

# FINGER LAKES

## *Vineyard Notes*

Newsletter #4

May 9, 2007

### Cornell Cooperative Extension

#### Finger Lakes Grape Program

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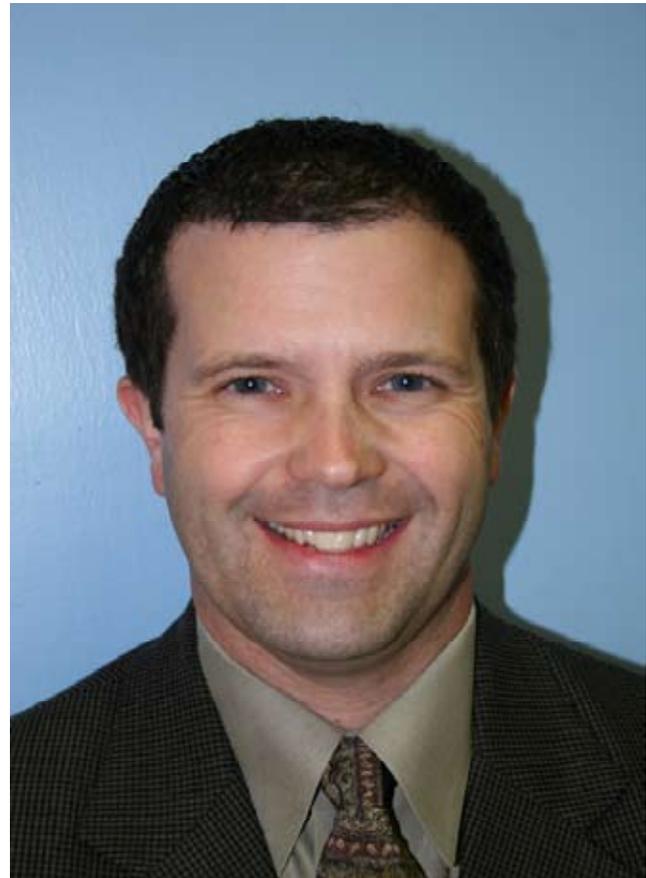
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#### HANS WALTER-PETERSON NAMED TO FINGER LAKES VITICULTURE POSITION

Hans Walter-Peterson has been hired as the new viticulture extension educator for the Finger Lakes Grape Program. He comes to the position after spending the past 5½ years in a similar position with the Lake Erie Regional Grape Program (LERGP), based in Fredonia, NY.

“I am very excited to have the opportunity to work in what I feel is one of the most diverse and exciting grape industries in the world,” Walter-Peterson stated. “One day, you can be working with a grower who is trying to increase his yield of Concord grapes while reducing his production costs in order to remain profitable. The next day, you’re working with someone who is trying to improve the quality of her Riesling grapes so her wines will be able to compete with some of the best made anywhere in the world. As the viticulture extension educator for the region, I need to be able to address the needs of both of those growers, and the challenge of trying to do that excites me.”

Walter-Peterson received his B.A. degree in biology in 1990 from St. Olaf College in Northfield, MN, and his



M.S. degree in viticulture from the University of California – Davis in 2001. Since finishing his graduate studies, he has worked for Cornell Cooperative Extension (CCE) as the viticulture extension educator for the LERGP in the Lake Erie grape belt of western New York and northwestern Pennsylvania, which is one of the country’s largest grape growing regions outside of California.

“I think I bring a unique set of skills and experiences to this job, between my experience working with low cost, high production growers of Concord and Niagara grapes in the Lake Erie region, and the education and experience that I gained while studying with some of the best viticulturists in the world at UC-Davis,” Wal-

ter-Peterson said.

Walter-Peterson said that, while much of the time during his first season in the Finger Lakes will be devoted to getting to know growers and the industry in general, he has some ideas for programs that he can start developing for growers right away. "I think there are some things that we have been working on lately with the growers in the Lake Erie region that I can bring to the industry in the Finger Lakes right away," he said. Some of the topics that he plans to work on include ways to evaluate and improve vineyard soils, managing vineyards' water requirements during the growing season, reducing vine injury due to winter cold temperatures and spring frosts, estimating and controlling cropping levels in vineyards, and other practices that can help to improve the quality and profitability of grapes that are grown in the region, whether they are processed into grape juice or fine wines.

"The Finger Lakes has earned a reputation as one of the finest grape growing and wine producing regions in the United States, if not the world. I want to help the industry strengthen that reputation even further," Walter-Peterson said.

Walter-Peterson moves into the position which was previously held by Tim Martinson, who was recently hired to coordinate CCE's viticulture extension programs across New York State. Martinson's promotion and Walter-Peterson's hiring are part of a larger movement by Cornell University and CCE to expand the resources available to the state's growing grape and wine industry, which has a \$3.3 billion impact on the state's economy. Cornell has expanded grape and wine outreach on Long Island and in the Hudson and Champlain valleys, created new enology and viticulture curricula for undergraduates, and plans to build a new research and extension facility in the Lake Erie region. Three new enology and viticulture faculty members have been hired, and a search is underway to fill the position recently vacated by Dr. Thomas Henick-Kling, who directed wine research and extension at Cornell since 1987.

## MANAGEMENT OF GRAPE INSECT AND MITE PESTS – 2007

*Greg Loeb*

*Department of Entomology*

*Cornell University*

*New York State Agricultural Experiment Station*

*Geneva, NY 14456*

The 2006 field season was not a particularly bad year for arthropod pests in New York and Pennsylvania, but as I have noted previously, arthropod pest pressure the year before is not necessarily a good predictor of pressure for the coming year. This is in contrast to diseases where high disease pressure in the previous year is a good reason to be concerned for the upcoming season due to a build up of inoculum. Of course, for both diseases and arthropods, climate conditions during the current growing season are the most important factors determining whether it will be a good or bad year for these pests. Temperatures in the spring and early summer seem particularly important for arthropods that go through several generations during the season (leafhoppers, grape berry moth, spider mites). When we have wet and cool temperatures in the spring, these pests get off to a slow start and they may never quite recover, even when temperatures turn above average in August and September. Conversely, when we have above average temperatures in May and June, the potential for leafhoppers and berry moth to get an extra generation in increases, which leads to higher populations. More generally, those years that seem particularly good for diseases are typically not great for insects and vice a versa.

In preparation for the 2007 growing season, in this article I review the major arthropod pests of grapes, providing a brief summary of their biology and the damage they cause (including any new information that is available) and a discussion of control options. The material I present is based on the work of many people at Cornell and elsewhere. I would like to especially acknowledge the contributions of Rick Dunst and Ted Taft and the rest of the crew at the Vineyard Lab at Fredonia, Tim Weigle of the NY IPM Program, Tim Martinson, Alice Wise, and Dan Gilrein from Cornell Cooperative Extension, Andy Muza from Penn State Cooperative Extension, Steve Hesler (my research support specialist here at Geneva) and Jan Nyrop (entomology faculty at Geneva). I should note, also, that

we have a new entomologist, Peter Jentsch, working on grape related issues, among other things, in the Hudson Valley. Peter is actually not that new to Cornell, having worked as a research support specialist on apple pest management problems for many years with Professor Dick Straub in the Entomology Department. With Dr. Straub's retirement last year, Peter was hired as an extension associate entomologist with roughly 10% research and extension responsibilities for grapes.

### **Insecticide and Miticide News**

I noted last year that the pyrethroid insecticides Baythroid XL (B-cyfluthrin, EPA# 264-840, Warning signal word, REI = 12 hrs, PHI = 3 days) and Baythroid 2E (cyfluthrin, EPA# 264-745, Danger signal word, REI = 12 hrs, PHI = 3 days) received federal labels for use on grapes. Both products have also received NY DEC approval. Both are restricted use pesticides. Like the other two pyrethroids labeled on grapes (Danitol 2.4 EC & Capture 2 EC), Baythroid is a broad-spectrum insecticide with good efficacy against a number of grape pests including grape berry moth, leafhoppers, steely beetle and climbing cutworm. Unlike Danitol and Capture, Baythroid does not include mites on the label. All of these pyrethroids are pretty hard on beneficial insects and mites. An important label change occurred last year for the organophosphate insecticide Imidan 70W (phosmet). For grapes, the REI has increased from 1 day to 14 days. Material with the old label can still be used according to the label.

Three neonicotinoid insecticides have received federal labels for grapes in the last year or so, although none of these are yet labeled in NY. Neonicotinoids are particularly effective against sucking insects (leafhoppers, mealybugs, aphids) but also can have efficacy against other important groups (beetles, moth larvae, etc.) depending on compound and specific pest. In New York we have two neonicotinoid insecticides labeled on grapes (Provado 75WP [imidacloprid], Assail 30SG [acetamiprid]). This year there is a second formulation of imidacloprid (Provado 1.6 F) that has received a federal label for foliar treatment of grapes that probably will eventually also be labeled in NY. The other two, Venom (dinotefuran, EPA# 59639-135, Caution signal word, REI = 12 hrs, DTH = 28) and Clutch 50 WDG (clothianidin, EPA# 66330-40, Caution signal word, REI = 12 hrs, DTH = 0) will probably not be labeled for use in NY on grapes any time soon but can be used in Pennsylvania and most other states. For Clutch,

you will need the grape supplemental label. Note that Clutch includes grape berry moth on the list of pests.

There continues to be development and registration of new miticides and some of these are seeing their way to be labeled on grapes. This past year Zeal and Zeal Miticide 1 (etoxazole) have received federal labels. You will need a 2(ee) recommendation to use these miticides against European Red Mite on grapes in New York. In other miticide news, Envidor (spirodiclofen, EPA# 264-831, Caution signal word, REI = 12 hrs, DTH = 14), a miticide with a novel mode of action has received a federal label for use against spider mites, including European Red Mite, on grapes. Envidor is not yet labeled for use in NY. According to Dan Gilrein, it is active against all stages including eggs, although it may not act as quickly as some 'knock-down' miticides.

There are a couple of insecticides making their way to receiving a federal label for use on grapes. The one to come the soonest, perhaps as early as this spring, is Avaunt, a DuPont product (indoxacarb, EPA# 352-597, Caution signal word). Avaunt is in a new chemical class of insecticides and shows fairly broad-spectrum activity against sucking insects and lepidoptera. It is fairly easy on beneficials, however. In our trials Avaunt has provided good, but not outstanding, control of grape leafhopper and grape berry moth. Use of Avaunt in New York for grapes will depend on the outcome of a review by the DEC, but this is not expected for the 2007 growing season. DuPont also has plans to label another insecticide (rynaxypyr) on grapes in the next year or two. Rynaxypyr is primarily effective against Lepidoptera pests such as grape berry moth and other chewing insect pests.

### **Review of Key Arthropod Pests**

There are over 20 insect and mite pests that attack grapes in New York, although many of these are rarely abundant enough to be of economic concern. In this review I will focus on the key grape pests that have a moderate to large pest potential. Where pertinent, I will indicate if there is variation in pest potential for different parts of the state or for particular cultivars. I will briefly go over basic biology and symptoms of damage and then discuss some of the control options available. More details can be found in the *2007 New York and Pennsylvania Pest Management Guidelines for Grapes* now on line (<http://ipmguidelines.org/grapes>). And of

course, before applying any chemical control measure make sure to read the label, taking into account things like potential for phytotoxicity, labeled pests, re-entry and days to harvest intervals, effects of pH, and compatibility with other pesticides. I will present pests in the order they tend to show up in the vineyard during the season (budbreak, pre-bloom, post-bloom, and mid-season). As a caveat before proceeding, note that an important distinction exists between control of diseases and arthropods. Because of the small size of plant pathogens and their capacity to increase rapidly under suitable growing conditions, you often need to make chemical control decisions well before obvious symptoms are visible. Related to this, most of the fungicides act to protect foliage or fruit before infection rather than eradicate the disease. Arthropods, on the other hand, are generally detectable in the field before they cause economic injury and insecticides and miticides mostly work as eradicants. Hence, for arthropods it's possible, and generally advisable, to monitor pest densities and only apply control measures when economically justified.

### **Bud Swell to Bloom**

**Grape Cane Borer.** In the fall the adults of this beetle bore tunnels into live 1 and 2 year old canes to create a place to spend the winter. Although this damage doesn't generally kill canes, they may be weakened and break during the growing season. In addition, experimental results indicate tunnels may reduce yield on a cane for some cultivars. In many cases damaged canes can be removed at pruning, although this adds time to the process. Historically, grape cane borer (GCB) problems have been most severe around Keuka Lake in the Finger Lakes Region, although we are finding more GCB evidence around some of the other Finger Lakes and also in the Lake Eire Region. The larva of GCB develops in dead wood and does not cause economic damage. However, since larvae grow into adults it makes sense to try and limit reproduction. Dead wood in the grape canopy, on the vineyard floor, or in burn piles is a good food source for GCB larvae. My sense is that destroying as much of this dead wood as possible through chopping in the vineyard or burning before larvae have a chance to mature (end of July) helps reduce GCB adult populations in the fall, although we do not have a lot of data yet to back this up. Adults become active in the spring as temperatures warm up (especially evening temperatures) and sap begins to flow (probably as early as bud-swell). Egg-laying gets

started about budbreak and continues well into June. Our current approach to controlling GCB is to target an insecticide (Imidan 70W is the only material labeled right now) against the spring adults in order to reduce reproduction and overall population levels. In a trial conducted several years ago in the Finger Lakes Region we found that three applications of Imidan 70W, starting at around budbreak and repeated about every 10 days, significantly reduced damage from adults in the fall. However, in 2005 and 2006 three applications of Imidan were not very effective. We also tried a fall application of Imidan, targeted against the overwintering adults, but this also had little impact on damage in the late fall/winter. Hence, we are still searching for an effective chemical control option. It is possible that vineyard-wide application of Imidan in the spring, over time, could be beneficial, but we have not been able to conduct such large-scale trials to verify this. Note that we are in the process of developing a fact sheet on GCB that should be available via a pdf file on the web later this spring or early summer.

**Steely Beetle (Grape Flea Beetle).** These shiny black beetles overwinter as adults and become active as temperatures increase in the spring. They feed on swollen buds prior to budbreak with the potential of causing considerable damage under the right conditions; specifically when we get a prolonged swollen bud stage. Look for damage from Steely Beetle along the edges of the vineyard. Use about 2% bud damage as a threshold



for treatment. Some hybrids with fruitful secondary buds and a tendency to over-crop can probably handle higher damage levels. Note that after budbreak, the adults do not cause additional injury. Later in the season the beetles lay eggs that hatch into larvae that do feed on grape leaves but this damage is not economically important. There are several effective, broad-spectrum, insecticides labeled for Steely Beetle in

grapes including Sevin, Imidan, and Danitol.

**Banded Grape Bug and Lygocoris Bug.** As growers have reduced insecticide use over the past 15 years we have observed more of these plant bugs in vineyards. Both species overwinter as eggs in grape canes, emerging as nymphs shortly after budbreak to 5-inch shoot growth. The Banded Grape Bug (BGB) nymph is greenish to brown in color with black and white banded antennae. Nymphs of *Lygocoris* are pale green with thin antennae and about half the size of BGB. Nymphs of both species can cause economic damage by feeding on young clusters (buds, pedicel and rachis) prior to flowering. Adults, which appear close to bloom, do not cause economic damage and for at least one of the



*Banded Grape Bug Adult on Flower Cluster*

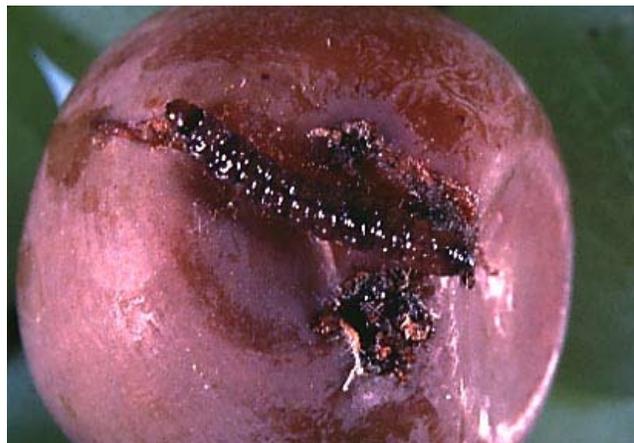
species (BGB) become predaceous on small arthropods. There is only one generation per season. Monitor for nymphs at about 5-inch shoot stage by examining flower buds on approximately 100 shoots along the edge and interior of vineyard blocks. These plant bugs are sporadic from year to year and from vineyard to vineyard; most vineyards will not require treatment. But if present at sufficient numbers (1 nymph per 10 shoots), they can cause significant yield reductions and make it worth the time to check. Pay particular attention to vineyard edges. There are several insecticides labeled for use against plant bugs (Imidan, Danitol, and Assail [only BGB on label]).

**Grape Plume Moth.** This is another potential pest of grapes that overwinters as eggs in canes and emerges shortly after budbreak. Larvae typically web together young leaves or shoot tips and leaves to form a protective chamber from which they feed. Sometimes the flower buds get caught up in the webbing and get fed on and this is where the potential for damage oc-

curs. Research indicates that 1) damage tends to be concentrated on the vineyard edge near woods and 2) it takes quite a few plume moth larvae to cause economic damage. For Niagara grapes we were unable to detect a statistical effect on vines with 20% infested shoots compared to control vines where plume moth was killed with an insecticide. Nevertheless, the trend was for reduced yield associated with high plume moth infestations (>20%). For higher value cultivars a somewhat lower threshold would be appropriate. Treatment of plume moth can be tricky for several reasons. First, the larvae develop very quickly and often have reached the pupal stage before you even recognize there is a problem. Second, larvae inside their leaf shelters are protected from insecticides. For these reasons, it's important to monitor and treat for plume moth early in the season (before the 10-inch shoot stage) using sufficient water to achieve good coverage.

### **Bloom to Mid-season**

**Grape Berry Moth.** Grape Berry Moth (GBM) is familiar to most grape growers in New York. It is considered our most important arthropod pest in Lake Erie and the Finger Lakes and much of our current IPM strategy centers around its control. GBM is typically not abundant on Long Island, although it can still be a serious problem especially for cultivars prone to bunch rots (see below). GBM overwinters as pupae in the leaf litter, emerging as adults in May and June to initiate the first generation of larvae that feed directly on young fruit clusters of wild and cultivated grapes. Depending on temperature, there can be one to three additional generations produced during the season. The larvae cause damage in three ways. First, they can reduce yield by 1) directly feeding on the flower clusters, 2) hollowing out the grape berry and 3) causing premature berry drop. Second, they contaminate the



juice, which can lead to rejection of entire loads at the processing plant. This is mainly a serious problem for native grapes grown for sweet juice. Third, their feeding activity on flowers/young berries (first generation) and green or ripe fruit (later generations) create good conditions for the development of bunch rots. This is particularly a serious problem for wine grapes, especially those with tight clusters.

Growers have effectively managed GBM over the past 15 years while at the same time reducing overall pesticide use through 1) the recognition that vineyards vary in risk to GBM, 2) the use of a reliable monitoring plan, and 3) judicious use of broad-spectrum insecticides. Note that this approach to GBM management was developed for native grapes and although it can provide a useful guideline for wine grapes, more research needs to be done for these grape varieties. Categorizing vineyard blocks according to risk is a good place to start. High Risk vineyard blocks (vineyards with at least one side bordered by woods, prone to heavy snow accumulation, history of GBM problems) should be treated with insecticides shortly after bloom (first generation larvae) and in late July (second generation). They should be scouted for GBM damage in late August to see if a third insecticide application is required. The exact timing of these later insecticide applications is dependent on temperature, which will vary from year to year. A temperature-based phenology model is currently being developed and tested by Mike Saunders at Penn State University using bloom time as the starting point, which could prove useful in better timing control efforts. Note that much of the problems with GBM from 1999-2002 were from late-season egg-laying. Too often growers put their sprayers away after early August and do not check for GBM. Pay attention to email crop updates for alerts on GBM (and other pests). For Low Risk vineyard blocks (lack of woods, low amounts of snow, little history of GBM problems) you can probably safely ignore GBM for the first generation, but remember to scout in late July. It may even make sense to scout in late August as well. For vineyard blocks that fall in between high and low risk (Intermediate Risk) we recommend an insecticide treatment for first generation (immediate post-bloom) and scouting for GBM at the end of July and the end of August. The current thresholds are 6% cluster damage for late-July and 15% at the end of August. These thresholds have been developed for native grapes bound to processing plants. Thresholds for vinifera are probably lower due to the additional risk of bunch rots

associated with GBM feeding injury and their higher value.

There are several options available for chemical control of GBM. The most commonly used products are Danitol and Sevin. Other broad-spectrum pyrethroids (e.g. Capture and Baythroid) are also effective. Imidan is also an effective broad-spectrum material, but it is not quite as effective against leafhoppers as the pyrethroids. Moreover, the new label for Imidan has a 14 REI, which makes its use problematic. There has been some evidence of control failures with Sevin in the Lake Erie area due to resistance. Although such problems have not been documented in the Finger Lakes or Long Island, it is something to pay attention to and rotation among pesticides is usually a good idea. The pyrethroids are effective materials as noted above, but I have concerns about their overuse leading to spider mite problems.

There are some additional, more narrow-spectrum, materials registered for use against GBM. Dipel is one option that has been around for a number of years. The toxin produced by the *Bacillus thuringiensis* (Bt) bacteria is specific to Lepidoptera. In our trials it has been less effective than the broad-spectrum insecticides but has the advantage that it conserves predators and parasitoids in the system. We have found that 2 applications of Dipel per GBM generation (immediate post bloom and mid-July) improves efficacy. Use sufficient water to achieve good coverage of fruit since the larvae must consume the Bt as they enter the berry for it to be effective. Good coverage is an issue for all the GBM materials. Mating disruption, using large releases of the GBM sex pheromone, is another control option to consider. The idea is to prevent mating by artificially releasing so much sex pheromone that males have difficulty locating the female moths. This technique has been around for a number of years and is being used by a small percentage of growers. It is probably most effective for intermediate and low risk vineyards or in years where berry moth densities are low. However, these are the areas that often times do not require an insecticide application for GBM every year. Plastic twist ties impregnated with sex pheromone is now the main method for releasing pheromone. The older version of the Isomate GBM twist tie releaser is no longer being sold. However, there is a new product called Isomate-GBM Plus, which lasts the entire growing season. The older product was thought to run out of pheromone by the end of the season in some years thereby leaving

the vineyard unprotected. We have just started large-scale field trials to test the efficacy of Isomate GBM plus in collaboration with researchers in Pennsylvania and Michigan. Finally the insect growth regulator Intrepid from Dow Corporation has an EPA label for use on grapes and is available in Pennsylvania and most other states. It has not received DEC approval for New York, and we don't expect it to happen this field season. Intrepid is a selective material active against the larvae and eggs of many species of Lepidoptera including GBM. We are still learning how to best use this new material, but it seems it needs to be applied a bit earlier than other insecticides (e.g. bloom instead of immediate post-bloom). Intrepid has fairly long residual activity.

**Grape Leafhoppers.** There is actually a suite of leafhoppers that feed on grapes. The Eastern Grape Leafhopper *Erythroneura comes* (pale white in summer) mainly feeds on native cultivars like Concord while several additional species feed on *V. vinifera* and hybrids including *E. bistrata/vitifex*, *E. vitis*, *E. vulnerata*, and *E. tricinta*. All these *Erythroneura* leafhoppers have similar life-cycles. They overwinter as adults and become active as temperatures warm up in the spring. They move on to grapes after budbreak, mate and begin laying eggs around bloom. There is one full generation during the summer and a partial second. In warm years



there is a potential for a nearly full second generation of nymphs and adults. Both nymphs and adults cause similar damage – removal of leaf cell contents using sucking mouthparts. Hence, moderate densities can reduce photosynthesis, ripening and yields. Severity of damage is increased in dry years, assuming irrigation is not available. The last few years have been low grape leafhopper years, probably due to cold winters and cool temperatures during spring and early summer.

Sampling for leafhoppers corresponds to sampling for grape berry moth. At the immediate post-bloom period sucker shoots should be examined for evidence of stippling (white dots on leaves caused by leafhopper feeding). If you see stippling throughout the vineyard block an insecticide treatment is recommended. Note that for vineyards at high or intermediate risk of GBM damage, you would probably already be applying an insecticide at this time. If you use a broad-spectrum material such as Sevin or Danitol you will also control leafhoppers. The next sampling period for leafhoppers is mid to late July and focuses on abundance of first generation nymphs. Monitoring for leafhoppers is only necessary for low and intermediate risk vineyards, assuming a broad-spectrum material is used to control GBM in high risk vineyards. At this time check leaves at the basal part of shoots (leaves 3 through 7) for leafhopper nymphs or damage, on multiple shoots and multiple vines located in the exterior and interior of the vineyard. Use a threshold of 5 nymphs per leaf or 10% of leaves with at least moderate stippling to determine need for treatment. The third time for sampling for leafhoppers should occur in late August. This focuses on nymphs of the second generation. Follow a similar sampling protocol as used at the end of July, using a threshold of 10 nymphs per leaf. Note if you have made previous applications of insecticides for leafhopper or GBM it is very unlikely that it will be necessary to treat for leafhoppers in late August. If you do not observe much stippling it is not necessary to more carefully sample for leafhopper nymphs.

There are several choices of pesticides to use against leafhoppers. The carbamate Sevin has been a standard for many years and is still effective except in isolated pockets of Concord and other native grapes around the Finger Lakes where we have observed control failures suggesting emergence of resistance. There are several effective alternatives to Sevin including Danitol, Capture, Baythroid, Lannate (methomyl), and the two neonicotinoids Provado and Assail. Lannate is in the same chemical class as Sevin, so there is potential for cross-resistance. The carbamates (Sevin and Lannate) and pyrethroids are hard on predatory mites. The neonicotinoids are mainly effective against sucking insects like leafhoppers and not as hard on natural enemies as the broad-spectrum insecticides. Note that a half label rate of Provado WP (0.5 oz) was as effective as the full rate in controlling leafhoppers in our trials.

**Potato Leafhopper.** The Potato Leafhopper (PL) is

quite distinct from the grape leafhoppers discussed above. One big difference is that PL originates each year from the southeastern US (it can not successfully overwinter in upstate NY) while grape leafhoppers are indigenous to our area. The overwintered, winged adults ride north on warm fronts and usually arrive in our area sometime after bloom. When and where they arrive is not very predictable and some years are worse than others. However, they tend to arrive on Long Island before the Finger Lakes or Lake Erie region. Vineyards adjacent to alfalfa sometimes get an infestation of PL right after the alfalfa is mowed. The adult PL is iridescent green and wedge-shaped, while the nymph is usually green and moves sideways in a unique manner when disturbed. Instead of feeding on cell contents of leaves like grape leafhoppers, PL adults and nymphs use their sucking mouthparts to tap into the phloem vessels (the tubes used by plants to transport the products of photosynthesis) of a number of different species of plants including grapes. In the process of feeding, they introduce saliva into the plant that causes, to varying degrees, distorted leaf and shoot development. Some cultivars of vinifera grapes seem particularly sensitive (as does the French-American hybrid Cayuga White) but Labrusca cultivars also show symptoms. Feeding symptoms in grapes include leaves with yellow margins (more reddish for red vinifera grapes) that cup downward. Often these symptoms are noticed before the leafhoppers themselves.

PL is a sporadic pest, although it can be serious in some places and some years. Long Island seems particularly hard hit. We currently do not have good estimates for an economic threshold. We do know that shoots will recover from feeding damage once the leafhoppers are removed. Several insecticides are registered for its control in grapes including Sevin, Danitol, Lannate, Assail and Provado. Note that Provado is now a restricted use pesticide in NY. PL is fairly mobile, and it may require several treatments over the season as new infestations occur.

**Grape Phylloxera.** Grape phylloxera is an aphid-like insect with a complex life-cycle that causes feeding galls on either roots or leaves. Leaf galls are in the shape of pouches or invaginations and can contain several adults and hundreds of eggs or immature states. Root galls are swellings on the root, sometimes showing a hook shape where the phylloxera feed at the elbow of the hook. At high densities, leaf galls can cause reduced photosynthesis. Root galls likely reduce root

growth and the uptake of nutrients and water, and can create sites for invasion of pathogenic fungi. There is a wide range in susceptibility of grape varieties to both gall types. Labrusca and vinifera grapes tend not to get leaf galls. Some hybrid grapes, such as Baco noir, Seyval, and Aurora, can become heavily infested with leaf galls. Labrusca grapes will get root galls, but these tend to be on smaller diameter, non-woody roots that may reduce vine vigor in some cases but are not lethal. The roots of vinifera grapes are very susceptible to the root-form of phylloxera, including galls on larger, woody roots that can cause significant injury and even vine death. Indeed, most vinifera grapes grown in the eastern US are grown on phylloxera-resistant rootstock such as 3309, and this is the main method for managing the root-form of phylloxera. There are a couple of insecticides labeled for the control of leaf-form phylloxera, although we do not have a well-defined treatment threshold at this time. The organophosphate insecticide endosulfan (e.g. Thionex) is effective but causes phytotoxicity on some varieties such as Baco noir and Chancellor. The neonicotinoid Assail (acetamiprid) and the pyrethroid Danitol (fenpropathrin) are also labeled for the leaf-form of grape phylloxera. Leaf-galls first appear at low densities on the third or fourth leaf, probably originating from overwintered eggs on canes. The crawlers from these first generation galls disperse out to shoots tips and initiate more galls around the end of June or beginning of July. These second generation galls tend to be more noticeable to growers.

**European Red Mite.** There are actually two species of spider mites that attack grapes in the Eastern US – Two-spotted Spider Mite and European Red Mite (ERM) – but ERM presents the more serious threat. Problems with ERM on grapes in New York have historically been concentrated on Long Island where the longer season and dryer climate are more conducive to population growth. However, vineyards in the Finger Lakes can also experience mite problems. ERM overwinters as eggs on one-year and older wood. Around budbreak eggs hatch and larval mites move to young leaves. The immature and adult mites feed on cell contents causing stippling of leaves and when abundant, leaf bronzing. The eggs of ERM are red to brown-red in color, while the immatures and adults are pale brown to red. ERM are very small in size (a fraction of an inch) and best observed with a 10 to 15X hand lens. Under the right conditions (hot and dry, lack of natural enemies), they can reach high populations and cause serious injury to grapes. Cultivars of *V. vinifera* and

French-American hybrids appear most susceptible, but native varieties can also develop large populations. With rare exception, ERM typically does not become a problem until mid to late summer when conditions are most favorable for population growth and shoot growth has slowed down. Look for immature and adult mites on the top and bottom of leaves in the middle of shoots. The current economic threshold is about 7-10 mites per leaf or 50% of the leaves infested.

Spider mites are often thought of as a secondary pest. In other words, something must happen in the vineyard that disrupts their natural control by predators, particularly predatory mites, before their populations can increase to damaging levels. Pesticides that differentially harm predators but not spider mites are the most typical cause of disruption, and this seems to be the case for grapes in New York. We and other researchers have been looking at this issue for several years now. Some tentative conclusions can be made. The use of certain fungicides, particularly mancozeb products, suppresses predatory mites. Repeated use of a mancozeb product may promote outbreaks of ERM. In some situations, however, predatory mite populations are sufficient and/or conditions for ERM population growth are insufficient, such that outbreaks do not occur even with repeated use of a mancozeb product. Jan Nyrop and Wayne Wilcox have recently shown that one early-season application of Dithane had little effect on a well-established population of predatory mites. Several insecticides used in grapes, including Lannate, Danitol, and Capture can also suppress predatory mites. Danitol and Capture are also miticides, so at present their use does not create an ERM problem. However, in the past, spider mites have been quick to develop resistance to frequent use of pyrethroids like Danitol and Capture. This may or may not happen, but it is worth keeping in mind. One of the first things to watch out for is initial good suppression of mites followed by a resurgence indicating the spider mites recovered more quickly than the predatory mites. Overall, paying attention to conserving predatory mites can pay economic dividends since miticides are quite expensive.

We now have several chemical options available for mite control in New York: Kelthane (dicofol); Vendex (fenbutatin-oxide); Agri-Mek; Nexter (previously called and sold as Pyramite); Acramite; JMS Stylet Oil (aliphatic petroleum distillate); Zeal; Danitol; and Capture. Note that Nexter is not allowed on Long Island. Kelthane and Vendex are the old standards that have

been relied upon for a number of years. Kelthane is fairly hard on predatory mites while Vendex is not. My experience with Vendex is that it takes a bit longer to have an impact than Kelthane. Kelthane 50W is no longer being manufactured, but material in stock can be used. Trials conducted by Tim Martinson demonstrated that 3 early-season applications of JMS Stylet Oil, being used primarily for control of grape powdery mildew, reduced ERM populations by about 50%. JMS Stylet Oil is relatively benign to predatory mites. Read the label carefully since JMS Stylet Oil is not compatible with a number of other products including Captan, Vendex, and sulfur. Also, although Stylet Oil can help with ERM problems, it is not likely to provide complete control in problem vineyards. Nexter has been registered for use on grapes in New York (but not on Long Island) for a couple of years. It is very effective against ERM but higher rates may be necessary for Two-spotted Spider Mites. Nexter is pretty soft on predatory mites except at high rates. It also provides some partial control of leafhoppers. Agri-Mek currently has Two-spotted Spider Mite on the label but not ERM. The Agri-Mek label recommends the use of a nonionic surfactant to improve wetting. Acramite, as indicated earlier, has recently received DEC approval for use in New York, including Long Island. The new label for Acramite includes both Two-spotted Spider Mite and ERM. Acramite and Agri-Mek are relatively soft on beneficial arthropods. Zeal miticide has recently been labeled for grapes and is allowed in NY (you do need a 2(ee) to treat for ERM, though). Since Zeal primarily affects eggs and immatures, it is advised to apply before populations reach damaging levels to give the material time to work. Note the different miticides vary in their re-entry interval and days to harvest requirements. It is good news that we now have several miticides to choose from for control of ERM in grapes. It is a good idea to rotate materials to help reduce pressure for resistance.

**Japanese Beetle.** Most of you are familiar with Japanese beetles and their fondness for grape foliage. Actually, the adults (1/2 inch body, metallic green in color) feed on a number of different plant species, but they do seem to really get excited about grapes. Japanese beetles were introduced into the eastern USA a number of years ago and have been spreading throughout the Northeast and Great Lakes regions. Although the adults have broad diets, the larvae feed principally on the roots of grasses. Hence, we often find the most significant problems with adult Japanese beetles in areas

surrounded by an abundance of turf. The adults emerge from the soil in mid-summer and begin feeding and then mating and egg-laying. In some years Japanese beetles can be fairly destructive (last year they were quite abundant in the Finger Lakes), removing significant amounts of foliage (10%). Fortunately, grapes are fairly tolerant of this type of feeding at this time of the season. Dr. Rufus Isaacs of Michigan State has been examining the economic impact of Japanese beetle for the last couple of years. Removal of up to 30% of leaf area on young Niagara vines at veraison did not cause significant decreases in growth or yield the next season. Note, though, that the actual impact of leaf feeding will depend on health and size of the vine. Young vines in growth tubes, for example, may be particularly vulnerable in that they have fewer reserves to draw upon to recover from damage and the beetles are protected in the tubes from insecticide sprays. You should make a special effort to regularly monitor vines inside growth tubes for Japanese beetles and apply insecticides directly into the tubes if treatment is warranted. Grape cultivars do seem to vary in resistance to Japanese beetle. Thick leaved native cultivars are the most resistant followed by hybrids and then *V. vinifera*.

There are several insecticides labeled for use against Japanese beetles on grapevines including Sevin, Imidan, Danitol, Capture, and Assail. These all are roughly similar in efficacy. The key fact to remember about controlling Japanese beetle is that the adults are very mobile and can re-colonize a vineyard block after being treated with an insecticide. Regular monitoring of the situation is recommended.

**Multicolored Asian Lady Beetle (MALB).** MALB was introduced into the US from Asia to help control aphid pests. It has spread to many areas in the southern and eastern US and into Ontario, Canada and has generally been an effective biological control agent. However, it has the habit of moving into vineyards in the fall near harvest time. When disturbed, the adult MALB releases a defensive chemical out of its joints that helps it ward off enemies. Unfortunately, the defensive chemical has a nasty taste and bad odor that gets carried into the juice and wine. Relatively low densities of MALB (10 per grape lug) can cause off-flavors in juice and wine. MALB is sporadic both in where it shows up during a given year and from year to year. Vineyards in the Niagara Peninsula in Canada appear particularly vulnerable. Also, vineyards adjacent to soybeans in a year when soybean aphid is abun-

dant may be more vulnerable. I recommend that you scout your vineyards before harvest to see if MALB is present. There could be several different species of ladybugs in your vineyard but probably only MALB would be at high densities on the clusters. You can recognize MALB by the black markings directly behind the head that look like a W or M depending on which direction you look from. The color or number of spots is variable. I would also pay attention to the crop updates to see if and when MALB is turning up in vineyards. As indicated above, the abundance of MALB appears to be closely tied to the abundance of soybean



aphid, which tends to alternate between high and low years. Researchers are predicting a high soybean aphid population in 2007 and hence, a high MALB population is also probable. If you do end up with a problem, there are a few chemical approaches you can try. Note that we have yet to develop a good estimate of the economic threshold for MALB. There are several pesticides now labeled for MALB: Sevin (carbaryl), Danitol (fenprothrin), Aza-Direct and Evergreen (natural pyrethrins). To use Sevin and Danitol in New York for this purpose, you need to have the 2(ee) label or a copy of the 2007 NY and PA pest management guidelines. Sevin and Danitol are toxic to MALB based on field and laboratory trials conducted by Roger Williams at Ohio State University. Aza-Direct, which is based on the active ingredient azadirachtin from the neem tree, appears to have a repellent effect on MALB, again based on trials by Roger. Based on a trial two years ago by Tim Weigle, Evergreen appears to have both toxic and repellent effects on MALB. Note that Danitol has a 21 days to harvest restriction, Sevin has a 7 days to harvest restriction, and Aza-Direct and Evergreen have no days to harvest restrictions. For Aza-Direct, pH in spray water should be 7 or less (optimum is 5.5 to 6.5).

## Some final comments

There are a large number of potential arthropod pests of grapes, and it is possible to get overwhelmed with information on biology, symptoms, control options, etc. Here are a few points to keep in mind to help simplify things.

Although there are a large number of potential pests, there are relatively few that consistently represent a major threat (grape berry moth, leafhoppers, mites, and a few others). And of those that can cause significant injury, they may not become a pest at a particular site or during a particular year. Generally speaking, with arthropod pests you have time to make management decisions based on what is present in the vineyard rather than what may develop in the future. There is a distinct time of the season when particular pests may turn up in your vineyard. In other words, you can focus your scouting on a limited number of pests at a given vine phenology. Look for steely beetles, climbing cutworm, and grape cane borer at bud swell; plant bugs and plume moths when shoots are between 3 and 10 inches; grape rootworm and rose chaffer around bloom; grape berry moth, leafhoppers, leaf phylloxera, Japanese beetle, and spider mites after bloom to late August. Don't put your sprayer away too early in the season. Watch out for late-season damage from grape berry moth. Read extension pest alerts available through the grape extension programs. If you don't have access to email, see if you can get someone who does to make copies for you. To sign up for electronic updates, please contact the Finger Lakes, Lake Erie, or Long Island extension programs directly. Generally speaking we have good chemical control options available for most arthropod pests (Grape Cane Borer being an exception), but be smart about using them. Pay attention to label restrictions and review recommendations in the pest management guidelines. Be aware of the potential for grape berry moth and grape leafhopper resistance to Sevin. Rotate among materials to reduce development of resistance. Be aware of consequences for natural enemies. The cheapest material to apply on a per acre basis may not always result in the lowest cost because of unintended consequences. Most important, only use pesticides or other control options when it makes economic sense to do so (monitor and apply economic thresholds where available). If you have questions or concerns PLEASE LET ME KNOW.

## WORKSHEET AVAILABLE TO DETERMINE NITROGEN NEEDS OF CONCORD VINEYARDS

*Hans Walter-Peterson*

As growers have been preparing for another growing season, one of the first decisions that they are facing is deciding how much nitrogen fertilizer to use. Applying nitrogen fertilizer has traditionally been one of the first things done in Concord vineyards, and most growers have used their "traditional" rates of nitrogen for many years without much thought to the vines' actual needs, or the cost of the material because it has been fairly inexpensive.

With the escalating cost of nitrogen fertilizers over the past few years, however, the cost of this practice has forced many growers to ask just how much nitrogen they really need to apply. Thanks to several research projects conducted at the Fredonia Vineyard Laboratory and on growers' farms in the Lake Erie region, we are able to provide growers with that information.

Based on that research, the following worksheet was developed to help growers calculate their vineyards' nitrogen needs. The calculation is based primarily on the amount of organic matter present in their soils, which can be obtained from the most recent set of soil test results (if no soil tests have been done, the worksheet provides some suggested values for different soil types). A completed example of the worksheet is presented on one side of the page, while the other side is for growers to do their own calculations. The back page, then, contains some suggestions for how to use the results from this calculation worksheet on the farm.

If there are any questions about how to use this sheet, please feel free to contact me at [hcw5@cornell.edu](mailto:hcw5@cornell.edu).



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## Lake Erie Regional Grape Program



### #1: Cost Comparison

To calculate the potential savings of the fertilizer application rates calculated here, redo the calculation using the standard rate traditionally used in the vineyard. Put the value in Line 5 if based on the pounds of actual nitrogen per acre, or Line 7 if based on the pounds of fertilizer per acre, then finish the rest of the worksheet. Subtract the costs of the "new" program from those of the standard one, and that is the savings that could be realized by using this method.

### #2: Do Your Own Field Comparison

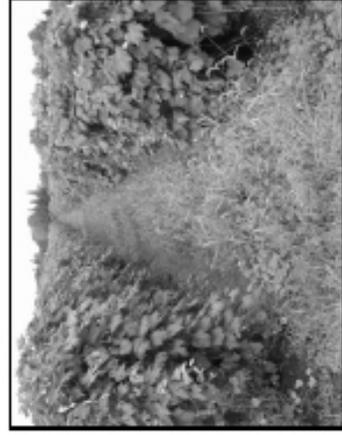
The LERGP extension team encourages growers to try new practices on a small scale before implementing them across all of their acreage. Changing the amount of nitrogen fertilizer to apply is no exception to this. Select a relatively small and uniform block (i.e. vine size and production is fairly even across the block) of vines to do a comparison between your standard nitrogen application rate and the one suggested by these calculations. Use 4-6 rows for each treatment, and if you have room, repeat the comparison a couple of times (i.e., five rows standard rate, five rows lower rate, five rows standard rate, five rows lower rate, etc.). Make sure to mark which rows received which rate of fertilizer using flagging tape, permanent marker or something that can easily be identified.

At the end of the season, compare how many bins were harvested from each of the treatments to see if there was a major difference between the two. Also try to observe if there are any differences in the amount of vegetative growth that developed during the year. Do this comparison (same treatments in the same rows) for a few years in order to see how a lower nitrogen rate impacts vine growth and productivity. It is difficult to make any real conclusions after only one year of comparison.

### Questions?

If you have any questions about this information, please contact Hans Walter-Peterson with the Lake Erie Regional Grape Program's extension team at 716-672-2191 or [hew5@cornell.edu](mailto:hew5@cornell.edu).

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## HOW MUCH NITROGEN FERTILIZER DO CONCORD VINEYARDS REALLY NEED?

Until recently, the cost of nitrogen was only a small piece of the overall cost of producing a crop of Concord grapes every year. Over the past few years, the cost of nitrogen-supplying fertilizers has increased dramatically due to energy costs and additional security measures required for certain types of fertilizers. This has brought the cost of vineyard fertilization up to a level similar to the cost of one or two disease sprays.

The optimal amount and timing of nitrogen fertilizer for Concord vines is based on the type(s) of soil in the vineyard and the organic matter content of that soil. The following worksheet will help to calculate the amount of nitrogen that is needed based on the amount of organic matter. This information is based on a number of research projects conducted at the Fredonia Vineyard Lab and on growers' farms that have helped to better define the real nitrogen needs of Concord vines.

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**Nitrogen Requirements & Costs Worksheet for Concord Vineyards**  
(SAMPLE)

1	% Soil organic matter (OM) <i>Value can be obtained from soil test reports If no soil tests are available, use:</i> • 2.0 for sandy soils • 2.5 for gravel soils • 3.5 for silt or clay soils	1	<u>2.3</u> % OM
2	Pounds of N / % soil OM	2	20 lbs N/acre
3	Lbs N/acre supplied by mineralization of OM (Line 1 x Line 2)	3	<u>46</u> lbs N acre
4	Equivalent lbs N/acre required by Concord	4	50 lbs N/acre
5	Lbs N/acre required from supplemental fertilizer (Line 4 - Line 3) <i>If Line 5 is equal to or less than 0, stop here.*</i>	5	<u>4</u> lbs N/acre
6	% N content of supplemental fertilizer <i>This value should be provided to you by your supplier</i>	6	<u>46</u> % N
7	Lbs of fertilizer/acre to apply assuming 100% uptake (Line 5 divided by [Line 6/100])	7	<u>8.7</u> lbs fert/acre
8	Uptake efficiency of N <i>If applying at budbreak, enter 0.10 If applying 2 weeks before to 2 weeks after bloom, enter 0.17</i>	8	<u>0.17</u>
9	Pounds of fertilizer/acre to apply (Line 7 divided by Line 8)	9	<u>51</u> lbs fert/acre
10	Cost per ton of fertilizer	10	<u>480</u> \$/ton
11	Cost per pound of fertilizer (Line 10 divided by 2000)	11	<u>0.24</u> \$/lb fert
12	Cost of fertilizer per acre (Line 9 x Line 11)	12	<u>12.24</u> \$/acre

\* If the calculation indicates that no supplemental nitrogen is needed, make sure to monitor canopy growth and color during the growing season. If N is required later in the season, it can be applied to the soil or to the foliage. Contact the LERGP for information on this.

**Nitrogen Requirements & Costs Worksheet for Concord Vineyards**

1	% Soil organic matter (OM) <i>Value can be obtained from soil test reports If no soil tests are available, use:</i> • 2.0 for sandy soils • 2.5 for gravel soils • 3.5 for silt or clay soils	1	_____ % OM
2	Pounds of N / % soil OM	2	20 lbs N/acre
3	Lbs N/acre supplied by mineralization of OM (Line 1 x Line 2)	3	_____ lbs N acre
4	Equivalent lbs N/acre required by Concord	4	50 lbs N/acre
5	Lbs N/acre required from supplemental fertilizer (Line 4 - Line 3) <i>If Line 5 is equal to or less than 0, stop here.*</i>	5	_____ lbs N/acre
6	% N content of supplemental fertilizer <i>This value should be provided to you by your supplier</i>	6	_____ % N
7	Lbs of fertilizer/acre to apply assuming 100% uptake (Line 5 divided by [Line 6/100])	7	_____ lbs fert/acre
8	Uptake efficiency of N <i>If applying at budbreak, enter 0.10 If applying 2 weeks before to 2 weeks after bloom, enter 0.17</i>	8	_____
9	Pounds of fertilizer/acre to apply (Line 7 divided by Line 8)	9	_____ lbs fert/acre
10	Cost per ton of fertilizer	10	_____ \$/ton
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Newsletter No.4  
May 9, 2007

FINGER LAKES VINEYARD NOTES

is published monthly by  
Cornell Cooperative Extension  
Finger Lakes Grape Program  
Ontario, Schuyler, Seneca, Steuben, and Yates  
Counties  
County Office Building  
417 Liberty Street • Penn Yan, NY 14527

*Comments may be directed to*

**James D. Hawk**  
Sustainable Viticulture Educator  
Finger Lakes Grape Program  
315-536-5134  
jdh73@cornell.edu

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Cornell Cooperative Extension  
Finger Lakes Grape Program  
417 Liberty Street  
Penn Yan, NY 14527

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