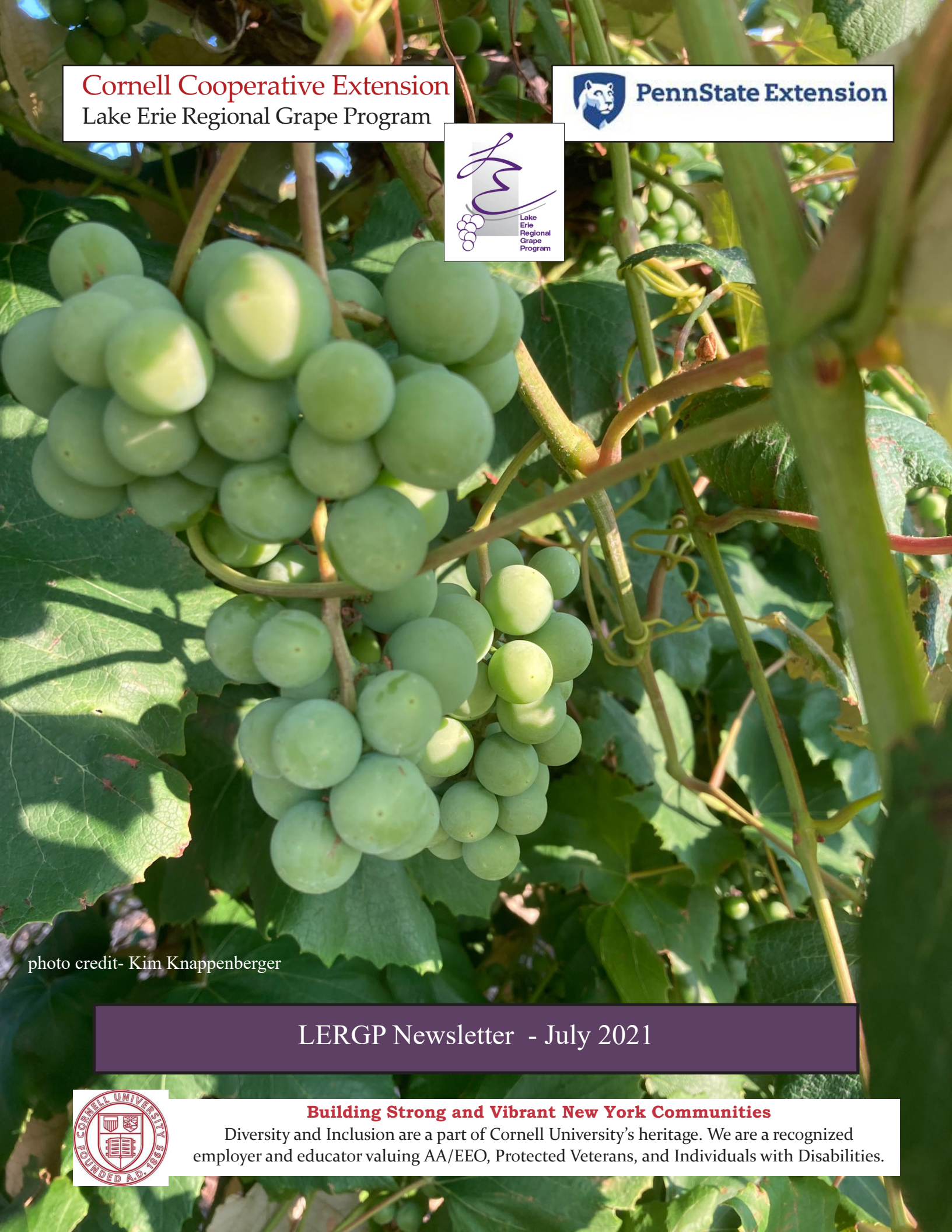

Cornell Cooperative Extension
Lake Erie Regional Grape Program

PennState Extension

Lake Erie Regional Grape Program

photo credit- Kim Knappenberger

LERGP Newsletter - July 2021

Building Strong and Vibrant New York Communities

Diversity and Inclusion are a part of Cornell University's heritage. We are a recognized employer and educator valuing AA/EEO, Protected Veterans, and Individuals with Disabilities.

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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.

We are having an In-Person Coffee Pot meeting!

When: Tuesday, August 3rd, 2021

Where: Brian Chess Farm
10289 West Main Rd.
Ripley NY 14715

Time: 12:30pm- 2:00pm

Lunch will be served!

Come connect with us and your fellow growers and have a bite to eat. Leave ZOOM at home!

Register here!

Succession Planning for Bulk Juice Production

A farm succession plan can be fairly difficult to navigate. By some measure most farm succession plans end in failure. Much of that can be attributed to an unfair definition of failure. Measures often include a count of generations. Sometimes a farm will be auctioned off in bankruptcy, that is a failure. Sometimes a farm will not be transferred to the next generation but will build wealth and a sizeable estate. Some might view this as a failure but it is not a financial failure like the prior example. A farm succession and estate plan becomes increasingly complex as the number of people and their reliance on the business grows. When more than three nuclear families rely on the business as their livelihood, a detailed analysis of the business and review of strategy becomes fundamental the financial well-being of all interested parties.

Employee Based Succession Plans
Poor estate and succession planning can result in the failure of a farm. For some, that can be an emotional loss. If that is the case, it is important to understand the history and work behind a farm that results in that emotion. When the attachment and interest is not shared by the following generation, acceptance can be particularly challenging for the senior generation. Expanding the scope of what succession means and how to define successful succession can be helpful. Building a relationship with an individual, even if they're outside of the family can be rewarding.

A non-family succession plan can allow the farm business to transfer to the next generation, gradually, despite the lack of family interest. It can also allow a senior generation or even a spouse that is passive in the operation to stay more involved for a greater period of time. That benefit can improve satisfaction and the quality of life in "retirement". It may come at a cost, of course. The sustainability of a business will often require a non-family member to be reimbursed in salary as well as stock. It may reduce the overall size of the estate for children. Weighing the priorities of the senior generation and their business goals for their later years and beyond can help guide the practicality of a non-family succession plan.

I introduce this as a possible risk, but this method of business transfer can also increase the value of the farm. If there is a perception or structure of generosity geared toward helping a non-family member, it may actually be offset by other financial benefits. Growers that desire to manage their operation until at least their 100th birthday are taking other financial risks. In these situations, it becomes increasingly likely that the owner does not get to time the sale or transfer of management. The value of land or ability to easily transfer may not be immediately practical. This can lead to poor rental agreements and abandoned vineyards.

Research continues to forecast higher labor costs. Equity ownership is a way to attract higher quality and costly labor. This type of plan also has the opportunity to improve the business operations of the farm. A typical farm of 100 – 200 acres would only require one or two full time operators. This plan will minimize or eliminate the need for employees that do not have an ownership interest. Such an interest can increase productivity, critical thinking, and innovation. If done gradually enough and early enough, this type of plan could improve profit margins to the extent that the estate size is actually maintained.

If a spouse would prefer to fully divest from this partnership in the event of a farmer's death, a sizable life insurance policy is typically the only practical way to avoid asset sales that cripple the farm's ability to operate. If the non-farm spouse predeceases the farmer, the significant life insurance policy could be reduced substantially. Life insurance is not always practical. Unless this plan gets a very early start, it usually makes more sense for a financial connection to endure. Payments to purchase the remaining equity of the farm, in the event of a death, should be spelled out in the ownership agreement. In an effort to plan for any possibility, buy-out payment structures should be designed for all owners.

Growers entering into these agreements stand to benefit from the advice of lawyers and accountants. Arranging these plans properly tend to pay for themselves through tax benefits. One thing to plan for is a structure to identify the different forms of ownership. How equity interest is shared, how profits are shared and how losses are shared.

After a trustworthy partner is found a written ownership agreement provides insurance if partners later decide working together is not an option. These agreements should also consider how ownership interest is passed to significant others,

Family Based Succession Plan
Next generation growers have increased in number since the last recession. To me it appears to be an economic function, rather than a long-term pattern. Significant economic growth and an expansion of middle classes wages could undermine this trend. The interest that next generation growers have shown is almost universally practical. A growth in operational capacity is typically necessary for the temporary support of two full-time owners, rather than one. Relative to average farm size, a vineyard with two or three generations of operators should be significantly larger. Vineyards with growers under the age of 35 are almost universally above 150 acres. In other words, expectations are realistic.

Growers should aim for a minimum farm size of 200 acres for this type of plan to be realistic. As an alternative to size, one member can supplement income with off-farm labor. Even our largest farms of 200 – 300 acres off farm income may be necessary to provide health care or additional income. Highly leveraged farms that expand quickly, for example, may temporarily rely on this method to mitigate financial risk. It is important to structure and time growth in ways that work with the financial realities of the cooperative payment structure and the goals of interested parties. The current business climate is mostly working in favor of expansion for established growers. Higher prices and relatively high yields may have freed up capital to make expansions possible. With the risk of both inflation and higher interest rates rising somewhat, most debt to finance expansion should be fixed rate. If these economic risks materialize planning expansions could be considerably more difficult. To the extent possible, available cash and fixed rate debt should also be adequate to cover a year of operating expenses at about $850 per acre.

While the analysis of business health is particularly important, personal finance cannot be overlooked. Median household income in local gentrified communities is in the range of $50,000 - $60,000. Though looking at the region as a whole, median income is approximately $30,000. This disparity explains why the expectations of next generation growers tend to vary considerably. Growers may certainly build businesses with net revenue that regularly exceeds median household income. Doing so, however, takes considerable capital. In the cooperative market, it also takes time.

The personal financial health of the senior generation varies considerably. Not only do farm businesses have varying levels of success, personal financial decisions and retirement goals also vary greatly. While most growers do not plan on retiring a grower should have a certain amount of

assets at age 62 to provide income if retirement becomes necessary. Growers that are active, in good health, and do not want to use farm equity as a retirement asset can use the following formula as a rough guideline of asset health:

Total annual personal expenses minus SSI benefits times 50.

With succession plans that start early this may be less critical to fully fund. Later plans may require some financial backing to assure both parties' needs are fully met. Results will vary based on farm size, income needs, and health. This is a fairly aggressive goal as most personal finance experts recommend double that for a typical retiree. However, the typical person actually wants to retire at 64. This number should be adjusted upward significantly for cash market growers. Cooperative growers will have significant income upon a forced retirement from past year crops as well as certificates.

Management Transfer Plan

A healthy vineyard business, either large or one supported by outside income is one step toward success. Another critical element is a management transfer plan. Most family operated vineyards are run as a sole proprietorship. Even an LLC, S-Corp or C-Corp is typically run with one individual exclusively holds all titles and responsibilities above day laborer. A division of that management structure, along with a planned out evolution is necessary for success.

There are two temptations, mostly based on grower personality, that are important to avoid. Some growers, primarily interested in the horticulture, tractor and labor aspects of the business prefer to give up all control and responsibility immediately. In an effort to get away from the desk, people and the responsibility of business operations and enjoy doing what he does best the next generation is thrown into the deep end without a life jacket. The other temptation is to retain all management and control. Not only does this create risk, if it does not adequately prepare the next generation, it can also create equity issues. Perhaps fundamental control of the business remains in control of the senior generation until the junior generation is well into their 60’s. While retaining meaningful control is perfectly acceptable, decision-making needs to be shared more and more as time goes on.

A management transfer plan should first capitalize on the strengths of the junior generation. Whether it is computerized payroll management and fiscal analysis of operations or it is soil health analysis, the junior generation needs to be slowly empowered in a way that maximizes success and confidence. Eventually he will have to master all aspects of the business and any relative weaknesses should be addressed. That may involve working closely together on certain aspects of the business. It may also involve outside training. While it is important to have both generations involved in management, it is also important to cross train. For the long-term sustainability of the business, undue reliance on an individual’s skillset is not usually a good solution.

Core Elements of an Agreement

So there are some core elements of any agreement to own a business with another. These elements exist whether you write them down or not. A written agreement helps to resolve disputes for two reasons. First, the written agreement wins. It is almost always binding regardless of conversations or behavior of both parties. Two, it clearly sets expectations. Without a writing each business partner might have a different understanding of what is actually agreed to.

First up, capital contributions. Initially, the senior generation contributes most or all of the capital to the business. If others are making capital contributions it should be articulated here. A junior generation may have a schedule of contributions to make over time. If capital contributions will (or might) come from debt, that should also be articulated.

Next, distributions. Owners should receive distributions when a business is profitable. If distributions are advanced or regular, even if the business is not profitable, that needs to be spelled out in detail. Also, if the business is dissolved, distributions may need to be handled differently. Finally, losses and profits may be allocated in ways that are not directly reflected by ownership. It may be of value for the senior generation to retain rights to all losses until the junior generation is more established.

The business should have a management and operating agreement. While it may get detailed, there is some value in putting this right in organizational documents. This part of the agreement should restrict key decision-making powers like the ability to buy or sell ownership shares, specific acts that would undermine the health of the business, and admit new members into ownership. In addition, this document can serve to articulate the expectations of duties, responsibilities and labor. I think it's particularly important to divide tasks and estimate the amount of time it will take to run the business and operate the farm.

There are a number of other important elements in a document like this. Be sure to carefully detail the desires of each party and make clear what happens during transfers, repurchases of ownership shares or a right of first refusal. If things do not work out, this will be the key to an equitable remedy that keeps the farm together and does not result in a significant financial loss or gain to either party. Certainly, there should be no financial incentive for failure.

There are a number of different tools and techniques to plan for the unexpected and to mitigate risk. One element that should be included in any transfer plan that involves a period of joint ownership should include a buy-sell agreement.

This type of agreement allows a partner to exit the business in the event of an unexpected change. Such an agreement spells out the timeline for closing. It either spells out a methodology for valuation or a predetermined valuation. When family is involved, a predetermined discount on the percentage of valuation to prevent the purchase from undermining the farm business. If it is anticipated that finances for all parties will allow a less than immediate payout, an installment plan, rather than a discount, would be another appropriate tool to prevent the buying partner(s) from becoming overleveraged.

Succession planning can often be a complex endeavor. The value of expertise should not be overlooked. While it is important to control costs, devoting some monetary resources to succession planning can be an excellent investment. However, for free information, more detail, or specific questions please contact the author.

Labor Research! What's Happening in Your Farm?

An important research project is gearing up in the next few weeks to understand what is happening with New York farm labor during this time of great change in markets, regulations and technology. It's an opportunity for the voices of actual farm employers and employees to be heard through research! Strong participation from farm employers and employees is important!

Farm employers who operate fruit, vegetable, and greenhouse/nursery operations should watch their U.S. mail for a pre-notification letter in the coming weeks, followed a few days later by a survey packet. This survey packet will contain an employer survey plus six copies of an employee survey (3 in English, 3 in Spanish). We are asking farm employers to complete the employer survey to give us hard numbers about your farm's labor situation and the changes from 2019 to today. Employers will distribute the employee surveys to members of their team to complete and share current employee perspectives about the farm and employee management. All surveys will remain anonymous and only group data with no identifying information will ever be reported.Man on tractor

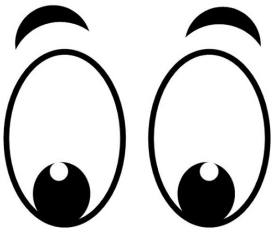
The dairy part of this research will start a few weeks after the fruit, vegetable, and greenhouse portion.

Objectives of this research are to:
Identify what human resource management practices are most effective at achieving high performance and labor efficiency.
Describe New York farm employee hours, compensation, quality of work life and satisfaction with working conditions and relations.
Describe how labor markets and regulations are affecting labor usage, enterprise selection, and business plans for New York farms.
Identify what labor-saving technologies farms are adopting and how they best fit in an overall human resource management strategy.

How to participate:
Watch your mail for the letter and survey packet, then follow the enclosed instructions to participate by mail, or use the online survey option. If you don't get a mailing in the next few weeks, and you a operate a New York farm with hired employees, then reach out to Julie Berry (jrb7@cornell.edu) to request a survey packet. Include your name, farm name, mailing address, phone, and email.

Project leadership:
This project, "New York Farm Labor in Transition," is led by Richard Stup (res396@cornell.edu) of Cornell's College of Agriculture and Life Sciences (CALS), in collaboration with colleagues from the Dyson School of Applied Economics and Management, and the School of Industrial and Labor Relations (ILR).

Support for this research is provided by:
Unites States Department of Agriculture, Agricultural Marketing Service
New York State Department of Agriculture and Markets
Farm Credit East
Northeast Dairy Producers Association
Dairy Farmers of America
Upstate Niagara Cooperative
Thank you for taking time to participate in this research!



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Viticulture

Jennifer Phillips Russo, Viticulture Extension Specialist, LERGP

I recently did a deep dive into the literature on floor management strategies and possible effects on soil and grapevine health. Below is a review combining information from many studies to help stress the importance of floor management strategies and sustainable viticulture. It is part of my goals to bring science-driven educational resources and applied research to the growers of our region to help inform management decisions. I am currently applying for funding to help support floor management strategies that are suitable for our grape growing region that help with nutrient and water availability.

Literature review topic: Cover Crops for Nitrogen and Water Availability

Introduction

There is a current push in the wine and juice grape industry towards sustainability. The United States Department of Agriculture (USDA) defines sustainable planet as "one that will accommodate the basic needs of its present inhabitants while preserving the resources that will enable future generations to flourish". This concept is gaining interest in the consumer markets, where consumers are interested in where and how their food and drink are grown. There is interest in protecting the environment, the community as a whole, and the safety of the products consumed.

Commercial agriculture emits greenhouse gasses, degrades soil health, and reduces the soil ability to absorb atmospheric carbon and convert it to soil carbon. Sustainable viticulture includes practices that build consumer interest based on a wholesome place to produce (social), encourage healthy vines and soil that can sustain production over the years (environmental), and must be economically viable. Sustainable floor management practices are needed to build healthy soil with complex biotic communities, reduce erosion, and reduce the need for fertilizer, pesticides, and herbicides. Cover cropping is one tool that can be incorporated into sustainability practices and used as a soil restoration management strategy.

Cover crops have the potential to improve soil and vine health, can be adapted to many climates and soils, and may influence vine vigor by adjusting parameters such as the length of their growth period, coverage of the vineyard floor, and aggressiveness. Cover crops increased juice soluble solids, anthocyanins, and other phenolic components and decreased titratable acidity and pH. They were associated with red wines judged superior to those issued from non-cover-cropped vines. Use of organic mulches resulted in improved vine balance, soil water content, and friability, increased yields, and reduced pathogen and pest pressure (Guerra and Steenwerth, 2012).

Commercial grape production is directly related to vineyard water and nutrient availability and vine uptake. At 32,000 acres, The Lake Erie American Viticulture Area (AVA) is the largest grape production region in the eastern U.S. and 80% of the grapes produced are Concord, *vitis labrusca,* processed for the juice and jelly market and sold internationally, substantially benefiting the local economy. Vineyards in Northeast United States suffer from chronic herbicide use, inefficient row middle management, and degrading soil health. New sustainable floor management strategies are needed to improve our agricultural soils' ability to regenerate soil structure, reduce weather-related risks, and increase productivity capacity in the long term.

Regenerative Agricultural Practices (RAP) that encourage soil health and carbon storage include crop rotation and cover cropping, composting, mulching, low/no till farming methods, and rotating

livestock; all of those RAPs allow microorganisms to absorb, convert, and store carbon. Adoption of these methods will reduce the agricultural system's contributions to climate change and can help transition farmers from being pollution emitters to carbon farmers and stakeholders and increase their soils productivity capacity. The interactions of soil chemical, physical and biological properties often determine how effectively the soil performs ecosystem functions such as nutrient retention and release, partitioning of rainfall into runoff and infiltration, moisture retention and release, resistance to environmental degradation and buffering environmental pollutants. The desire to maintain and improve agricultural productivity without jeopardizing environmental sustainability has increased the demand for assessment tools that are more comprehensive than tests that only measure chemical components of soil. Soil active carbon, and microbial activity are needed to see the entire soil health profile.

Production of grapes will be vulnerable to direct impacts from changes in yield due to changing climate conditions and extreme weather events, and to indirect impacts, through increasing pests and pathogen pressures which often benefit from a changing climate. Higher temperatures, extreme weather, and drought threaten to decrease grapevine production in the wake of climate change. The predominant vineyard floor management strategy is to use synthetic fertilizers and herbicides for nutrient and water conservation management. These practices work against sustainability principles for improving soil health and have contributed to documented herbicide resistance. In addition, potential regulations on glyphosate could thwart future use and render this strategy of floor management obsolete.

Conventional Floor Management Consequences

The use of synthetic nitrogen fertilizers has been indicted in a large number of adverse environmental effects including eutrophication, acidification, greenhouse gas emissions, groundwater contamination, and stratospheric ozone depletion (Erisman et al. 2013). The Habor-Bosch process to make synthetic fertilizer consumes large amounts of fossil fuels and releases large amounts of greenhouse gases (Razon 2015). Ammonia production via the Haber–Bosch process accounts for 1.2 % of annual global energy consumption (IFA 2009a), and two-thirds of the CO2 emissions in the Haber–Bosch process may be credited to the process to produce hydrogen from natural gas (IFA 2009b). Global NH3 emissions from N fertilizer use have increased from 1.9 ± 0.03 to 16.7 ± 0.5 Tg N/year between 1961 and 2010 (Xu et al. 2018). Such additions into the atmosphere perpetuates climate change.

Excess nutrients in the environment leach out of agricultural systems into the groundwater and runoff into waterbodies causing eutrophication, or excess aquatic plant growth, which can cause biotic trophic cascades. Eutrophication restricts the social pillar of sustainability. The ecosystem services of water used for fisheries, recreation, industry, and drinking are altered because of increased growth of undesirable algae and aquatic weeds and the oxygen shortages caused by their death and decomposition. Eutrophication can be minimized by regulating the nutrient sources, reducing the use of fertilizers, and proper soil management practices (Khan et al. 2013).

Herbicides are used as a water conservation floor management strategy in vineyards in the Northeast for weed and cover crop management. Several studies show how cover crops outcompete grapevines for water and nutrients, leading to low growth and production, especially in Concords (Pool et al. 1990). The general floor management practice to conserve water in non-irrigated vineyards is to use residual preemergent herbicides in a ~3-foot band under the vine along with a single application of systemic herbicide in the inter-row around bloom. Soils in the chronic "weed-free" band tend to have lower soil pH, organic matter, and soil structure. Herbicide and tillage techniques to create bare ground in agricultural systems do not promote sustainability due to subsequent induced runoff, ero-

sion, and poor soil structure including water holding capacity.

One study conducted water quality analysis from a vineyard catchment located in the commune of Rochefort sur Loire, West of France. They monitored headwaters for rainfall-induced peaks in pesticide concentrations. Very short pulses, from a few minutes to several hours, of high pesticide concentrations may negatively impact aquatic organisms (Cold et al. 2004). The results highlight that for all runoff events, the pesticide concentrations increased with outflow and significant pesticide export can occur during a single event; the toxic units of the pesticide mixture regularly exceeded (15%) and up to 30-fold underestimation of the toxic units for invertebrates were reported prior to the water analysis (LeFrancq et al. 2017).

Commonly used herbicides in vineyards are those based on the active ingredients: glyphosate, glufosinate, and flazasulfuron (Bauer et al. 2017). A recent study reported these herbicides reduced grapevine root mycorrhization on average by 53% compared to mechanical weeding and it was suggested that herbicide-induced alterations of soil microorganisms could have knock-on effects on other parts of the grapevine system (Zaller et al. 2018). The symbiotic relationship between mycorrhizae and grapevine nutrition has been documented. Research and knowledge of interactions between microorganisms in the soil, the rhizosphere and the phyllosphere, continue to increase. Mycorrhizal networks have also been shown to increase the tolerance of grapevines to abiotic stresses (drought, salinity, or heavy metals), water stress, and biotic stresses such as downy mildew (Trouvelot et al. 2015). Decreasing these important community structures through herbicide use could be detrimental. One study that looked at the microbiome community shifts using under vine cover crops found that bare soil maintained by soil cultivation and herbicide led to soil bacterial and fungal communities that diverged from the non-cultivation natural vegetation treatment. The results indicate that vineyard microbiome could be susceptible to changes under different soil management practices (Chou et al. 2018).

Earthworms play an important role in soil health by facilitating the mineralization of nutrients for vine uptake, aggregate formation for water retention, and improving organic matter. Glyphosate-herbicides used for weed control in vineyards have been linked to increased earthworm mortality especially for deep-burrowing earthworm species (Stellin et al. 2017). Earthworms are considered soil ecosystem engineers because their activities enhance root distribution and create space for immobile macro nutrients and micronutrients to flow through, which are then available for root uptake (Ojha et al 2014).

Many of the conventional floor management strategies for nutrient and water availability in vineyards may have more deleterious effects to vineyard production than anticipated. New sustainable floor management strategies are needed to combat the direct impacts from changes in yield due to changing climate conditions and extreme weather events, and indirect impacts, through increasing pests and pathogen pressures that will benefit from a changing climate. Higher temperatures, extreme weather, and drought threaten to decrease grapevine production and current management strategies exasperate these effects.

Support of New Floor Management Strategies

Cover crops enrich the soil with organic matter, reduce water runoff and nutrient leaching, limit erosion processes, stimulate biological activity, especially that of microbes and earthworms, enrich the soil with nitrogen when legume species are used, and suppress weeds. The use of cover crops, mulching, and other Integrated Pest Management (IPM) practices allow for the sustainable application of pesticides. Cover crops are promising to soil health properties but are detrimental to the non-irrigated vines in the Northeast, U.S., especially when used during peak water demand from bloom

(mid-June) to veraison (mid August). Cool season grass (annual rye), early cover crop termination, and mulching have seen limited use and mixed results in the Lake Erie AVA. Vineyard cover crops include both sown cover crop seed(s) and native vegetation (weeds or grass-ways), that grow in row middles and in the vine row. Vegetative floor cover provides stability for equipment and foot traffic and can also be competition towards the grapevines for water and nutrients. These last items are the strongest biases that farmers need to overcome to understand that soil management can also be a precious tool to regulate vine vigor and, ultimately, final grape composition (van Leeuwen et al., 2004, Costantini et al. 2016). Native grass is also the most competitive towards the grapevines for water and nutrients (Celette and Gary, 2013), and to eliminate or mitigate such competition, the native grass is often terminated in spring with herbicidal burn down or tillage. One area of research that is lacking information is how coexisting grapevine and grassroots interact in terms of soil colonization and uptake of water and nutrients (Diti et al. 2020). Cover crops can be used to improve soil health, reduce inputs, and conserve water during times of stress if properly managed.

Warmer temperatures expected with climate change and the potential for more extreme temperature events will impact plant productivity. Temperature effects are increased by water deficits from periods of drought and excess soil water from extreme storm events (Hatfield and Prueger 2015). A study was conducted in a Medoc vineyard, Chateau Talbot, France to determine how a grass layer could change soil thermal behavior compared to bare soil. Bare soil temperatures were generally higher. Under the grass layer, the horizontal component of soil conduction heat flux was barely detectable, whereas under bare soil, it was essentially vertical. The grass layer was therefore acting as an insulating layer, preventing exchanges between soil and atmosphere (Pradel and Pieri 2000)

Strategies such as herbicides application or mulching favor a shallower grapevine root development because they do not disturb the surface soil. Both tillage and cover crops can alter upper soil layers, discouraging shallow grapevine root development and promoting development in deeper soil horizons (Smart et al. 2006). Therefore, cover cropping could be used as a tool to send grapevine roots deeper into the soil for water and nutrient availability to minimize competition. A study on Concord vines grown in the Lake Erie AVA, compared whole vine root systems that were dug out from two different vineyards plots. One plot was managed with total herbicides and the other had herbicides under the vine strip (80cm width) with orchard grass in the row middles. The grapevine roots typically avoided growing in the same soil volume occupied by the grass roots and mostly spread deeper (Lakso and Eissenstat, 2012).

Vineyards that use mulches under-vine have higher soil water content due to a combination of reduced evaporation loss and greater soil water conservation as a result of reduced weed growth (Chan et al. 2010). Cover crop termination techniques of mowing, mow and throw, and roll crimping use the biomass to create a mulch. These techniques place cover crop residue on the soil surface which optimizes decomposition. This improves organic matter levels and maintains lower soil temperature and soil moisture levels, thereby reducing soil evaporation, which contributes to soil organic carbon (SOC) build-up, microbial activity and nutrient cycling (Liang et al. 2014).

Spraying cover crops with glyphosate has been shown to negatively influence carbon (C) mineralization, soluble C and β-glucosidase activity in different cropping systems (García-Orenes et al. 2010). Glyphosate can be absorbed in the soil and may be toxic to soil microbes which consequently affects biochemical processes, organic matter formation and SOC levels (Abbas et al. 2014). This agrees with Zaller et al. that herbicide-induced alterations of soil microorganisms could have knock-on effects on other parts of the grapevine system. It was suggested that cover crops (CC) be slashed or mowed after spray application for adequate residue cover and decomposition and indicated that the CC termination method involving slashing fostered higher levels of soil organic carbon (SOC) relative

to glyphosate use (Adetunji et al. 2021).

In regard to nitrogen availability through cover cropping strategies, Adetunji et al.'s recent study on soil pH, nitrogen, phosphatase (phosphorus enzyme) and urease (nitrogen enzyme) activities in response to cover crop species, termination, and termination method provides much information that may serve as a reference for sustainable viticulture strategies. It looked at the cover crop species vetch, field pea, oats, and cereal rye compared to no CC in a greenhouse experiment and the effect of termination at vegetative and flowering stages on the chemical composition nitrogen (N) and C:N. Also, short-term impacts of living CCs and residues on soil pH, total N, urease and phosphatase activities at the two termination stages and under two termination methods: slash and spray. If CCs were terminated at flowering (field pea, oats, vetch, and cereal rye), the N tissue concentration was decreased by 59%, 65%, 44% and 56% respectively from the N concentration when terminating at vegetive state, however, the C:N ratios increased. This indicates that if using CCs for N inputs, then you need to terminate at the vegetative stage but if your goal is carbon sequestration, then terminate at the flowering stage. This can create the biomass mulch and a slow release of N (Adetunji et al. 2021). Terminating at the vegetative stage also increased phosphatase activity indicating that the microbial activity under the CC had increased over the control. There was a general increase in soil pH over the two years but lower pH under the legume species (vetch and field pea) presumably an effect of soil N fixation (Nuruzzaman et al., 2006; Maltais-Landry 2015). This study indicated that these management approaches can optimize CC benefits and improve soil chemical and biological properties.

Sustainable floor management practices are needed to build healthy soil with complex biotic communities, reduce erosion, and reduce the need for fertilizer, pesticides, and herbicides. Incorporating different combinations of the above-mentioned floor management strategies for sustainability may help whole vineyard management in terms of more knowledgeable allocation of water and nutrients (Celette et al. 2008; Tomasi et al. 2015). I am hoping to obtain grant funding to research differential, sustainable floor management strategies to build healthy soil with complex biotic communities, reduce erosion, and reduce the need for fertilizer, pesticides, and herbicides. Optimizing cover cropping strategies to fit production and sustainability goals can ultimately be an extremely powerful agronomic tool to align with the current push in the wine and juice grape industry towards sustainability.

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Survey- please participate!

If you are a commercial grape grower in New England or New York, please visit the survey link below so we know how to better help you.

Your response will be used to prioritize future Extension and research efforts.

It should take between 5-15 min. The deadline is Friday August 6, 2021.

Completing this survey will automatically enter you into a raffle to win a $150 gift certificate & a free subscription to the Grape Notes Newsletter.

https://umassamherst.co1.qualtrics.com/jfe/form/SV_dhz2MMPQdvXYC9g

Best,

Elsa Petit, Sonia Schloemann, Jessica Ellis and Max Resnick on behalf of the UMass Extension Fruit Program

PA Update

Andy Muza, LERGP Extension Team/Penn State Extension- Erie County

Expectations for the remainder of the 2021 Season concerning Insects and Diseases in Juice Grape Vineyards in the Lake Erie Region

Below are my expectations on what the insect and disease situation will look like for the remainder of the season in the Lake Erie Region. These expectations are based on pest conditions I have found up to this point. However, insect problems and disease inoculum levels in your vineyard blocks, and weather conditions for the rest of the season, will be key factors contributing to any potential problems through harvest. The most reliable information for making pest management decisions is your own scouting information.

Insects

Grape Berry Moth – THIRD GENERATION (1620 GBM Degree Days)
The Table of NEWA stations (provided below by Kim Knappenberger) **approximates** when 1620 GBM DD will be reached across the region, based on an assumed daily accumulation of 21 GBM DD after 7/28/21. (**Note:** If actual daily GBM DD are greater than the assumed 21 DD then the date when 1620 will be reached at each station may be 1 or 2 days sooner than indicated in the table).

The NEWA site with the most GBM DD (Sheridan, NY) will reach 1620 DD as soon as this Sunday (8/1). However, the site with the fewest GBM DD (Burt, NY) may not reach 1620 DD until Monday (8/16). Seven sites will reach 1620 DD within the first week in August (8/1-7) while 18 sites will reach 1620 DD during the second week of August (8/8-14). For specific timings for an insecticide application, it is important to check the GBM Degree Day Model in NEWA http://newa.cornell.edu , choosing the closest station near your vineyard,

All High and Severe Risk sites should receive an insecticide application for the Third Generation.

Ingested and Contact Insecticides – See Table 4.2.2 on pages 63-64 in the 2021 New York and Pennsylvania Pest Management Guidelines for Grapes to determine which insecticides are designated as ingestion required (I), contact activity (C) or both (I,C).

Ingested Insecticides: If you are using insecticides that must be ingested, (i.e., Intrepid, Altacor, Verdepryn, Delegate) then applications should be applied before egg laying begins, so as close as possible to 1620 DD. This may require applying these insecticides as early as 3 days before1620 DD is reached at your site if many acres need to be covered.

Contact Insecticides: If you are using contact insecticides, (e.g. Imidan, pyrethroids such as Danitol, Baythroid, Brigade, Mustang Maxx, Sniper, etc.) then these insecticides should be applied between 1621 - 1710 DD.

Figure 1. Red discoloration and splitting of Concord berry caused by grape berry moth larva. Photo – Andy Muza, Penn State.

DO NOT neglect scouting low and intermediate risk vineyards. Scout when GBM DD accumulation reaches 1470-1620 DD. If more than 15% damaged clusters are found, then also apply an insecticide in these areas (Figure 1).

Grape Leafhopper – GLH populations are starting to increase in a few vineyard blocks checked this week. Although high population levels may build in scattered vineyard blocks in the region, widespread infestations requiring an insecticide application specifically for this pest are not expected.
The greatest risk for economic losses due to grape leafhopper feeding occurs during hot, dry years in vineyards with heavy crop loads and high leafhopper populations.
A scouting procedure to determine GLH threshold levels is provided in "Bulletin 138, Risk Assessment of Grape Berry Moth and Guidelines for Management of the Eastern Grape Leafhopper" (https://ecommons.cornell.edu/handle/1813/5202). An insecticide application is recommended if a threshold of 5 nymphs/leaf is reached by the third week in July or 10 nymphs/ leaf in late August (Figure 2).

Figure 2. Grape leafhopper nymphs on the underside of Concord leaf. Photo – Andy Muza, Penn State. - Copy

Diseases

Downy Mildew – The amount of rainfall across the region in July caused concern about downy mildew (DM) gaining a foothold in vineyards. But over the past 2 weeks I have not found any DM in Concord, Niagara, Fredonia, Delaware or various *Vitis vinifera* blocks that were scouted. The only DM that I was able to find was in unsprayed plots of Chancellor at the Grape Research & Extension Center in North East, PA. However, growers have reported finding some DM in Catawba, Niagara and susceptible wine grape varieties.

So, the good news is that the threat of any DM problems in Concord vineyards this season is minimal. I also don't expect DM to be a problem in Niagara blocks unless another pattern of rainy weather develops to cause an unexpected flare up of this disease. As a precaution, varieties with a high susceptibility to DM (e.g., Niagara, Catawba, Delaware, Chancellor, *Vitis vinifera* varieties) should be monitored during the remainder of the season (Figure 3).

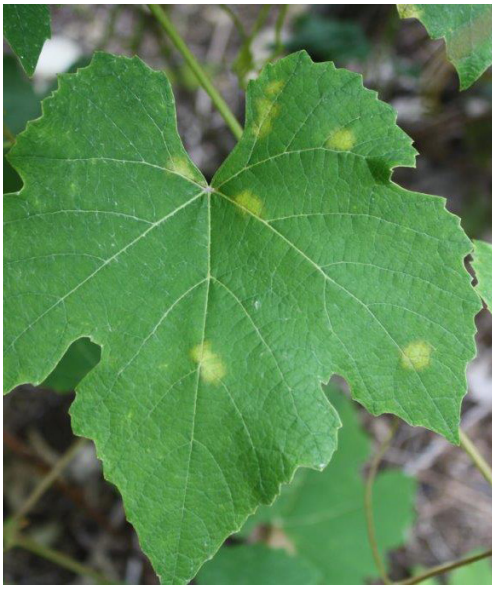

Figure 3. Downy mildew lesions on Niagara leaf. Photo – Andy Muza, Penn State.

Powdery Mildew – I am not going to try and predict the severity of powdery mildew (PM) across the region up to harvest as this will depend on: weather conditions for the remainder of the season, inoculum levels in a particular block and your management of PM so far.
Unfortunately, there is no formula for just how long you need to continue leaf sprays for powdery mildew. But I don't expect PM to be a factor, in reaching at least minimum brix level requirements by processors, for low-moderately cropped Concord/Niagara vineyards.

However, research has shown that good control of PM leaf infections is particularly important in blocks with large crops in years with cloudy, rainy weather conditions. So, the need for additional fungicide applications in Concord/Niagara vineyards will depend on the amount of PM leaf infections in **your** vineyard(s) and **crop load**. A block- by- block assessment is the best approach in deciding if another fungicide application for PM should be applied. It is important to conduct crop estimations to determine potential crop size and continue scouting vineyards for PM leaf infection levels (Figure 4).

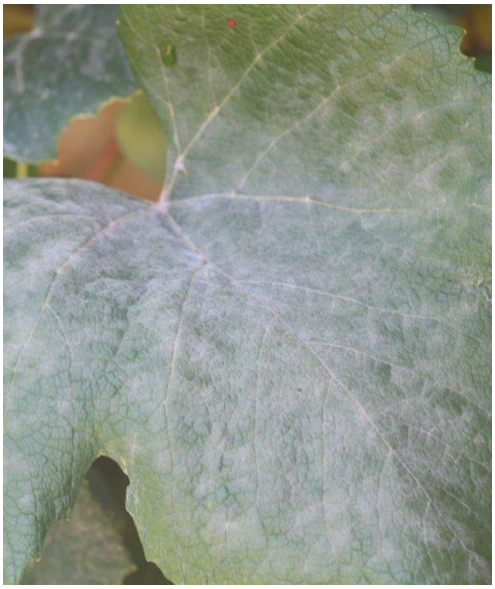

Figure 4. Powdery mildew on mature Concord leaf. Photo – Andy Muza, Penn State.

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Lake Erie Regional Grape Program

PennState Extension

GRAPE TWILIGHT MEETING
&
ERIE COUNTY HORTICULTURAL SOCIETY'S
ANNUAL FREE DINNER

DATE: **WEDNESDAY, AUGUST 4, 2021**

PLACE: **Gravel Pit Park**
10300 West Main Road (Route 20), North East, PA 16428

TIME: GRAPE PROGRAM – 5:00 - 6:00 P.M.
FREE DINNER – After the Program

NOTE: Farm Equipment Display by Various Vendors – 3:00 to 7:00 P.M.
Pesticide Recertification Credits available for NY & PA.
NO REGISTRATION REQUIRED (just show up)

GRAPE PROGRAM:

- **MAKING A HABIT OF THE WORKER PROTECTION STANDARD –** 5:00 -5:30 P.M.
  JIM HARVEY, PA OFFICE OF RURAL HEALTH, PENN STATE

- **INSECT & DISEASE MANAGEMENT UPDATES –** 5:30 to 6:00 P.M.
  Bryan Hed, Lake Erie Regional Grape Research & Extension Center, North East, PA
  Andy Muza, Jennifer Russo, Kevin Martin - Lake Erie Regional Grape Extension Team

NEWA location	**Wild Grape Bloom date***	**GBM GDD total for 7/28/2021**	**Date expected to hit 1620****
Ransomville	5/31/2021	1355	8/10/2021
Burt	6/6/2021	1218	8/16/2021
Corwin	6/2/2021	1320	8/11/2021
Brant	6/1/2021	1361	8/10/2021
Versailles	6/1/2021	1311	8/12/2021
Hanover	6/2/2021	1327	8/11/2021
Sheridan	5/22/2021	1548	8/1/2021
Silver Creek	6/3/2021	1309	8/12/2021
Silver Creek Double A	5/26/2021	1441	8/6/2021
Dunkirk Airport	5/29/2021	1423	8/7/2021
Forestville	5/27/2021	1370	8/9/2021
East Fredonia	5/31/2021	1325	8/11/2021
Fredonia	6/2/2021	1295	8/13/2021
Brocton Escarpment	5/31/2021	1322	8/11/2021
Portland	6/1/2021	1331	8/11/2021
Portland (LERGP West)	5/29/2021	1398	8/8/2021
Westfield	6/2/2021	1323	8/11/2021
Ripley	5/27/2021	1388	8/8/2021
Ripley Escarpment	5/26/2021	1387	8/8/2021
Ripley State Line	5/26/2021	1405	8/7/2021
North East State Line	5/26/2021	1357	8/10/2021
North East Sidehill	5/25/2021	1398	8/8/2021
North East Lab	5/26/2021	1434	8/6/2021
Harborcreek	5/26/2021	1474	8/4/2021
Harborcreek Escarpment	5/30/2021	1289	8/13/2021
Lake City	5/26/2021	1427	8/6/2021

****an average of 21 GDD are assumed to determine date expected to hit 1620**

***Estimated date provided by NEWA website Wild grape bloom occurs when 450 base 50BE degree days have accumulated from January 1st of the chosen year.**

The difference in wild grape bloom between Portland and Portland LERGP is likely due to marginal differences in the readings coming off of respective sensors or even marginal differences in microclimate. A spread of 2 days falls within the margin of error and the models give advance messages that bloom is approaching.

PA Update

Bryan Hed, Research Technologist, Lake Erie Grape Research and Extension Center

Weather and disease update from the North East PA lab:

July has been about average with respect to heat accumulation, but much wetter than average. We've recorded about five and half inches of rain in July here at the Penn State lab in North East. However, the past 10 days has been a return to a drier/hotter weather scenario and this has put the brakes on downy mildew for now. If rains resume though, we could see a resurgence of this dangerous disease and the need for regular scouting is a must, particularly for leaves close to the ground.

Black rot is pretty much done, even on *Vitis vinifera* cultivars. However, infections that occurred around the middle of the month, may not show up until early August, close to veraison.

Powdery mildew is ramping up as usual at this time of the season. With every day being an infection period with respect to secondary cycles (which don't require rain), it may be prudent to maintain good control of this disease on leaves in juice grape vineyards with very large crops. Word out there is that there are probably many juice grape vineyards that are overcropped this year, that will need extra insurance to ensure they get ripe on time. Most canopies I've scouted appear to be in pretty good shape right now and most of the mildew damage is to young, immature shoot tips that are currently sinks of resources rather than exporters of photosynthates. Late season sprays for powdery mildew on juice grapes should be based on crop size (the more above average the crop, the more necessary it will be to keep canopies clean, longer) and *anticipated* weather conditions. Foliar nutrient sprays like Nutrol (with a surfactant) or Harvestmore will provide some deterrent to buildup of mildew on leaves. Trials we've run with Harvestmore show that this product, applied as a foliar nutrient at 5 lbs/A, will provide about 30% suppression of mildew on Concord leaves. If you're applying a resistance prone material (one of the sterol inhibitor fungicides (Tebustar) or something like Quintec, Vivando, or Torino), you should tank mix these materials with a Nutrol or Harvestmore-like material or sulfur (for varieties that are not damaged by it) for resistance management. Limit your applications of resistance prone materials to two per season. Another option at this time is copper/lime. We have had very good control of leaf infections with copper/lime applications to Concord, and there are no resistance issues with copper. Just be careful to apply copper/lime only when you have good drying conditions to limit the odds that leaf injury may occur; ideal conditions are clear, sunny, low humidity with some air movement. Avoid applying copper to dew-covered leaves in the morning.

And finally, because the ripening period will soon be upon us, I'm also including some information from a previous report regarding Botrytis bunch rot and sour rot pesticide applications to susceptible wine varieties. Botrytis specific fungicides have active ingredients that are prone to the development of resistance by the Botrytis fungus. Below is a list of these materials according to the FRAC

(Fungicide Resistance Action Committee) group that each product belongs to. FRAC numbers group together active ingredients with the same mode of action.

For example, Vangard and Scala are in the same FRAC group, 9. This means that if a population of Botrytis in a vineyard has developed resistance to the active ingredient in Vangard, then it will also be resistant to the active ingredient in Scala, even though the active ingredients may be different chemical compounds (cyprodinil in Vangard and pyrimethanil in Scala). Nevertheless, the mode of action (the way in which the fungicide disrupts a specific metabolic pathway in the fungus, killing it) of these two chemistries is the same, or similar enough that pathogen resistance to one chemistry will confer resistance to the other.

1. Rovral/Meteor: FRAC group 2, 7 day pre-harvest interval
2. Endura: FRAC group 7, 14 day pre-harvest interval
3. Luna Experience: FRAC group 7 (and 3, which is not for Botrytis), 14 day pre-harvest interval
4. Pristine: FRAC group 7 and 11, 14 day pre-harvest interval
5. Vangard, Scala: FRAC group 9, 7 day pre-harvest interval
6. Inspire Super: FRAC group 9 (and 3, which is not for Botrytis), 14 day pre-harvest interval
7. Switch: FRAC group 9 and 12, 7 day pre-harvest interval
8. Flint and Intuity: FRAC group 11, 14 and 10 day pre-harvest interval, respectively.
9. Elevate: FRAC group 17, 0 day pre-harvest interval

Botrytis specific fungicides will provide little or no control of sour rot. However, recent work by Drs. Megan Hall and Wayne Wilcox at Cornell University has shown a close connection between fruit flies and sour rot development and spread. Weekly sprays of insecticides (to control the fruit flies) initiated just before sour rot symptoms are observed (preventive sprays just before about 15 brix) can provide significant control of sour rot. Furthermore, a tank mix with additional antimicrobials (Oxidate, Fracture) and you could see reductions in sour rots of 50-80%. Be careful to rotate insecticides as fruit flies can develop resistance to insecticides very quickly. This could be an important part of your rot control program if you're growing varieties like Pinot noir/gris, Vignoles, Chardonnay, or Riesling, especially if the last leg of the ripening period is a wet one.

Extension Programs

Kimberly Knappenberger, Viticulture Assistant, LERGP

NEWA

The East Westfield station is temporarily offline. This is a cellular Rainwise station that is normally pretty reliable. Unfortunately the local ants decided to make a home in the TeleMet (cellular "brain" of the station) and due to the fact that they contain formic acid and conduct electricity, they managed to short circuit the board in a few places and blow some components. We are in the process of getting a replacement TeleMet and hope to have it restored in the near future.

The Portland Escarpment station is online, but the temperature sensor is not reporting accurately. Wind speed and direction, air pressure, insolation, precipitation and leaf wetness all appear to be good. We are currently troubleshooting to try to remedy the problem.

The Ransomville station is also experiencing some problems. This station has been reporting no Relative humidity for quite a while now. On a recent trip to Niagara county we were able to check it out. Unfortunately changing out the sensors didn't work. We were able to clean the rain bucket to get more accurate precipitation. This station was set up in 2006 and is beyond its life expectancy. We are looking into the possibility of replacing this unit.

As always if you notice something that doesn't seem quite right, please contact Kim at ksk76@cornell.edu.

VIP

With two years remaining this is still a good time to submit your application to the program. Removal of a Concord vineyard in New York at least 1 acre in size is required for reimbursement and then that land must be used for agricultural purposes.

We are accepting applications for Concord vineyards that may be in a poor site, not producing well, or the vineyard is in disrepair and needs to be removed. You can visit www.lergp.com and click the Vineyard Improvement Program button. This will give you more information as well as lead you to the application. This is a reimbursement grant that matches funds used to remove Concord vineyards and then replace them with an agricultural commodity. It will match 50% of removal costs up to $1,500 per acre, which may include labor, custom hire, equipment use or rental, and land clearing. It will also match 25% of replant costs up to $1,500

per acre. This could include trellis, perennial plant material – vines/trees (seed cost will not be reimbursed), labor, equipment use or rental, and land preparation for specialty crops. Reimbursement cannot exceed $3,000 per acre with a maximum award of $50,000 per applicant. Because they are a reimbursement, funds will be distributed at the completion of the project.

Once the contract is established you can begin to remove the old vineyard**. If you have already removed or are in the process of removing an old Concord vineyard that you think might qualify for this program, please contact LERGP as soon as possible.**

If you have any questions or need help getting to the next step, please contact Kim Knappenberger at ksk76@cornell.edu.

COVID PPE

With all of the news about increased number of cases of COVID we want you to be protected! If you need hand sanitizer or masks please contact Kim at ksk76@cornell.edu.

A Message from USDA to Gardeners in New York State

Save Your Boxwoods: Check Them for the Box Tree Moth!

Courtesy: Matteo Maspero and Andrea Tantardini, Centro MiRT - Fondazione Minoprio [IT].)

A New Invasive Pest May Be in New York State

The U.S. Department of Agriculture (USDA) is responding to a significant plant health threat and needs your help. Please check your boxwood plants for the invasive and destructive box tree moth. During the spring, a number of U.S. nurseries received potentially infested Canadian boxwood plants. This invasive pest feeds on the plants' leaves, and can cause complete defoliation, eventually killing the plant.

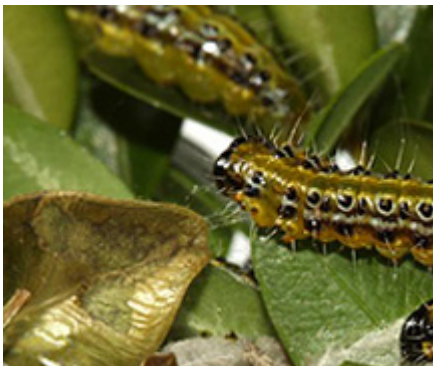
Many [Insert State Name] residents have already purchased and planted these boxwoods. If you bought one, you may have infested boxwood on your property. USDA wants to prevent the box tree moth from spreading and establishing itself in the State and beyond.

(Photo by iredding01, Adobe Stock.)

Help Protect New York State's Boxwoods!

Here's how you can help:

If you bought a boxwood plant during spring 2021, please inspect it for signs of the moth and report any findings to your local USDA office or State agriculture department. If State or Federal agriculture officials visit your home, please allow them to inspect your boxwood trees and place an insect trap. Box tree moths can produce several generations between June and October, so acting now is essential to prevent this pest from establishing itself in [Insert State Name].



This is what you should look for:

Caterpillars and webbing (larvae can reach 1.5 inches long)

(Courtesy of Matteo Maspero and Andrea Tantardini, Centro MiRT - Fondazione Minoprio [IT].)

Damage

(Photo by Lavizzara, Adobe Stock.)

Pupa

(Courtesy of Ilya Mityushev, Department of Plant protection of the Russian State Agrarian University - Moscow Timiryazev Agricultural Academy.)

Adult moths (wingspan is 1.5 to 1.75 inches):

(Courtesy of Matteo Maspero and Andrea Tantardini, Centro MiRT - Fondazione Minoprio [IT].)

Dark form of the moth. (Courtesy of Ilya Mityushev, Department of Plant protection of the Russian State Agrarian University - Moscow Timiryazev Agricultural Academy.)

Egg mass under the leaves

(Courtesy of Walter Schön, www.schmetterling-raupe.de/art/perspectalis.htm.)

Report signs of infestation to:

Your USDA local office: http://www.aphis.usda.gov/planthealth/sphd

More Information

For more information about the moth and boxwoods, or USDA's response with State partners, visit: www.aphis.usda.gov/planthealth/box-tree-moth

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