FINGER LAKES
Vineyard Notes
June 2015
Cornell University
Cooperative Extension
Finger Lakes Grape Program

Grape Insect and Mite Pests
Highlights For the 2015 Field Season

Greg Loeb
Department of Entomology
Cornell University
New York State Agricultural Experiment Station
Geneva, NY 14456

Rather than proving an exhaustive review this year of the important arthropod pests of grapes in our area, I decided to zero in on a relatively few species where there is either new information available or I want to re-enforce things I and other extension educators have been discussing recently. For a more comprehensive review, you can see my 2014 review at the following web site: http://www.fruit.cornell.edu/grape/pdfs/Loeb-Grape%20Insect%20Mite%20Pests%202014.pdf.

Update from NY and Pennsylvania Grape Guidelines and other chemical news

There are very few important changes to the arthropod components of the grape guidelines for 2015. NY DEC has granted 2(ee) exemptions for four insecticides labeled on grapes in NY for grape rootworm. These are 1) Sniper (a synthetic pyrethroid, active ingredient = bifenthrin, EPA # 34704-858), 2) Leverage 360 (a combination of a synthetic pyrethroid [cyfluthrin] and neonicotinoid [imidacloprid], EPA # 264-1104), 3) Danitol 2.4 EC 9 (also a pyrethroid, fenpropathrin, EPA # 59639-35) and 4) Admire Pro (a neonicotinoid, imidacloprid, EPA # 264-827). Prior to these exemptions, Sevin [carbaryl] was the only insecticide labeled for control of grape rootworm. See section below for an update on ongoing entomological research on this pest, which is resurging in some areas of the Lake Erie grape belt.

Review of key arthropod pests

Plant bugs

As I am writing this article (beginning of June), we have moved past the risk period of several insect pests of grapes (grape steely beetle and cutworm larvae) and soon will get past the risk from several other potential early-season pests (banded grape bug, *Lygocoris* bug, grape plume moth). These insects are only a threat up to bloom. If your grapes have not reached bloom stage, it still might be worth scouting clusters at this time for plant bugs (banded or *Lygocoris*). Both species overwinter as eggs, presumably on

Fig. 1 Photo: J. Ogrodnick

Fig. 2 Lygocoris. Photo: J. Ogrodnick

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 (see Fig. 1). Nymphs of *Lygocoris* are pale green with thin antennae (Fig. 2) and about half the size of BGB. Nymphs of both species **can** cause serious 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 species (BGB), become predaceous on small arthropods. There is only one generation per season. Monitor for nymphs 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. If present at relatively low numbers (1 nymph per 10 shoots), they can cause significant yield reductions and hence it is worth the time to check. Pay particular attention to vineyard edges. Remember, though, if you are already at bloom, it is too late to treat. There are several insecticides labeled for use against plant bugs (Imidan [phosmet], Danitol 2.4 EC, and Assail 30 SG [acetamiprid]).

Grape Phylloxera

The next insect pest I want to address is grape phylloxera, both the leaf gall form and the root form. Leaf galls are in the shape of pouches or invaginations and can contain several adults and hundreds of eggs or immature stages. Root galls are swellings on the root, sometimes showing a hook shape where the grape phylloxera feed at the elbow of the hook. At high densities, leaf galls can cause reduced photosynthesis. Root galls likely reduce root growth, 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-type grapes 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. We believe many of the *V. vinifera* interspecific hybrid wine grapes grown in the region also get some galling on roots, although we know less about their impact on vine productivity. We have done research, discussed in previous years, on the benefit of treating Concord vines with the systemic insecticide Movento [spirotetramat] to reduce root galls in terms of vine growth and yield. Overall, after several years of treating mature Concord vines with Movento, we observed modest yield benefits. One of the questions we would like to explore in the future is to assess the benefits of treating root-form phylloxera for some of the interspecific hybrids. Stay tuned.

There are a couple of insecticides labeled for the control of leaf-form grape phylloxera, although we do not have a well-defined treatment threshold at this time. The neonicotinoid Assail SG and the pyrethroid Danitol 2.4 EC (fenpropathrin) are also labeled for the leaf-form of grape phylloxera as is the systemic insecticide Movento. Soil applied Admire Pro is also systemic to the foliage and therefore will provide control of leaf-form phylloxera as well as some other sucking insects such as leafhoppers. Similarly, the neonicotinoid Platinum [thiamethoxam] is also labeled against 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.

Imidacloprid applied to the soil/root zone (e.g. Admire Pro) is labeled for the grape phylloxera as is Platinum and can provide some control, especially when applied through a drip system. Movento [spirotetramat], applied as a foliar spray, has also shown some reasonably good efficacy on root-form phylloxera in our trials both with *V. vinifera* vines, but also with concord.

Grape Rootworm

Grape rootworm was a key pest of grapes in NY and surrounding areas in the early 1900s. Since the sixties, broad-spectrum insecticides targeting grape berry moth greatly reduced the impact of grape rootworm. However, with the use of more selective materials and less use of insecticide overall in recent years, growers are observing more evidence of this pest, especially in the Lake Erie Region. Grape rootworm is a beetle in the Family Chrysomelidae (flea beetle family). The adult (Fig 3) feeds on leaf material, creating characteristic chain like feeding damage (Fig 4). This damage is not conomically significant. The adults emerge over the middle part of the season, starting around bloom time. After an initial bout of leaf feeding, they mate and the females lay clusters of eggs on older canes, often under loose bark. The eggs hatch and the larvae drop to the ground where they work their way into the soil to find fine grape roots to feed on. Feeding damage by larger larvae cause reduced vine growth and vigor, increased vulnerability to stress, and reduced yields.


Fig. 3

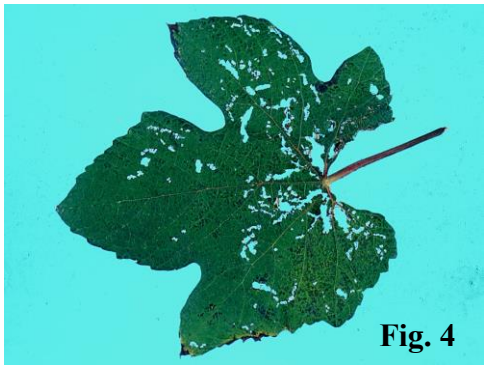
Fig. 4

As noted above, we now have five different insecticides labeled to control grape rootworm: Sevin, Sniper (2ee), Danitol 2.4 EC (2ee), Leverage 360 (2ee), and Admire Pro (2ee). Even though the adult stage does not cause significant damage to vines, it is the target of the insecticides to prevent egg laying and larval infestation. Female grape rootworm require a week or two pre-oviposition period (time when they feed and mate, but don't lay eggs), and hence, knowing when adults have emerged from the ground is critical to successful chemical control. Generally speaking, they emerge around bloom and continue to emerge over several weeks. Tim Weigle, NYS IPM Program, and I have initiated a new project to better characterize the timing of emergence, determine degree-day estimates for first and peak abundance, and compare the efficacy of different timings for insecticide treatments. Specifically, we want to determine if use of back to back sprays, starting at first detection of adults, provides significantly better control of damage than spraying once either at the start or in the middle time period of adult emergence. We also will be testing the use of entomopathogenic nematodes against grape rootworm larvae to see if this is a viable biological control option. Hopefully we will be in position to report on our results before the next field season. In the meantime, we recommend you scout for adult feeding damage around bloom for evidence of adult activity. Also, continue to follow email alerts from the regional grape programs. We are fast approaching the timing of adult emergence.

Soft Scales and Mealybugs

Soft scales and mealybugs are sucking insects that spend part of their life-cycle on the canes or the trunk and part out on leaves or fruit. At high densities they can reduce vine vigor or contaminate grape clusters with their sugary excrement, which supports the development of sooty mold. However, the major concern with soft scales and mealybugs in our area relates to their potential to vector leafroll viruses, a serious disease of grapevines (a fact sheet on leafroll virus is available at http://nysipm.cornell.edu/factsheets/grapes/diseases/grape_leafroll.pdf). Soft scales in our area overwinter on canes as large immatures or young adults. At this stage they vary in shape and color but are typically brown or gray and look like bumps or large scales on the canes. They have limited ability to move at this stage. As the spring progresses they complete development, mate and begin laying eggs (mid-May to early-June), often many hundreds to over a thousand per female. The eggs hatch into mobile crawlers that disperse out on to the foliage to feed. Most of the species of soft scales in our area have just one generation per year. As they mature during the season they move back to the canes to overwinter.

Fig. 5 Photo: S. Hesler

Grape mealybug overwinters on canes or trunks as crawlers (first immature stage after hatching from eggs), moving out from trunk wood to first or second year wood in spring (at budswell, see Fig 5). These crawlers like to hide under loose or cracked bark; look where one-year canes have been bent over trellis wire. As they become adults they move back to the trunk region to lay eggs (around mid-June). The first instar crawlers (summer generation) are observed around the beginning of July. These crawlers go on to mature, being found on various tissue including clusters. As they become adults they migrate back to the trunk regions to lay eggs, which mostly hatch and then spend the winter as first instar crawlers.

Dr. Marc Fuchs, virologist at NYSAES, has evidence that grape leafroll disease has increased within a vineyard over time in a minority of vineyard blocks in the Finger Lakes indicating that insect vectors are likely responsible. Moreover, the causal viruses have been detected in both grape mealybug and soft scale collected from Finger Lakes vineyards. The insects feed on plant phloem and in the process acquires the virus. For this virus-insect relationship, the virus needs to be re-acquired after each molt (shedding of the insect exoskeleton as it grows). Research indicates the crawler stage is the most efficient at transmitting the virus, but other stages likely have the capacity to transmit as well. Note that the virus is not passed on to the eggs from the female. The newly hatched crawler must acquire the virus when it feeds to be able to transmit to virus. Once acquired from an infected plant, if the insect moves on to an uninfected vine before it molts, it can spread the disease. Since crawlers are the most active stage of both mealybugs and soft scale, they are the most likely stage to spread the disease.

Marc and I were interested to determine when during the season mealybugs became infected with virus so we collected them through the season from a vineyard that had a very high infection rate, starting in the fall with overwintering crawlers and through the next season. In November, crawlers did not show any evidence of the virus. This confirms our supposition that after hatching, the crawlers do not move much or feed. However, we were somewhat surprised to discover that in April/earl May the now overwintered crawlers were infected at high levels (>70%) suggesting they had fed on the vine and acquired the virus sometime between late fall and late April prior to budbreak. We went on to

show that these crawlers are capable of transmitting the virus to uninfected vines in the greenhouse. We speculate that the crawlers may be particularly important in spreading the virus within a vineyard during the spring since there is little or no foliage to impede movement from vine to vine.

Can insecticide be used to slow the spread of leafroll disease within a vineyard? This is an important question that we are beginning to get some answers to. Experiments conducted over the past several years suggest that using an effective insecticide against grape mealybug, such as Movento, can slow, but not stop, the spread to some degree. The results were not overwhelming, however, and disappeared the year after we stopped applying Movento. It's possible, though, that combining an effective insecticide control with roguing (removing of infected vines) when infection levels in the vineyard are relatively low (less than 25%) may be cost effective. This is something we hope to test in the future.

There are two windows of opportunity for controlling soft scale and mealybugs with non-systemic insecticides (e.g. pyrethroids, foliar applied neonicotinoids). The first window is during the spring just before budbreak where the target is the overwintering stage. Dormant oil is often recommended at this time. The idea is the oil will smother the scale or mealybug. We have not tested oil against soft scale, although I suspect it would be effective since the soft scale overwinter out on the canes where they are more exposed and research done by other entomologists supports this. We obtained some data on efficacy of dormant oil just prior to budbreak for mealybug crawlers, however. Although we saw a decrease in mealybug numbers initially, overall it was not very effective, I believe because the overwintered crawlers are often well protected under bark on the trunk and canes at the time the oil is applied. Some of the other contact insecticides may be more effective at this time than oil, but we still need to conduct the trials. The second window is the crawler stage of the first generation. This occurs in mid or late June for soft scale and late June to early July for grape mealybug. The crawler stage is the most mobile stage and hence, you have the best chance of contacting them with insecticides. To make certain of timing, you can check underneath soft scales on canes in June or examine mealybug egg masses under loose bark on the trunk in later June with a hand lens and look for crawlers. In future research, we would like to examine the effectiveness of treating the crawler stage early in the season with a contact insecticide in combination with Movento during the growing season.

During the growing season carbaryl is labeled for European fruit lecanium, a species of soft scale on grapes known to transmit grape leafroll, and an insect growth regulator called Applaud [buprofezin] is labeled for both soft scale and mealybugs. *Note that Applaud is not legal to use on Long Island*. A number of additional insecticides are labeled for mealybugs but not soft scales including Movento, Admire Pro, Assail, Brigadier [bifenthin, imidacloprid and other active ingredients], Leverage 360, Portal [fenpyroximate], Baythroid [cyfluthrin] and Imidan.

Grape Berry Moth

This is a familiar insect pest to most grape growers in our region and I don't have a lot new to add here. However, I did want to provide an update/reminder about the use of the degree-day phenology model to assist in determining the timing of the different generations of grape berry moth during the season. Recall that in our area, we see 2 to 4 generations of this pest. Also recall that once the larva of this moth gets inside the berry, it is hard to reach with insecticides. Hence, determining the exact timing of egg laying for these different generations, especially the second and third flights, is important.

As I write this, we are fast approaching grape bloom and for vineyards at very high risk of grape berry moth damage, we continue to recommend an insecticide at around 10 days post bloom, which matches up pretty well with the timing of egg laying of the first flight of overwintered insects. The trick is determining the timing of egg laying for subsequent flights. We have developed a degree day model to help with this determination, available via a web-based system (Network for Environment and Weather Applications) found at the following web site (http://newa.cornell.edu/ and look under pest forecasts, grapes, grape berry moth).

To use the model, you need to provide a starting point to begin accumulating degree-days. We have found bloom date of the wild grape *V. riparia* is a pretty good indicator or biofix. The program asks that you provide a date for 50% bloom time of *V. riparia*. For my area around Geneva, NY, we observed bloom of wild grape this year on 26 May. The model actually does a pretty good job of estimating bloom date of wild grape. This year it estimated it as May 28 for Geneva. Based on the biofix, the model accumulates degree days using the nearest NEWA weather station (you choose the weather station on the web site; several new weather stations in New York and surrounding states have been added to the system recently). At any given date, the model will provide the degree-day accumulations from the biofix, a forecast of accumulation over the next several days, and pest management advice based on current accumulations. For example, as accumulation gets close to 810 degree days, the program notes that this is approaching the peak of the second GBM generation eggs and you are advised to apply an insecticide at near 810 for a high risk site and to scout for damage for low or intermediate risk sites. The NEWA forecast makes a distinction between insecticides that need to be consumed (e.g. Altacor [chlorantraniliprole], Belt [flubendiamide], and Intrepid [methoxyfenozide] (not allowed NY on grapes)) and those that work mostly through contact (e.g. Brigade, Danitol, Baythroid, Sevin). Note that this model should be used only as a guide for making pest management decisions. However, it's an improvement over the calendar-based practice. If you have questions on using the grape berry moth phenology model, please let me (gme1@cornell.edu), Tim Weigle (thw4@cornell.edu) or Juliet Carroll (jec3@cornell.edu) know.

Spotted Wing Drosophila.

Spotted Wing Drosophila (SWD) (also known as *Drosphila suzukii,* Fig 6) is a new invasive fruit fly that looks superficially like your everyday vinegar fly *Drosophila melanogaster* of genetics fame. The name comes from the spots at the end of the wings in the male. Note the female SWD lacks these spots. Female vinegar flies typically lay eggs in damaged and/or overripe fruit. On the other hand, female SWD have very robust ovipositors (the rear end portion of the fly used for egg laying, Fig 7) and will lay their eggs in ripe, marketable fruit leading to damage and contamination with maggots.

Photo: M. Hauser

Fig. 6 adult male SWD

Fig. 7 Photo: M. Hauser

SWD first was detected in NY in 2011, and since then has caused wide spread damage to vulnerable fruit crops like blueberries and raspberries. Research by several of us in the eastern US indicates that SWD females will lay eggs in some

cultivars of grape but this does not seem to be a common event in undamaged berries. Although the risk of direct damage by SWD to grapes seems relatively minor, we do have concerns about its potential, along with other fruit flies, in causing and spreading sour rot. Collaborative research between my lab and Cornell University plant pathologist Wayne Wilcox's lab is under way to evaluate the role fruit flies have in sour rot and whether targeting fruit flies with insecticides near harvest can be beneficial. Stay tuned for more details but it does seem clear that Drosophila fruit flies, in combination with damaged, ripe fruit of susceptible cultivars and suitable weather conditions, contributes to the problem. Our research should help us to identify under what conditions fruit is at risk of developing sour rot and which tactics are effective in managing the disease. For more information on SWD visit http://www.fruit.cornell.edu/spottedwing/. Adult SWD are susceptible to a number of different insecticides including organophosphates (e.g. malathion), pyrethroids (e.g. Mustang Max [zeta-cypermethrin]) and spinosad type insecticides (e.g. Delegate [spinetoram] or an organic alternative, Entrust [spinosad]). Since fruit flies are only a threat near harvest, insecticides with relatively short DTH restrictions are the most helpful.

Summary and Final Comments

There is a seasonality (or phenology) to grape insect pests and checking the electronic updates from your regional grape extension programs is an excellent way to stay on top of what you should be on the lookout for during the season. This article was not a comprehensive review of all relevant insect pests that might present problems in 2015. Rather, I focused on insects that could be problematic from pre-bloom to harvest and where there was some new information to convey. For a more comprehensive review, you can see my 2014 review at the following web site: http://www.fruit.cornell.edu/grape/pdfs/Loeb-Grape%20Insect%20Mite%20Pests%202014.pdf.

Monitoring for insect pests is generally recommended as a way to detect problems while there is time to do something to minimize economic damage and to avoid spending money on control measures if the pest is not causing economic damage. We generally have good chemical control options available for most arthropod pests if necessary. But also keep in mind that natural enemies are present in many vineyards and that they help keep pest populations below economically damaging levels. One way to maintain good populations of natural enemies in your vineyard is the judicious use of chemical control. When using insecticides pay attention to label restrictions and review recommendations in the pest management guidelines. Rotate among materials with different modes of action to reduce development of resistance. If you have questions or concerns please let me know.

Got some grapes to sell? Looking to buy some equipment or bulk wine? List your ad on the NY Grape & Wine Classifieds website today!

Become a fan of the Finger Lakes Grape Program on Facebook, or follow us on Twitter (@cceflgp). Also check out our website, at http://flg.cce.cornell.edu.

Cornell Cooperative Extension is an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities and provides equal program and employment opportunities

finger lakes grape program

FINGER LAKES VINEYARD UPDATE
Is published by
Cornell Cooperative Extension
Finger Lakes Grape Program
Ontario, Schuyler, Seneca, Steuben, Wayne and Yates