

## **4. Vineyard Insect & Mite Management**

### **4.1 Pest Information – Insects**

#### **4.1.1 Banded Grape Bug (BGB)**

Banded grape bug (BGB) is a sporadic pest of grapes in the Finger Lakes and Lake Erie regions and does not require treatment in most years. Nymphs of this insect emerge in the spring and feed on flowers and young berries, using their sucking and piercing mouth parts. The nymphs range in size from 1/8- to 1/2-inch in length, depending on the stage. Injury by small nymphs, occurring between 3- to 5-inch shoot growth (around May 15) and early June, results in floret drop, reduced berry set, and fewer clusters. Subsequent feeding by larger nymphs and adults does not affect cluster development. Economic injury can occur when more than 1 nymph per 10 shoots are present. This injury only occurs in the prebloom stages. Subsequent feeding by nymphs does not reduce berry set. Adults appear to be predaceous and do not cause injury to berries. Look for nymphs on grape clusters and shoot tips prior to the bloom period. They can be recognized by their long, banded antennae.

#### **Brown Marmorated Stink Bug (BMSB)**

Brown marmorated stink bug (BMSB) is a new invasive species in New York that may present problems for grapes. This stink bug, originally from Asia, was first observed in PA and has spread to many regions and has become particularly abundant in the mid-Atlantic states. It is present in NY and PA grape-growing regions, although at this time at relatively low numbers. BMSB uses its sucking mouthparts to feed on reproductive structures of many different crop plants, including grapes. At high densities, damage can be extensive. BMSB also produces strong odors that have the potential of tainting grape juice. Recent research indicates the offending compounds are not very stable and break down during fermentation. Even without fermentation, odors are relatively unstable and may not be of significant concern except when consumed close to harvest.

#### **Climbing Cutworms**

Climbing cutworms are known to feed on grapes. Larvae hide in the soil litter below the grape trellis and climb onto vines on warm nights to feed on developing primary buds. Only during bud swell are cutworms able to inflict serious damage to a vineyard. To examine vines for cutworms, search under the bark and in the soil litter beneath a vine with damaged buds, or search the vine with a flashlight after dark.

#### **European Corn Borer**

European corn borer is an important lepidopteran pest of corn, but it is also known to feed on over 200 other plant species, including grapes. Corn borer problems are rare, but under some circumstances, may require management. They are usually found in Vinifera varieties, especially vines with excessive foliage or where vineyards are weedy or surrounded by corn, sorghum, Sudan grass, or related crops. Young vineyards or nursery stock may be more seriously affected by borer injury than mature vines. The larvae vary in color, ranging from creamy to light gray to faint pink, with very small, round, dark brown spots on each segment and a dark-colored head capsule. After initially feeding on young leaves, larvae bore into canes. This weakens or kills shoots, especially when the larvae enter the middle or lower sections. Adult moths are a creamy yellowish-brown and approximately one inch long. Eggs are white and laid in masses

resembling overlapping fish scales on the underside of leaves. Egg laying can occur in late May, late June to early July, or early August, depending on the genetic race of corn borer present. See the section on pest management schedules for minor insects (4.3) for pesticide recommendations and other comments.

### **European Red Mites**

European red mites are spider mites. Adult mites are small, dark red, and have eight legs. When viewed with a hand lens, the mites appear hairy because they have white spines called “setae.” Nymphs range in color from pale to dark orange. Both adults and nymphs pierce the leaf cells and extract plant juices. This leads to the characteristic bronze coloration, which impairs the photosynthetic capacity of the leaf. Two-spotted spider mites are often found in mixed populations with European red mites. Two-spotted spider mites are light in color with two black spots on their backs. Vinifera and French hybrid varieties appear to be the most susceptible to infestations, although native varieties can also develop large densities under some conditions. Mites may be found on the upper or lower leaf surface. Four to nine generations occur in a season. Susceptible vineyards in production areas prone to damaging infestations should be monitored, starting at the bud break stage, for presence of this pest. Although problems can develop at any time after bud break, pay particular attention to the 1- to 4-inch growth stage and the postbloom period, especially after early July. Given a head start, the vine can tolerate a fair amount of feeding damage on lower leaves. Heavy mite infestations early in the season can cause stunted, chlorotic shoots with small leaves and pinpoint necrotic areas on leaves. Later in the season, as shoot growth rate declines and the vine allocates more resources to fruit, mites may also have an increased capacity to cause damage. Infestations can be severe on Long Island and in southeastern Pennsylvania vineyards. Serious infestations in the Finger Lakes region have occurred more frequently in recent years. Problems with spider mites in the Lake Erie region are uncommon. Predatory mites, when present in the vineyard at sufficient densities, can provide excellent biological control of spider mites. Recent research indicates that frequent use of mancozeb fungicides reduces predatory mite populations, although mancozeb use does not necessarily lead to mite problems.

### **Grape Berry Moth**

Grape berry moth is one of the most serious insect pests affecting grapes in New York and Pennsylvania. There are typically three and occasionally four generations of moths per season. Overwintered pupae emerge as adult moths in late May and lay eggs among the grape clusters. The larvae are small (up to 4/10-inch long) and feed internally in grape berries. External signs of larvae feeding are the silk webs that tie several berries together and changes in color at the feeding sites. Reddish areas are visible around sites of larval entries in red cultivars at pre-veraison, while dark spots are commonly seen in white cultivars. The larvae cut flaps in grape leaves and pupate inside, emerging as adult moths (wingspan is 0.5 inch). Timing of sprays to target recently hatched larvae of the second and third flights is best accomplished using the grape berry moth degree-day model available at the Network for Environment and Weather Applications (NEWA, [newa.cornell.edu/index](http://newa.cornell.edu/index)) in combination with grape berry moth risk assessment protocols. For later flights in high-risk vineyards (mid-August into September), calendar-based sprays at 7-10 day interval may be needed. The pyrethroid insecticide Danitol 2.4 EC has become ineffective for at least some populations of grape berry moth in the Lake Erie region. Bulletin 138 covers the risk assessment protocol in detail. See list of Cornell publications in section 2.6.

## **Grape Cane Borer**

Grape cane borer is a small (3/8-inch), cylindrical brown beetle that bores into canes, leaving round entrance holes that are about 1/8-inch in diameter. Immature cane borers feed only on dead or dying wood, but adults can enter vigorous, live canes starting in late August. Tunneling can weaken canes causing them to break or die back. It can be particularly problematic when training young vines. Damage has been reported primarily in vineyards surrounding Keuka and Seneca Lakes in the Finger Lakes region of New York. Research in New York and Europe indicates that problems with grape cane borer are reduced if wood from pruning is removed and destroyed each year. Destruction of burn piles before late summer is recommended.

## **Grape Leafhoppers**

Grape leafhoppers overwinter in leaves and litter and enter vineyards in the spring and feed on sucker leaves. These overwintered adults generally do not cause serious damage. Depending on degree-day accumulations, one to two generations occur. Rapid population increases are most likely in hot, dry years. Both the adults and nymphs feed on the underside of grape leaves by piercing the tissue and sucking out the plant juices. Damaged leaves become mottled with yellow dots. A moderate infestation of grape leafhopper does not affect yield and quality significantly. The species of leafhopper found on *Labrusca*-type cultivars differ from those found on hybrids and *Vinifera* grapes. The Eastern grape leafhopper, *Erythroneura* comes, is found on *Labrusca* cultivars such as Concord, Niagara, Catawba, Delaware, and other American varieties. Hybrids and *Vinifera* grapes are infested by other *Erythroneura* leafhopper species, principally *Erythroneura bistrata*. This distinction may be important in the Finger Lakes, where resistance of Eastern grape leafhopper to carbaryl is suspected in isolated vineyards. The species of leafhoppers found on hybrid and *Vinifera* grapes are not affected by resistance at this time.

## **Grape Phylloxera**

Grape phylloxera are minute insects with a complex life cycle. Two forms of phylloxera occur within the same species, and several generations of each may occur in any given year. The root gall form feeds on the outside of galls or on swelling on the roots. Loss due to this form can be substantially reduced by grafting to a phylloxera-resistant rootstock. This grafting will not affect injury caused by the leaf gall form of the phylloxera. The leaf gall form lives inside galls on the underside of grape leaves. There is a wide range in the susceptibility of grape varieties to both forms of phylloxera. Although *V. vinifera* roots are especially vulnerable to phylloxera, recent research indicates phylloxera can also feed on *L. labrusca* roots and reduce vine vigor. Examine foliage on a weekly basis before and after bloom. Apply spray when first galls are detected; spray again 10–12 days later if new growth becomes infested. Many varieties can withstand extensive leaf galling.

## **Grape Rootworm**

Grape rootworm is a beetle that feeds on grape foliage as an adult, producing chain-like feeding patterns on the leaves. Immature stages, however, feed on grape roots, and if left untreated, can cause serious damage and vineyard decline over a period of years. Grape rootworm adults begin appearing in vineyards in late May – early July, depending upon yearly variations in soil temperatures. They lay eggs on the vine trunk or canes. After the eggs hatch, the larvae crawl into the soil and attach themselves to grape roots. They remain there for 1–2 years while completing their development. An insecticide application made when

chain-like feeding symptoms appear throughout a vineyard will control adults before they lay eggs. This pest appears sporadically and does not require treatment every year. In the last few years vineyards in the Lake Erie Region have experienced increasing problems from this pest.

### **Grape Root Borers**

Grape root borers are clear-winged moths that strongly resemble paper wasps. At present, in this region they occur only in southern and eastern Pennsylvania. Larvae feed on grape roots for a 2-year period. Mature larvae burrow to just below the soil surface, spin a dirty brown silk cocoon, and pupate. Adults emerge in mid- to late summer, mate, and lay eggs beneath vines. The eggs hatch and reenter the root system. There is no registered method for controlling the subterranean stages of this insect.

### **Grape Flea Beetles or Steely Beetles**

Grape Flea Beetles or Steely Beetles are small (3/16-inch) bluish-black beetles that damage vines by feeding on small grape buds. Larvae feed on the upper surface of the leaves. If adult beetles are present in damaging numbers in the early season, they should be controlled with an insecticide application at bud swell.

### **Grape Cane Gallmakers**

Grape Cane Gallmakers are small (1/8-inch) brown weevils that form scars in shoots, typically, but not always, beyond the last grape cluster. The 3/4-inch reddish swelling is quite noticeable on green shoots. Berry size and percentage of sugar are not affected, although under high-pressure situations canes can be weakened and more easily damaged. During winter pruning the scars are easily found and removed. Control sprays should be applied in plantings when shoots are 4- to 6-inches long in areas where this insect previously has been a problem.

### **Grape Cane Girdlers**

Grape Cane Girdlers are small (1/8-inch) black weevils that girdle grape canes by chewing 2 series of holes several inches apart. The girdles are generally beyond the last grape cluster, so there is usually no loss of fruit. Control sprays should be applied at the new shoot stage to provide protection through bloom. Cultural control of grape cane girdler involves cutting off and burning the infested part of the canes. This must be done before adults emerge from the canes in late summer.

### **Japanese Beetles**

Japanese beetles are distinguished by a metallic green abdomen and copper outer wings. Tufts of white hairs are arranged along the side of the 1/2-inch body and behind the wing tips. Adults cause damage by feeding on the foliage and occasionally the berries. There is one generation per year, with the peak of adult activity occurring in midsummer. Vines with smooth, thin leaves are most susceptible to Japanese beetle attack, as are vineyards adjacent to pasture or sod fields. Young vines, especially those in grow tubes, should be monitored closely to prevent excessive damage. Note that multiple applications of carbaryl to control Japanese Beetles may be correlated with late season spider mite problems.

## **Lygocoris inconspicuus**

Lygocoris inconspicuus is in the same insect family as the banded grape bug (Miridae) and has a similar life cycle. Nymphs emerge from overwintering eggs shortly after bud break and begin feeding on shoot tips, flower buds, pedicels, and the cluster rachis. This feeding activity results in floret drop, reduced berry set, and reduced cluster number. The nymphs are light green in color with threadlike antennae that are not banded. They pass through five growth stages and become adults shortly before bloom. For a given growth stage, they are considerably smaller than the banded grape bug. Scout for these insects on clusters and shoot tips. Because of their small size, green color, and habit of hiding when disturbed, they can be very difficult to see on the cluster. This pest is sporadic and does not require treatment in most years. When present, however, it can cause considerable economic damage.

## **Mealybugs and Soft Scales**

Mealybugs and Soft Scales have received attention recently due to their ability to vector leafroll virus in grapes. There are several species of soft scales present in our area and one species of mealybug, the grape mealybug. In survey work in the Finger Lakes from 2006-2008 we have found low levels of both mealybugs and soft scale. Some of these individuals have tested positive for two strains of leafroll virus. Mealybugs and soft scale insects can contribute to the spread of the virus within infected vineyards, although spread is frequently not observed. Non-systemic insecticides applied during the season should be timed to coincide with movement of overwintered crawlers in spring just prior to budbreak or movement of first summer generation crawlers in mid-summer. Timing for use of the systemic insecticide spirotetramat [Movento] is not as critical, although it must be applied when foliage is present. Research has shown that a split application, near bloom and 30 days later, has been effective in dramatically reducing grape mealybug.

## **Multicolored Asian Lady Beetle (MALB)**

Multicolored Asian Lady Beetle (MALB) is an important predator of aphid pests on a number of different crops. However, near harvest it can become a problem for grape growers (both for wine and sweet juice). After a sufficient cold period in the fall the adult beetles begin searching for overwintering sites and this can bring them into vineyards where they may feed on ripe or damaged grapes. Injury to fruit, however, is not the real concern. When disturbed, by harvesting of grapes, for example, the beetles produce a noxious smelling liquid from their joints that contaminates the fruit and causes a severe off-flavor in juice or wine. This problem has been most severe on the Niagara Peninsula and the southeastern shore of Lake Erie, but has also been reported in the Finger Lakes. We currently do not have a good estimate of economic threshold, but it may be as little as 15 beetles per grape lug or 2 beetles per Kg fruit. During the summer MALB feed on a number of different aphid species, including the introduced soybean aphid. When soybean aphids are abundant, this probably leads to an abundance of MALB and potentially to greater problems in vineyards. Monitoring clusters for MALB near harvest is recommended, especially for later-maturing cultivars. Vineyard blocks adjacent to soybean fields may be more prone to problems with MALB.

## **Plume Moth**

Plume Moth larvae can cause injury to young shoots and grape clusters early in the growing season. In most years, this injury is not significant. The light green larvae hatch at, or near, bud break. They fold young, terminal leaves together to form a shelter in which they feed on leaf tissue (the leaves are held

together with webbing). This, in itself, is generally not a serious problem because the shoot can recover after the larvae complete development (in early June). When present in very high densities, the larvae sometimes accidentally enclose young flower clusters within their leaf shelters; if this happens, they will feed on the florets. Infestations are often limited to vineyard edges. This pest does not require treatment in most years.

### **Potato Leafhoppers**

Potato Leafhoppers are a sporadic but sometimes locally serious pest of grapes. Unlike grape leafhoppers, potato leafhoppers cannot overwinter in northern latitudes due to the cold winters. Each spring, however, large numbers of adults migrate north and colonize a number of different plant species, including grapes. Adult potato leafhoppers are wedge-shaped and iridescent green, while the nymphs are usually bright green. The nymphs, generally found on the undersides of leaves, walk in a sideways manner that helps distinguish them from other leafhopper species. Both adults and nymphs feed by sucking sap from the vascular system of grape leaves. They also inject a salivary toxin that produces characteristic symptoms including leaves with yellow margins that are cupped downwards. A low infestation of potato leafhopper does not affect fruit quality or yield.

### **Red-banded Leafroller**

Red-banded Leafroller larvae occasionally attack grape clusters. Their life cycle is similar to that of the grape berry moth except that the larvae feed on the surface of the grape berry rather than internally. Early generations are rarely a problem.

### **Rose Chafers**

Rose chafers are clumsy, light-brown beetles about 5/8- inch long. They damage leaves and flower clusters around the bloom period. Populations are usually highest on light, sandy soil.

### **Spotted Lanternfly (SLF)**

Spotted Lanternfly (SLF) is a new invasive insect pest of grapevines in the U.S., first detected in Southeastern PA in 2014. As an adult, this planthopper is large (1") and colorful (brown and black spotted forewings, red hindwings, and a black and yellow abdomen). SLF use their sucking mouthparts to feed on the plant phloem – they do not feed on the fruit.

The largest known population occurs in Southeastern PA with smaller populations in western and central PA and currently, large populations can be found in several locations in downstate NY, although not yet present in vineyards on Long Island. Significant infestations have also been found in the Hudson Valley, where there has been some infestation of vineyards at low to moderate numbers. There are also several established SLF populations in other grape-growing regions of NY State such as Syracuse, Ithaca, Geneva, Rochester, and Buffalo, generally found within city boundaries along transportation corridors.

Additional states where SLF populations have been found include NJ, VA, and MD where they are causing damage to cultivated grapes, DE, CT, RI, MA, WV, NC, OH, TN, IL, IN, KY, and MI. Continued spread of this pest is expected. There is only one generation per year with the egg stage overwintering.

Note that SLF females will lay egg masses on all sorts of natural and man-made surfaces, including trailers and vehicles that can facilitate transport into new areas. The adults are also good hitch hikers. Nymphs emerge in the spring and will feed on grapevines among many other plants, but SLF does not typically become problematic in vineyards until the late summer and early fall, with up to thousands of adult SLF invading vineyards in a short period of time in areas with high populations.

They are strong jumpers in both the nymph and adult life stage, but only adults can fly. They have a broad host range (>70 plant species), but grapevines appear to be among their preferred hosts. SLF may be found in the surrounding wood edge in high numbers before invading the vineyard. There is no economic threshold currently available for this pest. High levels of feeding by adults (approx. >20 per vine) may result in weak vines, increased susceptibility to winter injury, and a decrease in yield, juice, and wine quality. In some cases, complete vine death has been observed.

Feeding injury is typically not apparent within the growing season, though the presence of honeydew and/or sooty mold on the leaves, trunk, or fruit may be a sign of SLF presence. Note that this may also indicate the presence of other sap-feeding pests (e.g. scale, mealybugs). Many broad-spectrum insecticides are effective against this SLF, though frequent reapplication is often required due to continuous reinvasion by adults from the surrounding landscape. Research is ongoing for this pest. If you find SLF outside of the current quarantine zone, it should be immediately killed and reported to your state department of agriculture.

### **Spotted Wing Drosophila**

Spotted Wing Drosophila is an invasive vinegar fly that became widely distributed in the Northeast in 2011. In overall appearance it is similar to other vinegar flies that can be found in wineries and in overripe, damaged berries. One major difference is that the female has a very large ovipositor (egg-laying structure) that she uses to insert eggs into intact, ripe fruit. Berry crops appear to be particularly vulnerable while grapes not so much, although some spotted wing drosophila have been reared from very ripe, intact grapes. Also, thin-skinned varieties such as Pinot Noir may be more susceptible than others to direct damage. Overall risk to juice grapes and other thick-skinned cultivars appears relatively low. Our most recent research does indicate that vinegar flies, including SWD, can facilitate sour rot in susceptible grape varieties in years where the environmental conditions are supportive of disease development. Damage to fruit from birds or yellowjackets or incidental cracking in tight clustered cultivars likely exacerbate the situation by increasing opportunities for vinegar flies to spread disease microorganisms. Insecticide targeting vinegar flies starting at around 13-15 brix has been shown to reduce incidence and severity of sour rot. To reduce selection for insecticide resistance in vinegar flies, rotate active ingredients and only use when conditions favor sour rot development, such as extended warm and wet conditions after veraison.

### **Thrips**

Thrips are small (1/25-inch) yellowish or brownish insects that may rarely cause significant injury to grapes in our area. The adults are winged and more brownish, while immature thrips are more yellowish and have a worm-like appearance. They use their rasping/sucking mouth parts to feed on leaf tissue. When populations are high, during the early part of the season, their feeding activity can result in small, deformed leaves and stunted shoots. Later in the season, the vines are much better able to tolerate thrips feeding. It is rarely necessary to treat this pest. Aurore and DeChaunac varieties appear to be most susceptible to shoot stunting. Concord and other native varieties tolerate feeding with no apparent injury.

## **Tumid Gallmaker**

Tumid gallmaker is a small (1/10-inch) brown to reddish fly with plume-like antennae. From early May to mid-September, it lays its eggs in masses between developing tissues at the bud or shoot tips. The larvae cause injury to grapes. After hatching, they bore into vine tissue and cause a round, reddish gall to form. These galls can develop on leaf tissue or petioles, where they probably do little actual damage to the vine, or in grape clusters, where there is more concern about economic injury. Hence, the greatest concern for this pest is in the early part of the season. Tumid gallmaker is generally not as prevalent in the western and central grape-growing regions as in the southeastern areas. Aurore and Rougeon appear to be particularly susceptible.

## **Yellowjackets and other Social Wasps**

Yellowjackets and some other types of social wasps can be problematic at or near harvest in vineyards. Although predaceous during most of the year and therefore, beneficial, near harvest yellowjackets and other social wasps (paper wasps, hornets) are attracted into vineyards in search of berry juice (sugar). They will feed on previously damaged berries and for some species of yellowjackets, will also directly feed on and damage intact berries, opening them up to bacteria, yeast and vinegar flies, key contributors of sour rot.

Yellowjackets and other social wasps can also create significant nuisance issues. Management options are limited. No insecticides are labeled to control yellowjackets in vineyards, although some of the insecticides labeled for use against spotted wing drosophila, such as \*Mustang Maxx and Delegate, may provide some short-term knock down of foraging yellowjackets. Finding nests earlier in the season and treating with labeled insecticides may also help reduce overall populations closer to harvest.

And there is some research showing that using traps with an attractive lure and killing agent can help reduce yellowjacket populations. Finally, during the 2023 and 2024 field seasons we tested the use of side netting with smaller mesh size (3 X 5 mm) and found a significant reduction in yellowjacket feeding damage compared to vines without netting. Overall, however, more research is needed geared toward developing management tactics.