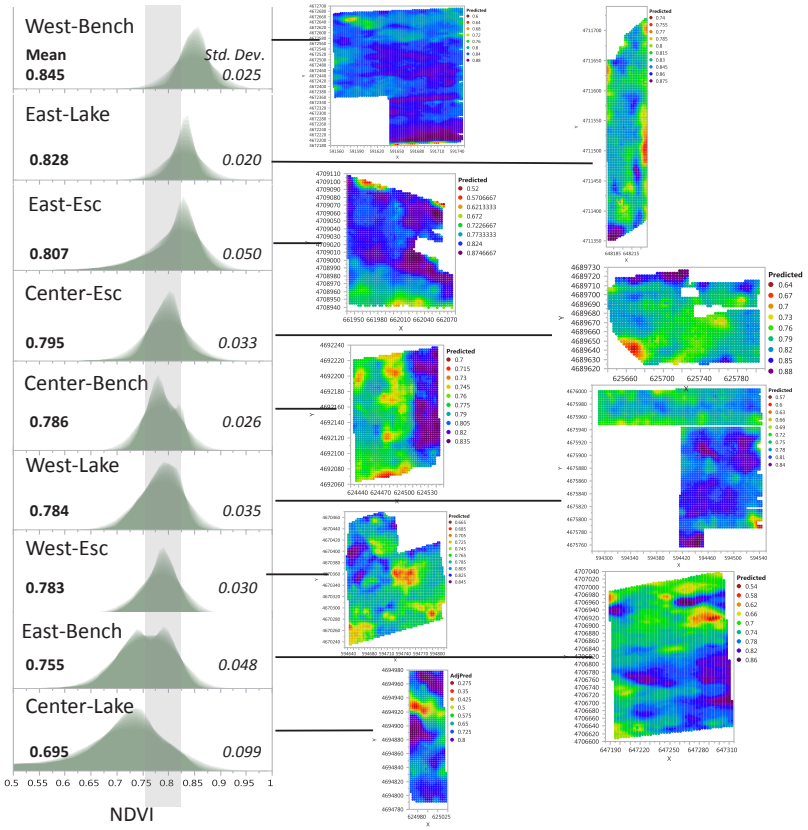

Figure 4. NDVI maps and distributions from each of the nine study locations. Colors indicate differences in canopy fill; however, each map has a different scale so colors cannot be compared between maps. Distributions show the difference in measurement mean (bold value) and standard deviation (italic value). The shaded bar indicates a desired range for efficient vine size. Vines below the shaded area may have lower production and vines above the shade may have shading issues.

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