Lake Erie Regional Grape Program

Vineyard Notes-June 2017

Cornell University
Cooperative Extension

Building Strong and Vibrant New York Communities

Business Management

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Timing Investment to Sustain for the Long-Term

Given the state of the bulk juice market, the focus of economic extension information has been on new technology and surviving periods of low prices. The adoption of new technology takes considerable time. Recently a number of growers have had questions regarding the adoption of slightly older vineyard enhancements. Despite extremely low bulk prices, the cooperative markets have been loosely holding their own. Growers are finding the labor market tightening and considering ways to remain sustainable with the capital that has been generated by modest prices.

Growers raising questions regarding equipment upgrades are identifying the key to sustainable bulk vineyard operations (outside of good viticulture). While it seems many growers over-invest in machinery, investments that reduce labor costs are easiest to justify.

Typically, growers are trying to determine when a machinery expense becomes cash positive. In other words, when the cash that was laid out to buy the machine is realized through savings from labor or other expense. Obviously, the largest variable is farm size, which is key to understanding which pieces of equipment are right for a grower.

Pre-pruner

A mechanical pre-pruner is an investment that varies considerably in upfront cost as designs, brands and home-brew modifications significantly change costs. However, most growers would become cash positive after pruning 250 acres. Mechanical pruning also results in additional deprecation on existing equipment. Breaking even considering tractor deprecation would take 350 – 400 acres. For a 100-acre farm, the investment would be cash positive in the 3rd year and profitable in the 4th year. For a farm half that size, it would take twice as long.

Multi-row Sprayer

A similar analysis can be applied to a multi-row sprayer, but does vary significantly from farm to farm. A multi-row fungicide sprayer can vary from 2-6 rows and prices of $30,000 - $145,000. The more expensive ones are also harvester mounted, which may or may not already be owned by the grower. The most efficient sprayer investment is to right size the number of rows/sprayers to the size of the farm. Farms smaller than 100 acres should have 1 single row sprayer. Farms larger than 150 acres likely need multiple single row sprayers or a multi-row sprayer. The most efficient sprayer investment is to upgrade a sprayer when previous technology nears the end of its useful life. At that point a grower should divide the number of acres owned by 100 – 150 and purchase a sprayer with that many rows. Growers that spray more frequently should lean toward 100 and growers with only Concords can lean closer to 150.

Multi-row fungicide sprayers may improve profitability in less direct ways. It may shift all fungicide spraying to the grower-owner. Labor costs shift from paid to unpaid. Spray timing, efficiency of materials and coverage may all improve yields and the bottom line.

Multi-row Herbicide Sprayer

These products are not as wide-spread as fungicide sprayers. Mostly sold as 2 row units, many cost more than double a single row herbicide sprayer. Many single-row herbicide sprayers are inexpensive to buy and maintain. A multi-row herbicide sprayer should not be purchased to directly improve cash-flow. It should be purchased

to expand the ability of the grower to operate additional acreage and as a hedge against labor market shortages. Current market rates for labor do not immediately justify a multi-row herbicide sprayer. Future labor markets or available labor to an individual grower may justify this investment.

Modernizing Harvest

We call them modern harvesters, the first were developed twenty years ago. These harvesters offer increased harvest efficiency and the ability to increase yields by 7% - 10%. However, the average grower-owned harvester is responsible for less than 50 acres of grapes. These $250,000 – $350,000 machines are capable of harvesting 300 – 600 acres of grapes. The over-investment in harvesters is attributable to the availability of older harvesters. A grower should be harvesting 200 acres of grapes or more before investing in a modern harvester. For many growers, the investment is so large it should be timed with high yields and prices.

A bin attendant on a modern harvester should be reserved for wine grapes. The investment of $5,000 – $10,000 pays off in 1-2 years for growers maximizing acreage in a modern harvester. It may take as long as 4 years for a 200-acre grower. A volunteering relative is the only cheaper alternative. Growers using older harvesters to harvest less than 45 acres may be better served with a bin attendant.

Bulk Harvesting and Delivery

Bulk equipment is a much larger investment than a De-Mogger but offers significant savings for some operations. In general growers can expect to reduce their harvest crew by an additional person and a tractor. With strategic planning and a bit of compromise, many growers could reduce harvest crews to 2 tractors and a harvester. For some, this would mean saving 2 tractors and 2 laborers.

Investment in bulk equipment should range between $50,000 and $75,000 per harvester. If, or when, Constellation (or any distant processor) begins receiving bulk, costs may increase by an additional $25,000. Thinking critically about the amount of bulk equipment necessary and correctly timing the purchase of the equipment can substantially reduce the pay-back period of the investment. Without careful planning, this investment may take 8 – 10 years. With some strategic ideas, it could pay off in as little as 2 years. In the long-run, bulk harvesting of some form, on a cost basis, will continue to be more efficient and eventually will provide the standard delivery method of Concords.

Bulk harvest was dealt with in a crop update last winter. You can find it on our website. You can also contact me for specific strategic ideas for making bulk harvesting or other capital outlays in a way that increases net farm profitability.

Where to Begin

Assuming you continue to operate a vineyard, as you can see, most of these investments make sense for many growers. Of course I think we just spent nearly $500,000 per vineyard and this list of investments is not exhaustive. As a general guide it typically makes sense to begin with investments that have the shortest payoff period. Since there is a large range, based on individual farm variables, it makes the most sense to consider how the equipment would integrate into an existing operation. Timing these investments when the older, less efficient counterparts have exhausted their useful life is the best method of ensuring shorter payback periods.

For investments over $100,000, the smaller grower should carefully consider non-conventional access to the equipment. While a 50-acre grower may realize savings from machine pruning, he may realize more savings by hiring or leasing rather than purchasing the equipment.

Risks of Inaction

The focus of newest equipment, with the exception of the harvester, is to reduce labor costs. When analyzing these investments, I use the current cost of labor. Since 2010 labor costs have been rising faster than inflation. Labor costs represent a strategic risk to sustainability. Much of this equipment will last 15 years or longer. The average cost of skilled labor over that time could average $24 per hour. The average cost of unskilled labor could average $18 or more. We have the ability to remain sustainable with higher wage rates; farm size and equipment investment offer some protection from these economic and bureaucratic forces.

Final Thoughts

Investments like these should be analyzed for growers of an appropriate size. They are of the upmost importance for the future long-term and medium-term sustainability of the operation and the industry. Depending on the current financial concerns of the farm, short-term priorities may take the place of these investments over the next 2-5 years. However, short-term priorities cannot provide a barrier to long-term investment when prices are above $260 and yields are above 6 tons per acre. I understand this newsletter reaches a very wide audience and this current market has impacted growers very differently depending on the size of their yields and quality of their markets. While some growers are in a very tough spot, it is important to know that there is a great deal of energy and financial interest to continue to build successful vineyard operations for the long-term.

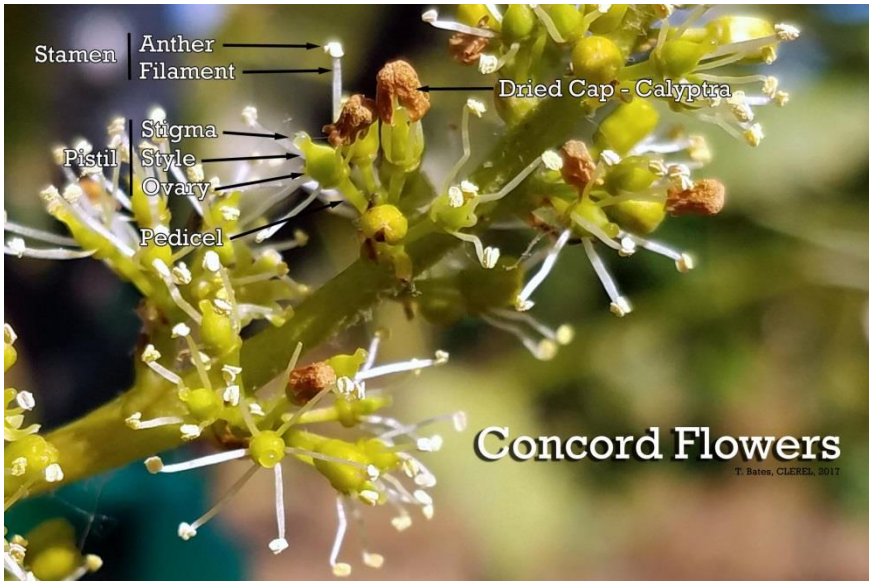
Research

Dr. Terry Bates, Director, CLEREL, Senior Research Associate, CALS Horticulture

Concord Flowering and Fruit set in the Lake Erie Region

Concord in full bloom: 6/14/2017

This season, the staff at CLEREL recorded trace bloom in the standard phenology vines on 6/11/2017 and official bloom (50% cap fall) on 6/12/2017. The Concord flower cluster in this image is at over 90% full bloom on June 14th.



Concord Flower Anatomy: 6/14/2017

Most of the wild grapes you see on the roadside or in the woods have either all male or all female flowers. However, most of the cultivated grape varieties we grow have "perfect" or "hermaphrodite" flowers. Interestingly, cultivated grapes are also highly self-pollinated because the pollen will go from the anther to the stigma before the cap pops off.

The anthers typically release pollen prior to cap fall so pollination likely started on Monday (6/12) when we recorded trace bloom. To catch and rehydrate the pollen, the stigma produces a sap (seen at the tip of the stigma arrow in the picture). Rehydration of pollen takes about 30 minutes and then the pollen uses stored starch in the pollen grain to grow down the style. The speed of pollen tube growth and the time it takes to reach the ovule is related to temperature (roughly 48 hours at 60 degrees F, 24 hours at 70 degrees, and 12 hours at 18 degrees). The colder it is, the slower the pollen tubes grow. Since the ovules are only receptive for a short time, cool weather during bloom can cause the pollen to miss the window and lead to poor fruit set. Fortunately for 2017, it has been sunny and warm (between 60-80) for the past three days so Concord fruit set in the Lake Erie Region should be in decent shape.

Concord Pre-Fruit Set: 6/16/2017

Just after flowering, the pollinated pistils on the grape clusters will start to develop but not all of the ovaries will successfully develop into fruit. This Concord cluster has about 100 developing ovaries but will only retain and develop 25-30 fruit, on average. Expanding pollen must first fertilize at least one of four ovules while they are receptive. Successful fertilization induces the production of certain plant growth hormones for cell division (auxin) and cell expansion (gibberellin) in different tissue layers. The balance of these hormones is important for the successful retention of the developing ovary. Percent total fruit set is influenced by cultivar and certain management practices, such as pruning level. A variety of environmental stresses (light, temperature, carbohydrate, nutrient, and water stress) can also reduce fruit set. Many of our management recommendations, such as for weed control and mineral nutrition, aim to eliminate any vine stress during the fruit set and berry cell division phase in the 3-4 weeks after bloom. Unfertilized or stressed ovaries will eventually abscise or "shatter."

Concord Mid-Shatter: 6/19/2017

Just one week after the start of bloom, Concord clusters are setting fertilized berries and dropping others. This cluster has dropped about 40% of the pistils which were originally pollinated but not successfully fertilized. A corky abscission scar can be seen where the pedicel of aborted flowers have separated from the rachis (cluster stem).

Why is it important to track fruit set?

Current research objectives aim to improve mid-season crop estimation. Grape yield is a function of shoots/vine, clusters/shoot, berries/cluster, and final berry weight. These "yield components" can be influenced by biological factors such as vine size and vine water status, management factors such as pruning level, or environmental factors such as temperature during fruit set. Spatial data from the Efficient Vineyard project illustrate how yield components can vary from vineyard to vineyard as well as within a vineyard. We are testing the use of the Carnegie Mellon Image sensor to directly detect and count certain yield components – such as shoot number and berry number across a vineyard. We are also combining this information with other spatial data to direct vineyard sampling during the middle of the growing season to predict final crop size across whole vineyard blocks.

PA Update

Andy Muza, Extension Educator, Penn State

Grape Leafhoppers

There are several species of leafhoppers in the genus *Erythroneura* that feed on grape foliage. Research conducted in New York showed that the eastern grape leafhopper *Erythroneura comes* (Say) is the most common on American varieties (e.g., Concord, Niagara) while *E. bistrata/vitifex* complex were more common on *Vitis vinifera* and interspecific hybrids. Other species found in commercial grapes included *E. tricinta*, *E. vulnerata* and *E. vitis* (1). Regardless of which of these species is prevalent, their life cycles are similar and the injury caused by these leafhoppers and their management is the same.

Life Cycle and Description

The various *Erythroneura* leafhoppers overwinter as adults in leaf litter in the vineyard or in plant debris around the vineyard. As temperatures increase in the spring, adults begin feeding on a variety of weeds, bushes and trees. Adults then migrate into vineyards to feed when leaves emerge (2). Eastern grape leafhopper adults are small (only about 1/8"), white-pale yellow, with darker lemon colored markings on the wings, and 3 black spots towards the posterior portion of the wings (**Figures 1 & 2**). Other *Erythroneura* species have varying coloration and markings (3).

Figure 1. Eastern Grape Leafhopper adult (summer form). Photo: https://ecommons.cornell.edu/bitstream/handle/1813/43102/grape-leafhopper-FS-NYSIPM.pdf?sequence=1&isAllowed=y

Figure 2. Adult grape leafhoppers on underside of Concord leaf. Photo: Andy Muza, Penn State.

Initial feeding occurs on sucker growth and basal leaves on shoots in the trellis. Females lay eggs on the undersides of leaves just below the leaf surface. Nymphs of the first generation hatch about late June. Immatures are wingless, white - pale yellow in coloration with tiny wing pads (**Figure 3**). Nymphs develop through 5 instars with wings fully developed after the fifth molt (2). Nymphal development to adulthood takes about 30 days or less depending on environmental conditions. In our region, nymphs of the second generation can be found in vineyards in mid-late August. Depending on seasonal temperatures, there are 1.5 – 2 generations/season in the Lake Erie Region. Grape leafhopper (GLH) adults and nymphs have piercing - sucking type mouthparts. They feed on the underside of leaves extracting the contents of leaf cells resulting in white - yellow spotting (stippling) of the foliage. Moderate - Heavy feeding causes yellowing and browning of tissue while severe injury can result in premature defoliation (**Figure 4**).

Figure 3. Grape leafhopper nymph.
Photo: https://ecommons.cornell.edu/bitstream/handle/1813/43102/grape-leafhopper-FS-NY-SIPM.pdf?sequence=1&isAllowed=y

Figure 4. Concord leaf with stippling and browning of leaf tissue caused by GLH feeding. Photo: Andy Muza, Penn State.

Management

The greatest risk for economic losses due to grape leafhopper (GLH) feeding occurs during hot, dry years in vineyards with heavy crop loads and high leafhopper populations (4). In most years, the majority of vineyards in the Lake Erie Region should not require an insecticide treatment specifically for management of grape leafhopper. Therefore, routine, prophylactic insecticide treatments for leafhoppers are unnecessary and not recommended. Insecticide applications should be based on scouting information and threshold levels.

Scouting - Tim Martinson (Senior Extension Associate, Cornell University) designed a scouting procedure for leafhoppers which corresponds to the timings when sampling for grape berry moth injury are conducted (5).

10 Days Postbloom – Usually population levels and feeding is minimal at this time of the season. If however, early in the season, high numbers of adult leafhoppers migrate into the vineyard this can result in enough leaf feeding to reduce bud fruitfulness in the following year (4). Scouting should be conducted to look for leaf feeding on interior leaves in the canopy. If leaf stippling is noticeable throughout the vineyard then an insecticide application is recommended.

Third week in July – Check 4 different areas in the vineyard (2 exterior and 2 interior). At each area look at lower leaves on shoots and check for leaf feeding. If No – Minimal injury is observed, proceed to the next sampling site **(Figure 5)**. If Moderate - Heavy leaf stippling is observed then begin counting nymphs on the undersides of leaves **(Figure 6)**.
Examine 5 leaves (leaves 3-7 from base of shoot)/shoot on 5 different shoots at each location. If a threshold of **5 nymphs/leaf** is reached then an insecticide application is recommended.
Late August – The scouting protocol at this time follows the same procedure as the July sampling. However, the threshold for the August sampling period is **10 nymphs/leaf** before an insecticide application is recommended.

Based on scouting data, if an insecticide application becomes necessary during the season, there are a number of options available. Consult the **"2017 New York and Pennsylvania Pest Management Guidelines for Grapes"** (6) for a list of insecticides which are effective for grape leafhopper management.
Shoot and leaf removal practices conducted in many wine grape vineyards may reduce leafhopper population levels, if the removed leaves are harboring nymphs of this pest. In addition, these practices will open up the canopy for better spray penetration.
A number of predators (e.g., spiders, green lacewings, lady beetles, etc.) and egg parasitoids (*Anagrus* species) which occur in vineyards contribute to reducing leafhopper population levels (7). Therefore conserving these

beneficial insects, by avoiding unnecessary applications of broad spectrum contact insecticides, is advised. Good weed control in the vineyard and the prevention of overgrown areas around the vineyard will also reduce leafhopper overwintering sites.

Figure 5. Minimal GLH stippling on Concord leaf. Photo: Andy Muza, Penn State.

Figure 6. GLH nymphs, cast nymphal skins and adults on underside of leaf. Photo: https://ecommons.cornell.edu/bitstream/handle/1813/43102/grape-leafhopper-FS-NYSIPM.pdf?sequence=1&isAllowed=y

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INSURING GRAPES

NY, 2017

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- **Aug. 15, 2017:** Premium Billing Date
- **Nov. 20, 2017:** Sales Closing, Policy Change, Cancellation, Termination Date
- **Nov. 20, 2017:** End of Insurance Period
- **Jan. 15, 2018:** Acreage / Production Report Date

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Ontario
Schuyler
Seneca
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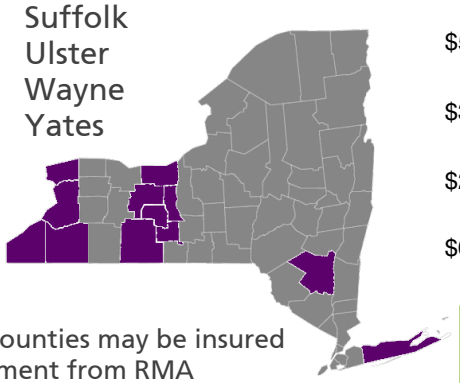
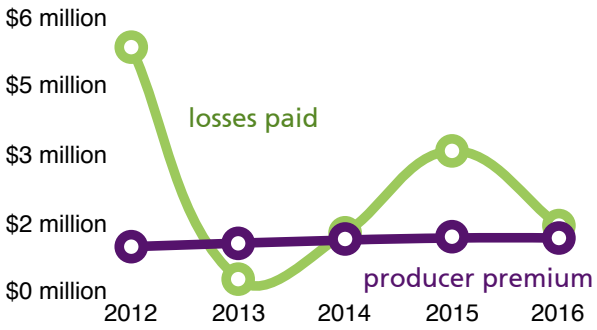
Suffolk
Ulster
Wayne
Yates



Grapes in other counties may be insured by written agreement from RMA

NYS Grape Crop Insurance Performance



for every $1 grape producers spent on crop insurance premiums from 2012 to 2016, **they received $2.07** in losses paid, on average

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USDA

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Friday August 11, 2017
at CLEREL
6592 W. Main Rd.
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9:00am-4:00pm

Summer Grape Grower Conference with a focus on Efficient Vineyard SCRI project, Variable Rate Management, Cover Crops, NEWA, GBM and Business Education. *$20.00 per person includes program, morning refreshments and a catered lunch. For more information, please call Katie 716-792-2800.*
Register at https://lergp.cce.cornell.com

2017
LERGP Hops Production in the Lake Erie Region Conference

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CLEREL-6592 West Main Rd. Portland, NY 14769

9:00am-4:00pm

$50.00- includes program, morning refreshments and a catered lunch

Join us for a day of Hops talks and a harvester/harvesting demonstration, followed by tours of the hopyards with time for open discussion.

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