Subject: New England Grape Notes – May 4, 20018
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New England Grape Notes – May 4, 2018

UMass Extension
CENTER FOR AGRICULTURE

Mealybugs and Soft Scales

Alice Wise & Faruque Zaman, Cornell Coop Ext. Suffolk County

We have been seeing these in local vineyards for a long time now. Often one clue is the presence of ants who lovingly tend them and enjoy the honeydew that the insects secret. Sometimes we see ants in the research vineyard feasting on sap coming from the cut ends of canes. It is likely that they are also tending MB and SS. In the research vineyard, we have seen light infestations of grape mealybug (MB) and moderate infestations of fruit lecanium scale (FLS) under the bark on trunks and on canes. With the warm weather, it is likely that large immature or adult MB are roaming around on vines right now and will continue until mid-June before returning to the trunk area to lay eggs.

To monitor vines, use double sided sticky tape. Place around the trunk (head area near the wire), canes and cordons. Entomologist Faruque Zaman has offered to inspect tape that is dropped at the LIHREC office. FLS overwinters as late stage immatures or young adults and look like bumps on the cane. Their movement is limited right now; however, newly hatched SS will start moving in early June.

Why worry about these insects? Mealybugs occasionally infest clusters close to harvest. When infestations are heavier, sooty mold grows on the honeydew secreted by the MB's. This can be quite messy and fruit may have to be sorted prior to processing. In addition, based on recent research, Cornell entomologist Greg Loeb and virologist Marc Fuchs have determined that, in some blocks, MB's may contribute to the spread of leaf roll virus. FLS may be involved as well (anecdotal observation - they are much more numerous in the LIHREC vineyard and leaf roll is spreading). This is an important point as many blocks – including the research vineyard – have experienced an increase in vines with leaf roll symptoms. Currently, it is not known if either insect spreads red blotch virus. Regardless, these creatures merit our attention and we need to try to understand the degree of infestation in our vineyards. The UC Dept of Natural Resources has put out several well-done scouting videos: Monitoring for scale: http://www.youtube.com/watch?v=QtPNxIDLVk4; monitoring for mealybug: http://www.youtube.com/watch?v=YgL4BMK8PGg. A hand lens might be helpful for some. Next week – key phenology times, control and a description of a new research project on MB and FLS. (***Source**: LI Fruit & Vegetable Update #4, April 26, 2018*)

Grape Berry Moth – A Serious Pest of Table Grapes in Pennsylvania

Andy Muza, Penn State

Grape Berry Moth (GBM) is an insect in the Order: Lepidoptera (moths and butterflies) and Family: Tortricidae. It is native to the eastern United States and has evolved with wild grapes (e.g., Vitis riparia). GBM larvae feed on berries of grapevines which are spread throughout eastern woodlands. As commercial vineyards are being planted in counties across the state this insect will readily take advantage of the newly available food sources.

GBM is considered a serious pest of grapes throughout Pennsylvania and the eastern U.S. The larval stage feeds on berries and causes yield losses due to: consumption and shelling of berries, and by providing entry sites for fungi (e.g., Botrytis) that can cause cluster rots.

Usually when I discuss GBM with growers I am referring to management of this pest in juice and wine grape varieties. However, this insect can also cause substantial economic losses in table grape varieties particularly due to the economic value and lower tolerance for injury levels associated with these varieties. But GBM management is basically the same regardless of varieties grown. The caveat is that more insecticide applications are often required but economically justified for higher value varieties (i.e., table and wine

grapes). I consider management of this pest to be a three phase process which includes:

1. Pre - Treatment Phase
2. Treatment Phase
3. Post - Treatment Phase

Pre-Treatment Phase

Sprayer Maintenance - Follow maintenance procedures outlined in your sprayer manual. Check pump, hoses, filters, nozzles, etc. to be sure that everything is in good working order before your first pesticide application. Also practice routine sprayer maintenance during the season such as lubrication of bearings and cleaning and flushing of the sprayer after each use.

Calibration of Sprayer - Sprayers should be calibrated early in the season well before any insecticide or fungicide spraying is required. Calibration of sprayers ensures that the appropriate amount of spray material is being applied where it is needed to manage pests. The sprayer should be calibrated in the vineyard under conditions in which the sprayer will be operated. Ideally, sprayers should be calibrated 2-3 times during the season as canopy growth increases.

Classifying a Vineyard Using the GBM Risk Assessment Program - The GBM Risk Assessment Program was developed by Hoffman and Dennehy (Cornell University), Bulletin 138, Risk Assessment of Grape Berry Moth and Guidelines for Management of the Eastern Grape Leafhopper. It is a method of classifying vineyard blocks for risk (e.g., High, Low or Intermediate) of receiving damage from grape berry moth. The criteria used for assigning risk include: Value of the varieties being grown; Surrounding Vineyard Habitat; History of GBM injury; Climatic factors related to the region where grapes are being grown.

High Risk Classification

VALUE OF THE VARIETIES BEING GROWN
If higher value varieties such as table grapes, *Vitis vinifera*, or hybrids are being grown then these vineyards should automatically be assigned a High Risk Classification. Therefore most vineyards in Pennsylvania, outside of the Lake Erie Region, should initially be classified as High Risk. This classification can be adjusted later if scouting history reveals that GBM injury is consistently low at your vineyard site.
SURROUNDING VINEYARD HABITAT
If wooded edges or hedgerows/weedy areas are present around vineyards.
HISTORY OF GBM INJURY
If scouting reveals that damage is often above 6% cluster damage in July and/or above 15 % cluster damage (2% berry damage) at harvest. These injury levels were developed with processed juice grape varieties in mind and tolerable injury levels are likely much lower for table grape varieties.
CLIMATIC FACTORS RELATED TO THE REGION
If a region has prolonged winter snow cover or mild winter temperatures.

Low Risk Classification

VALUE OF THE VARIETIES BEING GROWN
If lower value varieties (e.g., juice grapes) are being grown. Surrounding Vineyard Habitat - if no wooded edges or hedgerows/weedy areas are present around vineyards.
HISTORY OF GBM INJURY
If vineyards seldom have problems with GBM. The history of GBM injury for each site is acquired by maintaining scouting records of vineyards over the years.
CLIMATIC FACTORS RELATED TO THE REGION
If permanent snow cover is rare and site is prone to severe winter temperatures.

Intermediate Risk Classification

Is a catch all classification. If it isn't High or Low risk then site is classified as Intermediate risk.

Life cycle and description of GBM

Knowledge about the life cycle and ability to identify the pest and injury caused is important for successful management. Moths emerge from the overwintering pupal stage in spring. Emergence in Erie County, Pa. occurs in late May but in other areas of the state this may occur 2 -3 weeks earlier. These moths are small (about 6 mm), brownish with grey-blue coloration at the base of wings (Figure 1). Unless pheromone traps are used it is unlikely that moths will be observed. Adults are active around dusk and have a distinctive zig zag pattern in flight. Mated females lay eggs singly on flower clusters or berries. Eggs are very small (<1mm), scale-like and whitish, opaque (Figure 2). Due to their size, eggs are difficult to observe without a hand lens. Early in the season larvae hatching from eggs will web together small berries to feed. However, when berries reach about 5 - 7 mm in size, larvae will bore directly into berries to feed.

Figure 2. Grape berry moth eggs on Concord cluster. Photo: Andy Muza, Penn State

Newly hatched larvae are tiny with white bodies and black head capsules. Later stages are brownish to purple in coloration (Figure 3). Upon completing development larvae exit berries and either drop to the ground to pupate in leaf litter or some will pupate in the canopy in a semicircular leaf flap. Pupae which are encased in leaf sections are light brown to greenish in coloration (5 mm).

Figure 3. Grape berry moth mature larva on berry. Photo found at: Grape Berry Moth fact sheet.

Leaves with pupae will remain underneath the trellis if there is poor weed control or will be moved by the wind and collect along wood edges, or in brushy areas. Adults will emerge from pupae to begin the next generation. There are usually 3 - 4 generations of GBM per year in Pennsylvania, depending on temperatures during the growing season.

Scouting

Regular scouting throughout the season (at least weekly) is critical in determining if and where applications should be applied for GBM. A scouting protocol for GBM is described in "Bulletin 138, Risk Assessment of Grape Berry Moth and Guidelines for Management of the Eastern Grape Leafhopper" which was previously mentioned. This protocol recommends selecting four different areas in your vineyard to be sampled during each scouting event. Two different areas should be checked in the interior of the vineyard and two different areas along the exterior (border) portions of the vineyard. At each of the four sampling sites, randomly select 5 vines and examine 10 clusters/vine for GBM injury. Determine separate injury levels (# injured clusters/100 clusters = % injured clusters) for the interior and exterior portions of the vineyard. It is important to keep separate injury levels for the interior and exterior areas because border areas near woodlines/hedgerows will usually have higher levels of injury. Therefore, border areas may need an insecticide application while interior areas may not.

When scouting early in the season look for webbing in the clusters (Figure 4). Until berries are large enough to enter, larvae will web together multiple berries and feed from inside webbing sites.

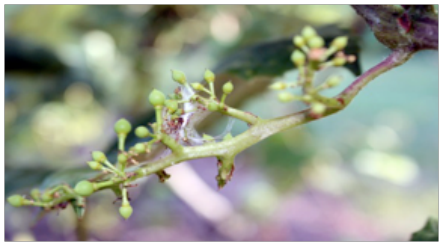

Figure 4. Webbing in cluster from GBM larva. Photo: Andy Muza, Penn State

Some varieties (e.g., Concord) may exhibit a distinct reddening of portions of the berry if injury occurs before veraison (Figure 5) while other varieties do not (Figure 6).

Figure 5. Reddening of Concord berries caused by GBM injury. Photo: Andy Muza, Penn State

Figure 6. Late season GBM injury on Concord berries. Photo: Andy Muza, Penn State

Later in the season look for holes, splits, webbing or dark tunneling underneath berry skin (Figure 7). If injured berries are broken open then larvae may be found.

Figure 7. GBM entry holes in Niagara berries. Photo: Andy Muza, Penn State

Map vineyards and keep scouting records

Develop detailed maps of your vineyards and surrounding topography. Keep records of GBM injury levels for each scouting date and vineyard sections checked. These records will provide a GBM history per site.

Pheromone Traps - GBM flight periods can be monitored using commercially available pheromone traps (Figure 8). Traps and pheromone caps can be purchased from a number of sources such as at Great Lakes IPM, Inc. and Scentry Biologicals, Inc.

Figure 8. Pheromone trap for monitoring GBM flight periods. Photo: Andy Muza, Penn State

Monitoring traps are baited with small rubber lures impregnated with GBM female sex pheromone for attracting male moths. Pheromone traps may provide an idea of population levels at your vineyard site and can be used as a scouting tool to indicate flight periods. However, trap data are not used for timing of spray applications due to ambiguity concerning correlation of capture numbers and berry injury levels.

Cultural Practices

Cultural practices are integral for any integrated pest management program. Therefore, maintain good weed control under the trellis. Poor weed management resulting in excessive vegetation under the vines can harbor grape berry moth (GBM) pupae. Viticultural practices that promote a more open, less dense canopy resulting in better exposure of clusters to sunlight (e.g., shoot thinning, leaf removal, judicious use of nitrogen) will not only improve quality of fruit but will enable better spray coverage. Vineyard area maintenance such as preventing overgrown, weedy areas around the vineyard will reduce overwintering sites for GBM pupae. If possible, removal of wild grapevines near the vineyard will decrease potential reservoir sites.

Treatment Phase

Spray Timing

- To accurately time insecticide applications it is recommended that the Grape Berry Moth Degree-Day Model be used. The GBM DD Model is a temperature-driven developmental model developed by Tobin and Saunders at Penn State. This model is incorporated into Cornell's Network for Environmental and Weather Applications (NEWA). Collaborative research at Penn State, Cornell and Michigan State Universities has shown that use of this developmental model can improve GBM management.
- For a comprehensive explanation concerning the development and use of this forecasting model consult

Focus on Females Provides New Insights for Grape Berry Moth Management, Issue 14, May 2013.

Use of the GBM DD Model:

- Check the NEWA weather station closest to your vineyard. There are a number of NEWA weather stations located throughout Pennsylvania. However, the majority of vineyards outside Erie County, PA will probably not be close enough (i.e., within a few miles) to a NEWA station for this option to be useful. But you can still use the GBM DD Model by recording daily maximum and minimum temperature data on your own. Options include either purchasing a max/min thermometer or weather station for your site. The RainWise AgroMET & IP-100 Package is the authorized choice for participation into the NEWA network.
- Monitor and record the date of wild grape bloom (i.e., when approximately 50% of flowers open) for each vineyard site. Research has shown that egg laying by females that emerge in the spring (first generation) is closely associated with bloom of wild grapevines. Therefore, the majority of eggs from this generation are laid on wild grape clusters and not in cultivated vineyards.
- Note: If using a NEWA site then enter the date of wild grape bloom into the model. If you do not record a wild grape bloom date for your site then the model does provide an estimated date for the weather station that is used.
- Track GBM degree days using a NEWA station closest to your vineyard site OR keep a running total throughout the season of GBM degree days [(Daily MAX + MIN Temperatures)/2) - 47.14 F] starting on the recorded date of wild grape bloom.

Scout to determine injury levels.

- Spray (if needed) as close to the designated degree day timings as possible.
- The model recommends an insecticide treatment in high and possibly intermediate risk sites when: 810 GBM degree days are accumulated for the second generation; 1620 GBM degree days for the third generation; and 2430 GBM degree days (if harvest has not yet occurred) in years that a fourth generation occurs. Insecticides such as Intrepid, Altacor, and Delegate are suggested for these timings.
- If using broad spectrum contact insecticides (e.g., pyrethroids) then applications should be delayed about 100 GBM degree days for each generation (i.e., 910, 1720, 2530 GBM degree days).

Insecticide Choices/Application Practices

- There are numerous insecticides effective for GBM which are registered for use in Pennsylvania. Consult the 2017 New York and Pennsylvania Pest Management Guidelines for Grapes.
- Rotate insecticides with different modes of action into your GBM spray program to prevent/delay insecticide resistance. Read the label to determine if a spray adjuvant and/or pH adjustment to spray water is required. Also, incorporate more selective insecticides (e.g., Intrepid, Altacor, Delegate) into your spray program which will aid in conserving natural enemies. Good spray coverage on clusters is critical. Therefore, spray every row and use appropriate gallonage, speed, pressure, and nozzles for good cluster coverage as the size of the canopy increases throughout the season.

Post-Treatment Phase

Evaluate efficacy of applications

Don't assume that because an insecticide was applied that GBM was controlled. After an insecticide application check areas that were sprayed to determine the effectiveness of the application. High Risk sites in Erie County, PA, with extremely high GBM population levels, have benefited from back to back applications (about 10 days apart) per generation. Table grape sites with high GBM pressure should plan on back to back applications per generation.

Continue to Scout

Monitoring your vineyard(s) not only for GBM but also for other insects, diseases and weeds should continue through harvest.

Keep Accurate Records

Accurate records should be kept each season for: scouting (e.g., dates, pests observed, vineyard location

where observed, injury levels); pesticide applications (e.g., pesticides used, rates/acre, gallons/acre applied, etc.) and weather data.

Re - examine management practices
At the end of the season, especially if GBM was not adequately controlled, re - examine management practices by reviewing your records. A few factors to consider that contribute to poor control include: Inadequate Spray Coverage; Inaccurate Spray Timing; Too Few Applications; and Choice of Insecticides.

Change/Fine Tune management practices
The result of re-examining your practices may reveal flaws in your management strategy. If flaws are identified then be prepared to make the necessary changes in the future. Fine tuning your pest management strategy is an ongoing process which should evolve as long as you continue to farm.
(***Source**: Penn State Fruit Blog, Update from May 1, 2018*)

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