FINGER LAKES VINEYARD NOTES

Newsletter 5 May 7, 2006

Cornell Cooperative Extension

Finger Lakes Grape Program

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SPRING PEST MANAGEMENT FIELD DAY

Lakewood Vineyards, Watkins Glen

Thursday May 18. 3-6 PM. *Spring Pest Management Field Day.* Lakewood Vineyards, Rte 14-4 mi N of Watkins Glen. Please join us for the annual pest management update, featuring talks on DEC regulations, University pest management updates, spray technology update and demonstration, and updates by industry representatives. **Three pesticide recertification credits will be offered.** The meeting will be followed by a Chicken barbecue and wine reception featuring Lakewood wines, or feel free to bring a bottle of your own product to share. There is no charge for this meeting, but **please preregister by Thursday May 11** by **calling our office at 315-536-5134,** or by **e-mail at leb15@cornell.edu or tem2@cornell.edu**

Important note: ***Please provide us with your pesticide applicator's number*** *when you sign up. We have been told by the DEC that we need to have names and certification numbers already printed on certificates we hand out, or watch you write them on your form.*

Schedule:

2:45 *Sign up for pesticide recertification credits*

3:00 *Welcome.* **Robin Travis**, Executive Director, Schuyler CCE, **Tim Martinson**, Finger Lakes Grape Program

3:05 *Sustainable Viticulture Project and Pest Management.*

- *A more inclusive look at sustainable production practices - The NY Sustainable Viticulture Self-Assessment Workbook* **-Jamie Hawk**, Finger Lakes Grape Program
- *The NY Farm Viability Institute - a new partner for NY Agriculture and Extension.* **Jim Bittner**, President, and Dave Grusenmeyer, Outreach Coordinator, NYFVI

3:25 *Survey on Herbicide and Weed Management to determine IR-4 registration Needs*

- **Robin Bellinder** and **Chris Benedict**, Horticulture Department, Cornell University

3:35 *DEC Update on Pesticide Regulatory Issues*

- How the industry fared in last year's WPS inspections
- Pesticide records and the USDA (!)
  Ed Hanbach - *NYS DEC, Bath Office*

4:00 *Cornell Pest Management Updates*

- Diseases-**Wayne Wilcox**, Professor, Plant Pathology
- Weeds - **Rick Dunst**, Research Support Specialist, Vineyard Lab
- Insects - **Greg English-Loeb**, Assoc. Professor, Entomology
- IPM Update - **Tim Weigle**, Statewide Grape IPM Specialist

4:45 *Spray Technology Demonstration*

- *"What is your orientation?"* Spray technology demonstration with emphasis on sprayer nozzles and their orientation. **Andrew Landers**, Senior Extension Associate, Cornell University

5:15 *Industry Updates – New Products and Label Changes*

- Commercial suppliers.

6:00 **Chicken Barbecue** *Lakewood Vineyards*.
Catered by **Smoke'n Bones** Restaurant, Burdett
Our thanks to Lakewood Vineyards for hosting this event!

MANAGEMENT OF GRAPE INSECT AND MITE PESTS 2006

Greg English-Loeb
Department of Entomology
Cornell University
New York State Agricultural Experiment Station

The 2005 growing season– warm and dry – was ideal for insects and mites. Fortunately, they were not particularly problematic for area vineyards. Why? Part of the reason may be that it takes a couple of favorable years in a row to allow populations to build up. Remember, some of our worse problems with grape berry moth occurred following several years of warm growing seasons coupled with mild winters in 2000-2002. Given the mild winter, we should be on guard for significant populations of some pests if we have a warm and dry growing season like last year.

Spring and early summer conditions are especially important for insects that can produce several generations during the growing season (grape berry moth, leafhoppers). When we have wet and cool temperatures in the spring, these insects get off to a slow start and may never quite recover, even with above-average temperatures in August and September. Conversely, when we have above-average temperatures in May and June, leafhoppers and berry moth can complete an extra generation, which leads to higher populations.

In this article I summarize biology and vine injury caused by the major insect and mite pests of grapes. I'll include new information, and a discussion of control options. This material is based on the work of many people at Cornell and elsewhere. I want to especially acknowledge the contributions of Rick Dunst, 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).

Insecticide and Miticide News.

Pyrethroids. I noted last year that a second pyrethoid (Capture 2EC, binfenthrin) has been labeled for use in grapes. Like the other pyrethroid, Danitol 2 EC (fenpropathrin), this is a broad-spectrum insecticide with activity against several important grape insect pests as well as spider mites. For unknown reasons, grape berry moth was not included on the original label. A new label approved this year includes grape berry moth, eastern grape leafhopper, cutworms, Japanese beetle, and two-spotted spider mite (not European red mite which is more of a problem for our area). Rates for Capture 2 EC range from 3.2 to 6.4 fl. oz./A. Keep in mind that you may not use more than 6.4 fl. oz./A during a single season. The preharvest interval (PHI) for Capture is 30 days while it is 21 days for Danitol 2 EC. For 2006, a third pyrethroid insecticide, Baythroid 2 (cyfluthrin), has received a federal label from the EPA for grapes. It has not yet received DEC approval in NY.

Advantages of these synthetic pyrethroids include broad-spectrum activity, relatively low mammalian toxicity and low cost. The major disadvantage is that they tend to be hard on beneficial insects and mites. One concern I have about the extensive use of these broad-spectrum products is that spider mites may develop resistance. Predatory mites, common and effective at controlling European red mite, are very sensitive to pyrethroids.

Neonicitinoids. The neonicotinoid imidacloprid can be applied as a foliar application (Provado) or as a soil treatment (Admire). Admire acts systemically while Provado does not. Until recently only the foliar material was labeled for grapes. However, two Admire formulations (Admire 2 and Admire Pro) are now labeled for grapes, although their usefulness in our area is limited by the fact that they work best when applied through a drip irrigation system. The two products mainly differ in concentration (21% active verses 42%) but generally control or suppress the same spectrum of pests (leafhoppers, mealybugs, and phylloxera). The PHI for both Admire formulations is 30 days and the amount applied during the season is limited by the label (32 fl. oz. and 14 fl. oz., respectively). All formulations of imidacloprid are now classified as restricted use in New York, so their use is limited to persons who are certified applicators.

In addition to imidacloprid there two other neonicotinoids labeled for use on grapes, Assail (acetamiprid) and Venom (dinotefuran). Assail has been labeled for use on grapes for several years now. However, the formulation of this product has changed from WSP (water soluble packet) to SG (soluble granule). Assail is not a restricted use insecticide. Venom (dinotefuran) obtained its EPA label in 2006 but has not yet received a NYS label. Assail and Venom, like imidacloprid, are particularly effective against sucking insects such as leafhoppers.

Imidan. Regulatory changes for Imidan (phosmet) are currently in the works. Imidan, an organophosphate insecticide, is one of the more effective materials for controlling grape berry moth as well as other grape pests. Like other organophosphates, it has been under Food Quality Protection Act review by EPA. As a result, EPA is changing the re-entry interval (REI) from 24 hours to 14 days, effective in July. This is quite a long REI and likely to affect its use in grapes. Interestingly, REI for Imidan use on some other crops (e.g. blueberries) has not changed, largely because blueberry growers were quite vocal about its benefits. Gowan and the EPA plan to meet this fall to discuss the implications of this long REI for grapes, perhaps opening the door for re-evaluation if EPA learns of serious concerns from grape growers.

Miticides. Several new miticides have been labeled for use on grapes over the past couple of years. These include Agri-mek and ABBA (abamectin), Acaramite (bifenazate), and Nextar (pyridaben). This past year another miticide named Zeal (etoxazole) received an EPA label for grapes as well as a supplemental label for use in NY. The Zeal Miticide label currently lists only two-spotted spider mite and not European red mite (ERM) (same is true for abamectin). Valent is pursuing a 2 ee exemption for use against European red mite in NY (stay tuned). To make things a bit more confusing, Valent is changing the formulation of Zeal from a granular one to a wettable powder (called Zeal Miticide1). There should be a supplemental NY grape label for Zeal Miticide1 – we are currently checking to make sure this will be the case.

In other miticide news, Dupont is in the process of getting their miticide Savey DF (hexythiazox) labeled for use on grapes. Savey is specific to the egg and small instar mite stages

Avaunt. Finally, Dupont is likely to obtain a federal label for use of the insecticide Avaunt [indoxicarb] on grapes this year. Avaunt is in a new chemical class of insecticide 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 control of grape leafhopper and grape berry moth. Use of Avaunt in New York for grapes will depend on the outcome of a NYS DEC review, but this is not expected for the 2006 growing season.

Review of key arthropod pests. Over 20 insect and mite pests attack grapes in New York, although many of these are rarely abundant enough to be of economic concern. Here I will focus on the key grape pests that are most common. I will briefly review basic biology and damage symptoms, then discuss some of the control options available. More details can be found in the New York and Pennsylvania Pest Management Guidelines for Grapes: 2006 now available in print or online at http://ipmguidelines.org/grapes/.

I will present these pests in the order they appear in the vineyard during the season (budbreak, pre bloom, post bloom, and mid-season). Before proceeding, I want to note an important distinction between disease and arthropod (insects and mites) control programs. 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. Most fungicides are protectants that prevent infection rather than eradicate disease organisms. Insects and mites are generally detectable in the field before they cause economic injury and insecticides and miticides mostly work as eradicants. Hence, for arthropods its possible, and generally advisable, to monitor pest density (population level) and only apply control measures when economically justified.

Budswell to Bloom

Grape Cane Borer (GCB). 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, initial experimental results indicate tunnels may reduce yield on a cane. In many cases damaged canes can be removed at pruning, although this adds time to the process. GCB larvae develop in dead wood and do not cause economic damage to vines. However, these larvae grow into adults that bore into canes in the fall, so it makes sense to try and limit reproduction.

Because of the severe winters the last few years there may be a fair amount of dead wood in the grape canopy, on the vineyard floor, or in burn piles. These are all good food sources for GCB larvae. My sense is that destroying as much of this dead wood as possible before larvae have a chance to mature (end of July) would help reduce GCB adult populations in the fall, although we do not have a lot of data yet to back this up.

Adults become active as spring temperatures warm up and sap begins to flow - as early as budswell. Warm evenings increase activity. Egg laying starts around 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 adults in adults in order to reduce reproduction. In a 2004 trial in the Finger Lakes we found that three applications of Imidan 70W, starting at around budbreak and repeated at 10 day intervals significantly reduced damage from adults in the fall. However, in a repeat 2005 trial 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. We are still searching for an effective chemical control option. We have also examined whether removing and destroying dead wood from the canopy and vineyard floor during the spring reduces damage in the fall. We found some evidence that this helps. However, the process was labor intensive and therefore expensive. This season we plan to assess whether thorough chopping of pulled brush raked into row middles will reduce damage.

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 along the edges of the vineyard. Use about 2% bud damage as a threshold for treatment. Some hybrids with fruitful base buds can probably tolerate higher damage levels. After budbreak, adults do not cause additional injury. Later in the season adults lay eggs that hatch into larvae that do feed on grape leaves but this damage is not economically important. Several effective, broad-spectrum insecticides are labeled for steely beetle, 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. Banded grape bug (BGB) nymphs are greenish to brown in color with black and white banded antennae. Lygocoris nymphs are pale green with thin antennae and about half the size of BGB. Nymphs of both species feed on young clusters (buds, pedicel and rachis) before bloom, often reducing berry number and cluster size. Adults, which appear close to bloom, do not cause economic damage and BGB adults become predaceous on other insects. There is only one generation per season. Monitor for nymphs at about 5 inch shoot growth by examining flower buds on approximately 100 shoots along the edge and interior of vineyard blocks. Populations of 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. It is worth spending the time to check. Pay particular attention to vineyard edges. Several broad-spectrum insecticides are labeled for use against plant bugs (Sevin, Imidan, Danitol).

Grape Plume Moth. This potential grape pest 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 flower clusters get webbed and fed upon. This is where the potential for economic damage occurs. 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 yield for vines with 20% infested shoots compared to insecticide-treated control vines. Nevertheless, the trend was for reduced yield associated with high plume moth infestations (>20%). For higher value cultivars a 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 are protected from insecticides inside their leaf shelters. For these reasons, its important to monitor and treat for plume moth early in the season (before 10 inch shoot growth) using sufficient water to achieve good coverage. Sevin, Danitol, and Dipel (Baccillis thuringiensis or Bt) are labeled for use against grape plume moth.

Bloom to Mid-season

Grape Berry Moth. Grape berry moth (GBM), familiar to most grape growers in New York is considered our most important arthropod pest in Lake Erie and the Finger Lakes. 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 a pupa in the leaf litter, emerging as adults in May and June to produce 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 berries and 3) causing premature berry drop. Second, they contaminate the juice that 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 *Botrytis* bunch rot. This is particularly a serious problem for wine grapes, especially those with tight clusters.

GBM has been effectively managed 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) 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. 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. Many of the problems with GBM from 1999-2002 were from late-season egg-laying. Too often growers put their sprayers away in 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 applying an insecticide treatment for first generation (immediate post bloom) and scouting for GBM at the end of July and end of August. The current thresholds are 6% cluster damage for late-July and 15% at the end of August. These thresholds were developed for native grapes bound for 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.

Several insecticides are available for chemical control of GBM. Sevin is the most commonly used insecticide, but Danitol and Imidan are also effective broad-spectrum materials. Imidan is not quite as effective against leafhoppers as the other two. 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 consider when choosing an insecticide. Rotation among pesticides from different chemical classes will help forestall development of resistance. More and more growers are turning to pyrethoids (e.g. Danitol, Capture, now Baythroid outside of NY) for control of several different arthropod pests, including berry moth. They are effective but, as noted above, I have concerns that their overuse may lead to increased problems with spider mites.

Additional, more narrow-spectrum, materials are available for use against GBM. Dipel – whose active ingredient is a toxin produced by the *Bacillis thuringiensis* (Bt) bacteria is specific to Lepidoptera – is one option that has been around for a number of years. In our trials it has been less effective than the broad-spectrum insecticides but has the advantage that it conserves predators and parasitoids. 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 before they enter the berry for it to be effective. Good coverage is an issue for all the GBM materials.

Pheromone mating disruption is another control option to consider. The idea is to prevent mating by artificially releasing so much sex pheromone that males have difficulty locating 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 original 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 before 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 selec-

tive 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 (bloom instead of immediate post bloom, for example).

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. They complete 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 damage leaves by removing leaf cell contents using sucking mouthparts. Hence, moderate population densities can reduce photosynthesis, ripening and yields. With adequate soil moisture, vines can tolerate more injury than in dry years when there is water stress in addition to leafhopper injury. The last few years have been low grape leafhopper years, probably due to cold winters and cool temperatures during spring and early summer.

Sample for leafhoppers at the same times that you scout 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. Thus, sampling for leafhoppers at immediate post bloom is only necessary for low risk vineyards.

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.

Several insecticides are effective against leafhoppers. 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. Effective alternatives to Sevin include Danitol, Capture, 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 (0.5 oz.) was as effective as the full rate in controlling leafhoppers in our trials.

Potato Leafhopper. Potato leafhopper is quite distinct from grape leafhopper. It migrates each year from the southeastern US (it can not successfully overwinter in upstate NY) while grape leafhoppers overwinter in our area. Adults ride north on wind currents and usually arrive in our area sometime after bloom. When and where they arrive is not very predictable. 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 potato leafhopper right after the alfalfa is mowed. Adult potato leafhoppers are iridescent green and wedge-shaped. Nymphs are bright green and move sideways in a unique manner when disturbed. Instead of feeding on leaf cell contents like grape leafhoppers, potato leafhoppers use their sucking mouthparts to tap into the phloem vessels (the tubes used by plants to transport 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 distorted leaf and shoot development. *Vinifera* cultivars seem particularly sensitive as does the French-American hybrid Cayuga White, but Labrusca varieties also show symptoms. Feeding symptoms in grapes include leaves with yellow margins (or reddish for red Vinifera grapes) that cup downward. Often

these symptoms are noticed before the leafhoppers themselves.

Potato leafhopper 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. Potato leafhopper is mobile and several treatments may be required over the season as new infestations occur.

European Red Mite. Two species of spider mites 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. ERM eggs are red to brown red in color. Immatures and adults are pale brown to red. ERM are very small (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. *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, normally held in check by predatory mites. In other words, many outbreaks happen when their natural control by predatory mites is disrupted. Pesticides that harm predators but not spider mites are the most typical cause of disruption 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 (EBDCs), suppresses predatory mites. Repeated use of EBDCs 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 EBDCs. 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 pyrethoids like Danitol and Capture. One of the first things to watch out for is initially good suppression of mites followed by a resurgence indicating the spider mites recovered more quickly than the predatory mites. Paying attention to conserving predatory mites can pay economic dividends – miticides are quite expensive.

Several chemical options are now available for mite control in New York: Kelthane [dicofol], Vendex [fenbutatin-oxide], Agri-Mek, Nexter (previously sold as Pyramite; not registered for use on Long Island), Acramite, JMS Stylet Oil [aliphatic petroleum distillate], Zeal, Danitol and Capture. 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.

Trials conducted by Tim Martinson demonstrated that 3 early-season applications of JMS Stylet Oil, being used primarily for control of grape powdery mildew, also 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 mite and ERM. Acramite and Agri-Mek are relatively soft on beneficial arthropods. 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's 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, 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 adults have broad diets, larvae feed underground, 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. Adults emerge from the soil in mid-summer and begin feeding, then mate and lay eggs. 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 Sate 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 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*.

Several insecticides are 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, adult MALBs release 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 in shows up during a given year and from year to year. Vineyards in the Niagara Peninsula in Canada appear particularly vulnerable. Vineyards adjacent to soybeans in a year when soybean aphid is abundant 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 feeding on clusters. You can recognize MALB by the black markings directly behind the head that look like an M or W 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.

If you do end up with a problem, there are a few chemical approaches you can try. Note that we have yet developed a good estimate of the economic threshold for MALB. There are several pesticides now labeled for MALB: Sevin [carbaryl], Danitol [fenropathrin], 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 2006 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 last year by Tim Weigle, Evergreen appears to have both toxic and repellent effects on MALB. Note that Danitol has a 21day PHI, Sevin has a 7 day PHI 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 arthropods pests of grapes and it is possible to get overwhelmed with information on biology, symp-

toms, 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 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 before it develops.

- 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 and climbing cutworm at budswell; plant bugs and plume moths when shoots are between 5 and 10 inches; grape rootworm, 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 makes copies for you.

Although the FQPA review process is starting to limit the use of some materials, for the most part, we have good chemical control options available. 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.

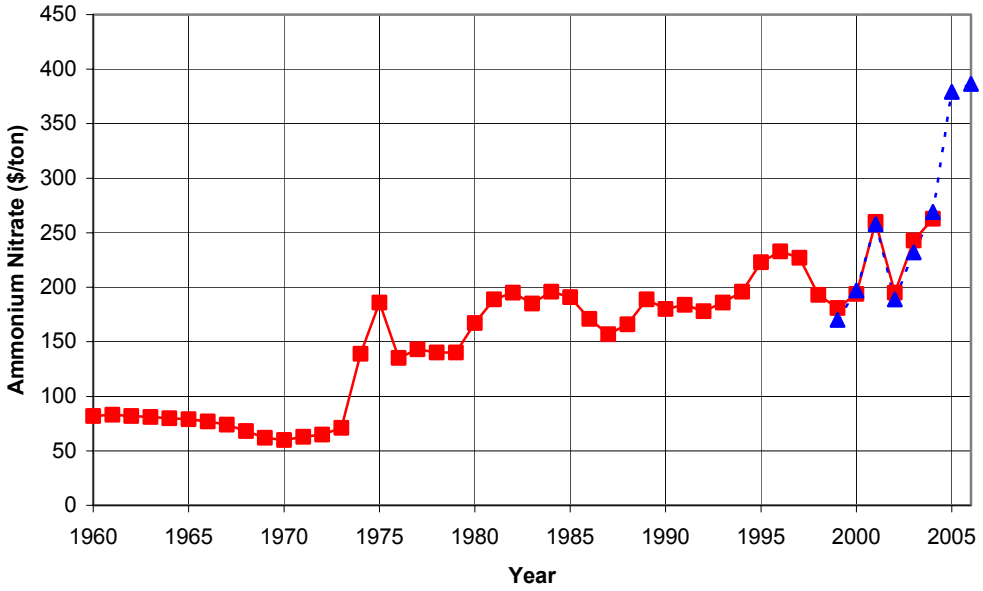
Rising Cost of Ammonium Nitrate

Jamie Hawk
Finger Lakes Grape Program

Ammonium nitrate prices are at historical highs. The production costs of nitrogen fertilizers are tied directly to natural gas prices, so as natural gas becomes more expensive, so too do nitrogen fertilizers. Figure 1 details the increase from 1960 to the present with data from the USDA (squares/solid line 1960-2004) and a Finger Lakes supply company (triangles/dotted line 1999-2006). The 2005 and 2006 costs have been adjusted for the switch to the calcium-coated form (27.5% actual N vs. 33.5-34% for the non-coated form).

At its current price (about $315/ton at 27.5% actual N), ammonium nitrate costs $0.57/lb actual. The key to minimizing costs as prices escalate is efficient, tailored nitrogen use. For example, a grower with 100 acres that is able to reduce application rates by 30 lb/acre would see a potential savings of $1,710, likely without any reduction in yield or vine size.

Figure 1. *Prices (per ton) for Ammonium Nitrate in the Finger Lakes, 1960 to 2006.*



Upcoming Events

May 18. *Spring Pest Management Field Day.* Lakewood Vineyards, Watkins Glen. See article in this newsletter. 3 Pesticide credits. Preregistration required.

July 11-13. *American Society of Enology and Viticulture Eastern Section.* Rochester, NY. Meeting will feature official release of new cultivars from Bruce Reisch's program, and an update on multicolored Asian lady beetle. Details in next month's newsletter

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