

Berry Notes

Prepared by the University of Massachusetts Fruit Team

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Massachusetts Berry Notes Underwriters:



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CROP CONDITIONS:

Strawberries: June bearing varieties set next year's flower buds at this time of year. A nitrogen application now can help plants store energy in crowns and set fruit buds. Some leaf diseases and insect problems can linger and cleaning them up now will help plants enter dormancy in a healthy state. Also scout fields for weed problems that can be addressed in the fall (more on this in the Strawberry section). **Brambles:** Spent floricanes should be removed now from summer fruiting types. This allows sunlight penetration into the remaining primocanes and helps fruit bud initiation on the full length of the canes. No fertilizer should be applied at this time. Monitor for two-spotted spider mite and control if necessary. Fall raspberries are still in production but are winding down. Spotted Wing Drosophila (SWD) populations are high now and require sustained control through frequent and thorough harvest, sanitation and weekly spraying of recommended materials. See [UMass Extension Fruitadvisor SWD page](#) for more details. Be sure to rotate materials and make sure to adhere to label restrictions when only a limited number of applications is allowed. Botrytis fruit rot infections are a concern where there is a lot of carryover inoculum as days shorten and evening dew periods lengthen or if wet weather returns. See [New England Small Fruit Guide](#) for recommended materials and rates. **Blueberries:** Scout fields for weeds to prepare for late season management strategies. Flag bushes where Blueberry Scorch or Stunt viruses are suspected so they can be rogued out after leaves fall. Only non-nitrogen fertilizer applications should be made this late in the season if leaf tissue tests indicate deficiency. **Grapes:** Harvest is running a week or so later than last year but is underway for many table grape varieties and for some wine grapes, too. Disease management can still be necessary this late in the season, especially for fruit rots on late harvested varieties. Also keeping fruit flies (including swd) in check will help maintain high quality of fruit during and after harvest. See more in the Grape section about these topics. Fall is an important time to assess weed issues and take some corrective action.

New England Vegetable & Fruit Conference: The 2017 NEVFC & Trade Show will be held this December 12, 13, & 14, 2017 at the Radisson Hotel in Manchester, NH and will include 32 educational sessions over 3 days, covering major vegetable, berry and tree fruit crops, as well as various special topics, such as hard cider and cut flower production. More at: <https://newenglandvfc.org/>.

ENVIRONMENTAL DATA

The following data was collected on or about September 6. Total accumulated growing degree days (GDD) represent the heating units above a 50° F baseline temperature collected via our instruments for the 2017 calendar year. This information is intended for use as a guide for monitoring the developmental stages of pests in your location and planning management strategies accordingly.

Region/Location	GDD			Soil Temp (°F at 4" depth)		Precipitation (in inches)
	2-Week Gain	2017 Total	2016 Total	Sun	Shade	2-Week Gain
Cape Cod	195	2060	2377	68	64	1.61"
Southeast	148	1830	2229	73	68	0.78"
North Shore	209	2102	2323	68	63	0.55"
East	200	2318	2575	70	68	0.46"
Metro West	154	2074	2353	66	n/a	0.66"
Central	168	2100	n/a	n/a	n/a	0.50"
Pioneer Valley	166	2146	2504	68	66	2.52"
Berkshires	185	1846	2139	64	61	0.95"
AVERAGE	178	2060	2357	68	65	1.00"

n/a = information not available

(Source: UMass Landscape Message #20, September 8, 2017)

STRAWBERRY

Strawberry Fall Check-List

Sonia Schloemann, UMass Extension

√ **General:** Flower bud initiation deep in the crown of the plants is happening now, determining next years' yield. So, maintaining good plant health into the fall is important. In addition to keeping up with the fertilizer program, suppressing leaf diseases improves the ability of the plant to carry on photosynthesis and store starch in the crowns. Don't let leaf spot or powdery mildew get ahead of you. Narrow the rows to about 12" and cultivate the alleys in fruiting fields and new plantings for the last time before mulching. Plant winter rye in plowed down fields as soon as possible in order to get good establishment and growth before winter.

√ **Nutrition:** Nitrogen fertilizer should be applied to bearing beds in early September to bring your seasonal total up to 100-120 lbs/acre. Most growers apply about 70-80 lbs of nitrogen on at renovation. The fall application should provide another 30-50 lbs (more on soils with low organic matter content). This stimulates good root growth in the fall and supplies nitrogen needed for flower bud initiation. New fields need to have a total of 80 - 100 lbs/acre of nitrogen with about 40 lbs applied in the fall. Ammonium nitrate (35% N) is a good fertilizer for the fall application. If your leaf tissue analysis shows deficiencies in magnesium or boron, early fall is a good time for foliar applications of Epsom salts (15lbs/100gal/acre) for magnesium and Solubor (3lbs/100gal/acre) for boron. Don't make these applications on hot humid days, however, or phytotoxicity could result. Read the labels.

√ **Weeds:** Weed management in the early fall is limited to cultivation and hand weeding/hoeing. The only herbicides you should consider using are Poast or Select Max for controlling grasses postemergence. These will only work on relatively small grasses. Big clumps of crabgrass will have to be pulled by hand. However, quackgrass can be knocked down by cultivation or mowing and then treated when new growth is less than 6" high. One note of caution; Poast, which is used with a crop oil surfactant, can injure strawberry foliage in cold weather. I would recommend its use as a spot treatment at this time of year rather than a broadcast treatment of the whole field. Chateau can be applied as a preemergence material to row middles to control broadleaf weeds in the fall, but should not be allowed to contact strawberry foliage. Weed management later in the fall can include applications of preemergent materials such as Devrinol, Ultra Blazer, Prowl H20, Spartan and Sinbar.

√ **Diseases:** Clean up severe infections of leaf spot and powdery mildew. Rally, Cabrio and Pristine may be good materials for this use. Organic options for leaf spots include copper products such as Nu Cop 50WP but consult label for sensitive cultivars. Organic options for powdery mildew include Oxidate, JMS Stylet Oil, potassium bicarbonate products and sulfur products (again, consult label for cautions on sensitive cultivars). Healthy leaves are important at this time of year to supply the plant with the energy to produce flower buds for next year's crop and to store energy in the roots for the first

flush of growth next spring. Apply Ridomil Gold, Alliette Prophyt or Phostrol in September or early October in areas where Red Stele has been identified. Organic growers can use Actinovate AG but this is best used prior to disease onset. It is best to apply these materials when the soil is beginning to cool but before heavy fall rains begin. This should not be considered an alternative to good site selection for strawberries.

√ **Insects:** Check fields for infestations of leafhopper, mites or aphids. Generally, plants can take a fair amount of feeding by these insects, but heavy infestations can be a problem. And, aphids in particular, can vector virus especially when they are in the winged form and can disperse to other fields. **Dayneutral fields should continue to be treated for spotted wing drosophila until harvest ends.**

Fall Herbicide Applications for Strawberries

Bruce Bordelon, Purdue University

A number of pre and post emergent herbicides can be used on strawberries during late summer and fall to prevent weed germination, kill emerged weeds, and provide residual control through next spring. The key set of weeds you need to control during this period are fall germinating winter annuals such as chickweed, henbit, and shepherds purse. You may also need to prevent germination of wheat, oats, or rye seeds that come in the straw mulch you apply for winter protection. Carefully read the labels to minimize risk of damage to your strawberries. Below is a list of herbicides registered and comments about each.

Chateau (flumioxazin) is primarily a pre emergent herbicide but has some post emergent activity against small susceptible weeds. Fall applications of Chateau should only be applied after the strawberries are completely dominant. If Chateau is applied to actively growing strawberries, injury can occur. Add 1% crop oil or 0.25% nonionic surfactant to improve post emergent control of small weeds.

Dacthal (DCPA) is a pre emergent herbicide that can be used in new plantings, immediately after renovation or in fall. It provides good control of many grasses and some broadleaves such as purslane and lambsquarter. It must be applied before weeds emerge.

Devrinol (napropamide) is a pre emergence herbicide that can inhibit rooting of daughter plants so it should be applied after early forming daughter plants have rooted. Late forming (after late August) daughter plants do not contribute to yield and Devrinol can be applied before these runners root. Devrinol must be applied before winter annuals and small grains emerge. Devrinol provides excellent control of small grains and some winter annuals such as chickweed. Devrinol must be moved into the soil by cultivation or water (rainfall or irrigation) after application.

Prowl H20 (pendimethalin) is a pre emergent herbicide that can be applied in fall after strawberries are completely dormant. Rainfall or irrigation following application provides best results.

Sinbar (terbacil) is primarily a pre emergent herbicide but it has some post emergent activity against small susceptible weeds. Fall applications of Sinbar should only be applied after the strawberries are completely dominant. If Sinbar is applied to actively growing strawberries, injury can occur. Cultivars differ in tolerance to Sinbar. In general, less vigorous cultivars have greater injury. Applications are most effective when applied to the soil and activated by rainfall or irrigation. Sinbar provides excellent control of many winter annual weeds.

Spartan (sulfentrazone) is a pre emergent herbicide with good activity against annual broadleaf weeds, grasses and nutsedge. It should be applied after strawberries are dormant. Some cultivars may be sensitive. The amount of rainfall or irrigation required for activation depends on existing soil moisture, organic matter content, and soil texture.

Poast (sethoxydim) is a post emergent, grass specific herbicide. The grasses must be actively growing, thus Poast should be applied in late summer or early fall before plants become dormant. Summer annual grasses, such as foxtails and crabgrass, will be killed by fall frosts, and do not require Poast applications for control. Poast is more effective against annual than perennial grasses. Poast can be used in the fall to suppress perennial grasses such as quackgrass, control early emerging small grains, and kill winter annual grasses such as wild oats and downy brome.

Select Max (cletodim) is a post emergent, grass specific herbicide that provides good control of most annual and perennial grasses. Like Poast, grasses should be actively growing for best results.

Ultra Blazer (acifluorfen) is a post emergent herbicide that provides good control of annual grasses and broadleaves. It can be applied when strawberry plants are dormant during fall or early spring.

2,4-D amine, a post emergent broadleaf herbicide, can be applied when strawberries are dormant to control some winter annuals. 2,4-D provides good control of many winter annuals and shepherds purse, but is not very effective against chickweed. The herbicide should be applied to actively growing weeds. Be careful of 2,4-D drift causing

injury to non-target plants. Check the label as only a few formulations are labeled for strawberries. 2,4-D is typically used during renovation rather than in fall.

Gramoxone Inteon (paraquat) can be applied as a directed spray between strawberry rows, using shields to prevent contact with strawberry plants. Gramoxone is a nonselective herbicide, so it will kill or severely injure

strawberries it contacts. Gramoxone is a restricted use pesticide and is extremely toxic to humans. It provides excellent control of annual grass and broadleaf weeds. Gramoxone does not translocate in plants so it does not control perennial weeds. Weeds should be actively growing when Gramoxone is applied. (*Source: Facts for Fancy Fruit, Vol. 15, Issue 10, Sept. 14, 2015*)

RASPBERRIES/BLACKBERRIES

Raspberry Fall Check List

Sonia Schloemann, UMass Extension

√ **General:** Encourage hardening off of canes in summer bearing varieties of red and black raspberries and blackberries by avoiding nitrogen fertilizers and supplemental watering at this time. Fall bearing raspberries can still benefit from irrigation in dry weather to help maintain fruit size.

√ **Nutrition:** Based on soil and tissue test results, apply non-nitrogen containing fertilizers and lime as needed. For example, Sul-Po-Mag or Epsom Salts can be applied now so that fall rains can help wash it into the root zone for the plants.

√ **Weeds:** Now is a good time to do a weed survey and map of problem areas, so that you can use this information to develop an effective management strategy. A late fall application of Casoron®, Devrinol®, Surflan®, or Princep® for preemergent control of broadleaf weeds next spring should be made. Apply Casoron® only when temperatures are below 40°F, preferably just before rain or snow. Most of these materials should only be used on established plantings, not newly planted fields. See the *New England Small Fruit Pest Management Guide* for more specific information.

√ **Diseases:** Fall bearing raspberries can suffer fruit rot problems due to increased moisture present in the planting (more frequent precipitation, longer dew retention, longer nights) late in the growing season. The majority of this fruit-rot is *Botrytis cinerea*, gray mold. Captan 80 WDG is labeled for use on brambles. In addition Elevate®,

Switch®, Pristine® and Rovral® are materials available for this use. Frequent harvesting and cull-harvesting are the best practices for keeping fruit rot levels low. Thinning canes in dense plantings can also help. Scout summer bearing brambles to look for powdery mildew and treat if necessary. See the *New England Small Fruit Pest Management Guide* for recommended materials and rates. If Phytophthora root rot has been identified in a field, treat the affected area with Ridomil Gold®, Alliette®, or Phostrol® in September or early October. This timing is important to get the material in place in the root zone before the onset of cool wet weather (and soil) in the fall.

√ **Insects:** Now is the time to check plantings for crown borers. Adults of this pest look like very large yellowjackets, but is actually a moth. They are active in the field in August and September laying eggs. Scout the fields for crown borer damage by looking for wilting canes. This symptom can also indicate Phytophthora root rot, so when you find a plant with a wilting cane (or two), dig up the plant and check the roots for brick red discoloration in the core of the roots (phytophthora) or the presence of a crown borer larvae in the crown. Rogue out infested crowns and eliminate wild bramble near the planting, since they will harbor more of this pest. **Fall bearing fields should continue to be treated for spotted wing drosophila until harvest ends.**

Broad Mites on Blackberries

Kathy Demchack, Penn State University

Broad mite (*Polyphagotarsonemus latus*) has been problematic for pepper growers in PA for the last couple of years. Now we can add blackberries to the list of crops that they frequent.



In PA, we first found broad mites on blackberries in 2013. In 2015, we found that they can contribute to a nearly total crop loss on primocane-fruiting blackberries. On these plants, bacterial issues are part of the problem with symptoms similar to those from fire blight (tissue browning and death) present. At this point, we don't know whether the two issues just happen to be present at the same time, whether injury by the mites may be contributing to tissue susceptibility to bacterial infection, or whether other interactions are coming into play. In Arkansas and North Carolina, researchers began experiencing problems with broad mites on primocane-fruiting blackberries in 2006 and a commercial grower has had problems since 2014.



Photo 1: Leaf distortion and cupping of blackberry leaves infested by broad mites. **Photo credit:** Donn Johnson, Univ. of Arkansas

Typical damage from broad mites is tissue distortion, reduced terminal leaf growth, either downward or upward curling or cupping of leaves (Photo 1) and flower clusters that appear compressed (Photo 2) or blossoms that dry up.

Symptoms on flower clusters may not show up until the second year of infestation. Broad mites build up to hundreds per leaflet on younger terminal leaves.



Photo 2: Infested blackberry terminal growth showing upward leaf cupping and compression of flower cluster. **Photo credit:** Kathy Demchack, Penn State

These mites are very tiny - less than 0.2 mm (about 1/100th of an inch) as are their distinctive eggs dotted with white spots (Photo 3). These mites are difficult to see even with a 16X hand lens.



Photo 3: Greatly-magnified young blackberry fruit with broad mite female (right) and eggs (left of center). **Photo credit:** Sara May, Penn State

Because of the small sizes of broad mites and the eggs, symptoms of leaf curling and dying terminal foliage (Photo 4) and flower clusters are all that a grower is likely to notice.



Photo 4: Terminal dieback of blackberry plant resulting from broad mite infestation. **Photo credit:** Donn Johnson, Univ. of Arkansas

With citrus, the mites are found in depressions on the fruit where the females lay their eggs, and as is evidenced by the number of mites and eggs on a young blackberry fruit (Photo 5), it appears that blackberries provide a similarly desirable fruit surface.



Photo 5: Young blackberry fruit with numerous broad mite eggs and adults. **Photo credit:** Tim Gleason, Penn State

At this point, we mainly want to make growers aware of this potential problem in case they have seen similar

symptoms (either terminal leaf and flower distortion or symptoms similar to fire blight), especially if they are growing primocane-fruiting blackberries in the field or high tunnels. We're not sure exactly why we are seeing this new mite pest on blackberry at this time or where it came from. Perhaps this pest is better able to survive in more mild winter temperatures, both in the field and in high tunnels.

In both instances where broad mites were problematic in PA, the blackberries were grown in high tunnels, but they are ones from which the covers are removed for the winter. Since the tunnel climate is generally conducive to increased mite populations, their numbers may have increased, regardless of whether the cover was removed for the winter or not. Interestingly, there is some evidence that they may be able to gain mobility by attaching themselves to whiteflies.

So, what can one do to control broad mite infestations? First, keep watch for them, and if you notice just a plant or two exhibiting suspicious symptoms, rogue it out along with a couple of plants to each side of it. It appears that it is possible to hold the problem at bay, or slow it down greatly by utilizing this simple practice. Practices similar to those that would assist with controlling two-spotted mites (conserving natural enemies, releasing predatory mites early enough and at timings that would allow them to establish in the planting, and avoiding use of broad-spectrum insecticides) may be beneficial, though there is currently very little information in this area.

Few miticides are labeled for use on blackberries at this time, resistance development is a huge concern, and efficacy data is somewhat limited, so we will need to do some work before making recommendations on miticide usage. Stay tuned for more news on this front.

Acknowledgement

Thanks to Sara May at [Penn State's Plant Disease Clinic](#) for assistance in diagnosing this problem in Pennsylvania.

(*Source: Penn State Fruit Pest & Disease Blog, Aug. 8, 2017*)

BLUEBERRIES

Highbush Blueberry Fall Check-List

Sonia Schloemann, UMass Extension

√ **General:** Blueberry plants should be encouraged to harden off for the winter. This means no nitrogen fertilizer at this time. Flag bushes that show premature reddening of leaves compared to others of the same variety. This can be an indicator of infection with virus or other pathogens. If you haven't done it already, make some notes on observations from this year that might be

helpful in coming years (e.g., variety performance, sections of the field that did well or poorly, how well some practices worked, or didn't, etc.). Relying on memory isn't always accurate enough. Nothing can replace a detailed field history when trying to diagnose problems.

√ **Nutrition:** Hold off on any nitrogen fertilizers. Based on leaf tissue tests and soil tests, sulfur, lime, and some fertilizers can be added now. Apply these before fall rains begin and also before adding any supplemental mulch to the plants.

√ **Weeds:** As with other small fruit crops, now is a good time to do a weed survey and map the weed problems in your planting. This information will be very useful in tailoring your weed management plan so that is effective and not wasteful. A late fall application of Casoron® for preemergent control of broadleaf weeds next spring should be made only when temperatures are below 40°F, preferably just before rain or snow. Devrinol®, Surflan®, and Kerb® may also be used in the fall according to label recommendations. See the *New England Small Fruit Pest Management Guide* for more specific information.

√ **Diseases:** Weak plants can easily be detected at this time of year because they tend to turn red earlier than healthy bushes. Upon finding weakened bushes, try to determine the reason for weakness. Is the root system damaged? If so, is it likely from disease infection or root damage by voles or grubs? If the roots are healthy, could a crown borer (Dogwood borer) be the culprit? Or is stunt

disease the cause? Or Scorch? Accurate diagnosis is the first step in resolving the problem and avoiding spread. Enlist the help of specialists if you have trouble determining the cause of problems. See factsheet on Blueberry Scorch at www.umass.edu/fruitadvisor for help diagnosing this disease.

√ **Insects:** The main worry now is for sharp-nosed leafhopper which is the vector for stunt disease. If you have determined that you have bushes infected with stunt disease in your planting, an application of malathion to the infected bushes and any immediately surrounding bushes should be made to control leafhoppers BEFORE removing the infected bushes. Failing to do this will likely cause the spread of the disease to clean bushes even after infected bushes have been removed. In eastern areas of the state, growers are concerned about infestations of Winter Moth. Go to <http://www.umassgreeninfo.org/factsheets/defoliators> for more information on this pest. For now, growers should know that any moths seen flying in their plantings now are NOT Winter Moth or Canker Worm moths. These moths do not emerge and begin flight until November.

Stunt Disease

Gary Pavlis, Rutgers Univ.

The removal of a bush with stunt disease should never be attempted before some effort has been made to control the leafhoppers in it. The removal process could actually facilitate the spreading of the disease. The agitation of the bush will dislodge the leafhoppers, causing them to hop to another healthy bush, thereby transmitting the virus from a diseased bush to a healthy bush. Spray each diseased bush with a garden knapsack sprayer before it is rogued out. Malathion is safe to use and is effective against all stages of leafhopper. Spraying the entire field is not necessary at this time. In fields severely infected with stunt disease and in nurseries seeking NJ Department of Agriculture Certification, a special spray for leafhopper

adults is needed. The leafhoppers are still in the wingless nymph stage and usually do not start the flight period until late in August.

Stunt Symptoms are described as an overall dwarfing of the bush, hence the name stunt. Small leaves that are cupped downward or puckered are characteristic symptoms. Leaves on infected bushes are often chlorotic, with chlorosis most pronounced among the leaf margins and between lateral veins. Midribs and lateral veins usually retain normal green coloration. Chlorotic areas often turn a brilliant red in the later summer. Stem internodes become shortened, and growth of normally dormant buds caused twiggy branching. (*Source: The Blueberry Bulletin. Vol. 33, No. 14. August 16, 2017*)

In the Vineyard – Phomopsis

Andy Muza, Penn State University



Figure 1. Black, scabby lesions on Concord shoot due to Phomopsis infection. Photo: Andy Muza, Penn State.

The abundance of Phomopsis shoot infections observed this week (Figure 1), in any vineyard that was checked, brought me back to the beginning of the season. If you remember, the season started out wet (May and June). Due to the cool, wet weather in May, shoot growth was minimal for a period of about a week. We started reporting in the Crop Update (mid-May) about extensive Phomopsis shoot infections in the region which occurred between the 1” - 3” stage of shoot growth. Few fungicide applications were applied in the region during this period (1” - 3” stage) which left vines vulnerable to Phomopsis infections. Our initial concern was not only the extent of shoot infections but more importantly infections of rachises and berry stems (Figure 2). Phomopsis rachis lesions can cause girdling resulting in loss of clusters. This can become more apparent as we approach harvest. In addition, pedicel

(berry stem) infections can result in fruit infections later in the season after veraison.



Figure 2. Phomopsis lesion on Concord rachis. Photo: Andy Muza, Penn State.

Fortunately, the majority of growers did apply fungicide applications for Phomopsis after the 3” stage and through the first Postbloom spray to protect against additional shoot, rachis and berry stem infections. So, as we approach harvest will we see any appreciable crop loss due to early Phomopsis infections? This remains to be seen but we will know the closer we get to harvest. (Source: Lake Erie Regional Grape Program Crop Update. Aug. 24, 2017)

Defining and Developing Management Strategies for Sour Rot

Megan Hall, Gregory Loeb, and Wayne Wilcox, Cornell University

[Editor's Note: This is an excerpt from a longer article. See source information at end for link to the whole article]

Sour rot, a late-season bunch rot, is an increasing concern, particularly among growers of tight-clustered or thin-skinned grape varieties. It is characterized by brownish, oxidized berries and a strong vinegar aroma. Its causes and management in the field have been poorly understood.

Over the past four years, we have studied sour rot in the laboratory and field to determine which specific organisms and conditions are needed for it to develop. We found that ethanol-producing yeast, acetic acid bacteria, and *Drosophila* fruit flies are all essential for

sour rot to develop and spread. Spray trials assessing control with antimicrobial products, insecticides, or both in combination showed that the combination program was most effective. An insecticide alone provided significant control in two of the three years in one trial, whereas antimicrobial products without an insecticide usually provided relatively little control.



Sour rot disease develops because of berry wounds, ethanol-producing yeast, acetic acid bacteria, and fruit flies. Drosophila sp. fruit flies play a key role in the development of the disease.

Key Concepts

- Sour Rot is sometimes used as a catch-all term to refer to unidentified late-season bunch rots that develop in tight-clustered or thin-skinned varieties.
 - The causes and organisms associated with sour rot have been poorly understood.
 - Our project defined sour rot as a combination of several elements: oxidized skins (brown), odor of acetic acid, and association with *Drosophila* fruit flies.
 - Sour rot-affected berries collected in the field contained significant amounts of ethanol (produced by *Saccharomyces* yeasts) and acetic acid (produced by bacteria).
 - Experimental inoculation in the laboratory with these microbes alone was not sufficient to produce sour rot symptoms.
 - Sour rot symptoms developed only when *Drosophila* fruit flies were added to experimental inoculations.
 - Field spray trials over three years with antimicrobials targeting the yeast and bacteria alone provided modest reductions in sour rot severity.
 - Including insecticides targeting *Drosophila* fruit flies dramatically reduced sour rot severity.
 - *Drosophila* fruit flies play an important role in the development and spread of sour rot.
- High cordon-trained Vignoles had higher severity of sour rot than midwire cordon-trained vines with vertical shoot positioning in 2014, 2015 and 2016.
 - Management of sour rot involves controlling both the microbes and the *Drosophila* fruit flies.

Conclusions:

Treatments targeting both insects and microbes. Our results suggest that in addition to relevant canopy management, chemical treatments utilizing both broad-spectrum antimicrobials and, particularly, insecticides targeting *Drosophila* spp. may provide significant control of this disease. Additional trials under commercial or large-plot conditions should help define the most efficient timings to balance the competing desires to minimize spray numbers while maximizing control, although our existing data suggest that control is likely to be maximized by initiating sprays before an epidemic is in progress. It is also important to note that these studies have been conducted with susceptible cultivars and in a climate favorable to the development of severe disease symptoms. While we did not specifically study cultivars and climatic variables, management recommendations may vary for vineyards with thicker-skinned, looser-clustered cultivars in a less conducive environment.

This understanding of the sour rot complex is not only applicable to New York State grape growers but can be valuable to growers worldwide who experience sour rot as a challenge in their vineyards. We now understand that the yeast and bacteria necessary for the onset of symptoms can vary, and that oftentimes these organisms are already present within or on the grape surface, waiting for a wound site to provide an entry point for *Drosophila*. This complex is unique because we are not targeting a single causal organism, but we now have a more comprehensive understanding of how it develops, and in turn, how to manage it. (*Source: Appellation Cornell, Issue 30, Aug. 2017*).

To read full article go to:

<https://grapesandwine.cals.cornell.edu/newsletters/appellation-cornell/>.

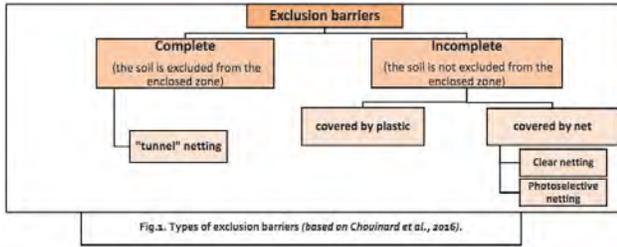
GENERAL INFO

Exclusion Barriers As A Sustainable Strategy For Management Of Spotted Wing *Drosophila*

Alina Avanesyan and Christelle Guédot, University of Wisconsin

Using exclusion barriers is a mechanical control strategy which prevents insect pests from getting into the enclosed area. Over the past decade, the use of exclusion barriers in berry crops has been gradually increased and, in some states, such as in California, exclusion barriers are used for almost all raspberries (Hanson et al., 2013).

There are many types of exclusion barriers, but the main idea is to cover crop plants either from all sides (called complete exclusion) or from the top (called incomplete exclusion); such barriers can be made from plastic or netting materials of different colors (Chouinard et al., 2016; Fig. 1-3).



Such exclusion barriers can protect crop plants not only by physical exclusion of insect pests but also by providing the microclimate which is unsuitable for developing pests (but favorable for plant growth and fruiting) (Table 1). Particularly, plastic cover in high tunnels can alter the solar radiation which may disrupt insect orientation and host location; this happens, for example, with Japanese beetle's movement (Hanson et al., 2013) and behavior of thrips and whiteflies (Burrack et al., 2013). On the other hand, enclosing the plot may cause potential problems with temperature management for plants or development of secondary pests (Chouinard et al., 2016).

Table 1. Advantages and disadvantages of using exclusion barriers

(based on Demchak et al., 2013; Hanson et al., 2013; Rogers et al., 2015; and Chouinard et al., 2016).

Advantages	Disadvantages
<ul style="list-style-type: none"> • Protection from animals, wind, frost, sunburn damage, etc. • Increased crop yields and fruit marketability • Physical exclusion of insect pests (e.g. <i>Drosophila suzukii</i>) • Unsuitable climate for pest development (e.g., increased temperature, altered solar radiation) • Decreased pressure from diseases • Advancement of the harvest season for early-season crops • Lengthening of the fall harvest season for late-season crops • Lengthening of shelf-life of crops • Significant reduction of the number of pesticide applications • Increased opportunities for organic control methods 	<ul style="list-style-type: none"> • Additional costs for the tunnels and their management • Not easy to move • Potential problems with temperature management • Occurrence of disease and pests, which are more problematic in the exclusions (e.g., powdery mildew, two-spotted spider mites, etc.) • Development of secondary pests (e.g., woolly apple aphid, the summer fruit tortrix moth, etc.) • Soil quality issues

It has been demonstrated recently that exclusion barriers could be effective strategies for the management of the invasive spotted wing drosophila, *Drosophila suzukii*, one of the main insect pests which attack berries. The studies which compared infestation of berries by *D. suzukii* inside and outside of the exclusion barriers showed that overall the exclusion barriers significantly decreased larval infestation rates.

Particularly, Burrack et al. (2013) showed that blackberries and raspberries had lower infestation rate by

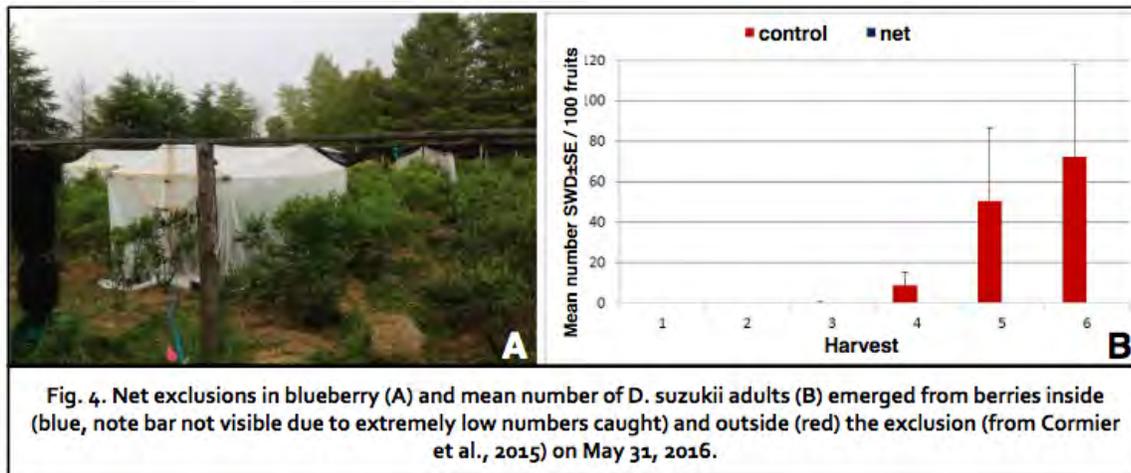
D. suzukii under high tunnels than outside (Table 2). Similarly, Rogers et al. (2015) found that covered raspberry plots (both plastic and netting) had more marketable fruit than open plots. Interestingly, plastic high tunnels had the lowest percentage of infested berries compared to netting and uncovered plots (Table 3). In another study on blueberry, Cormier et al. (2015) trapped almost no adult *D. suzukii* inside net exclusions (Fig. 4).

Table 2. Mean *D. suzukii* larvae (+/-SEM) per blackberry and raspberry inside and outside high tunnels; pooled 2010–2012 data (from Burrack et al., 2013).

Plants	Inside tunnel	Outside tunnel
Blackberry	0.34 ± 0.11	1.17 ± 0.14
Raspberry	0.56 ± 0.09	2.90 ± 0.34

Table 3. Mean *D. suzukii* larval infestation (+/-SEM) of ‘Heritage’ raspberry grown in high tunnels and open plots (from Rogers et al., 2015).

Treatment	Percentage of infested berries
Netting high tunnel – untreated	34.58 ± 7.59
Plastic high tunnel – untreated	2.08 ± 1.34
Open plot - insecticide application	60.20 ± 6.53
Open plot – untreated	80.93 ± 5.17



Although the exclusion barriers can protect berries from *D. suzukii*, this strategy can be less effective if used, for example, during pollination, or if the mesh size of net cover is too large and flies still penetrate the enclosed area. For successful control of *D. suzukii*, it is critical to use exclusion barriers at the right time and to follow several recommendations:

- 1) Plants should not be covered during pollination, in order to allow pollinators (e.g., bees) access to the flowers. The exclusion covers (plastic or net) should be placed over plants right after pollination is complete (Liburd and Iglesias, 2013).
- 2) If netting is used, the recommended mesh size is 0.98 mm or less. It has been shown on blueberries that such mesh size can provide 100% protection from *D. suzukii* (Cormier et al., 2015).
- 3) If plastic exclusion (e.g. a high tunnel) is used, we recommend to use it as a complimentary strategy to netting and to leave entrances of the tunnel covered by a net. This will minimize the number of *D. suzukii* adults entering the tunnel.
- 4) Since some plant varieties (e.g., summer-bearing and fall-bearing raspberries) have different flowering and fruiting time, exclusions can be applied in sections: the varieties which have begun to ripen can be covered, whereas flowering varieties can be

uncovered for pollination. This strategy can be helpful for small or organic growers. (Liburd and Iglesias, 2013).

- 5) Traps should be placed inside the netting to monitor for the presence of flies. It is important to not trap flies within the barrier. If flies are trapped inside the barrier, they should be controlled using an effective insecticide to eliminate the population before it builds up.

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(*Source: Wisconsin Fruit News. Vol 1, Issue 6. June 24, 2016*)

Spotted Lanternfly: Update on Control Options Sept. 2017

Amy Korman and Emelie Swackhammer, Penn State Univ.

As the result of a mild winter, the Spotted Lanternfly (*Lycorma delicatula*) population is enormous this year. In many areas in early August, trees were completely covered with feeding nymphs. Unsurprisingly, reports of Spotted Lanternfly from locations previously considered uninfested are significantly on the rise in southeast Pennsylvania.

There is limited information on pesticide options for control of Spotted Lanternfly because it is a new pest to this area. This year, Penn State Extension is conducting efficacy trials on products that are available to the homeowner for control on their property. Early this month, we began testing contact insecticides including horticultural oil, neem oil, insecticidal soap, and products that contained spinosad, carbaryl, bifenthrin, or pyrethrin as the active ingredient. Additionally, we included two systemic insecticides (both applied as soil drenches and one as a bark spray) in our preliminary trials.

Our initial observations suggest that some active ingredients produce better control than others. For those products with active ingredients of bifenthrin, pyrethrin, and carbaryl (from what was tested so far), we saw an immediate effect on caged lanternflies. There was some effect from neem oil and insecticidal soap, but results were variable. Also, the insects were not killed immediately with these products; it took several days to see the full effect. For the systemic products, the bark spray (active ingredient = dinotefuran) appears to outperform the drenches (dinotefuran and imidacloprid). We speculate that the drenches may do better if applied to the soil earlier in the season and may consider changing our study design for next year. Regardless, our 2017 study is a preliminary effort. Moreover, we have not completed collecting our data for the season.

Adult Spotted Lanternflies started emerging in early August. The female lanternflies are not reproductively mature at emergence. It is believed that they must feed on the Tree-of-Heaven (*Ailanthus altissima*) at some point in order to complete the life cycle. However, it is important to understand that the number of hosts on which the insect can complete its life cycle is unknown at this time. Other researchers are involved with determining primary and secondary host plants from opportunistic/accidental

feeding. However, Penn State Extension is also monitoring the population for general reproductive status in order to adjust control tactics (if appropriate) to target pesticide applications prior to the onset of oviposition in the majority of the population in order to make additional control suggestions that may reduce the population of the following year.

Always use pesticides carefully. Read the label to ensure your safety as well as that of the environment.

For more information on the Pennsylvania Department of Agriculture's (PDA) Spotted Lanternfly Program, please see the PDA's website: http://www.agriculture.pa.gov/protect/plantindustry/spotted_lanternfly/Pages/default.aspx

Penn State Extension will continue to provide updates as information becomes available.



Photo: Emelie Swackhammer

(*Source: Penn State Fruit Times September 2017 Update*)

UPCOMING MEETINGS:

September 12, 2017 – *UMass Vegetable Program's Research Tour and Pest Roundtable*. 4pm-7pm. UMass Crop Research and Education Center, 91 River Rd. Deerfield, MA. 3 Pesticide credits available. For more information go to: <https://ag.umass.edu/vegetable/events/twilight-meeting-umass-vegetable-programs-research-tour-pest-roundtable>.

September 13, 2017 – *Seedless Table Grapes & Fall Strawberries Meeting (Postponed from Sept. 6th due to weather concerns)*. 5:00. NH Ag. Experiment Station's Woodman Farm, 70 Spinney Ln., Durham NH. **For more information**, contact Becky Sideman (becky.sideman@unh.edu) or Suzanne Hebert (603-862-3200). Click [here](#) to view the flyer.

September 13, 2017 – *Best Management Practices for High Tunnel Nutrition and Soil Health*. Poughkeepsie Farm Project 51 Vassar Farm Lane, Poughkeepsie, NY 12603. More info: <https://enych.cce.cornell.edu/event.php?id=773>

December 5-7, 2017 – *Great Lakes Expo*. Devos Place Conference Center and The Amway Grand Plaza Hotel, Grand Rapids, MI. Registration opens September 25, 2017. Go to <http://glexpo.com> for more details on program and registration.

December 12-14, 2017 – *New England Vegetable & Fruit Conference*. This is the premier fruit and vegetable conference in the New England with over 30 information sessions over 3 days, many Farmer-to-Farmer information sharing sessions each day, over 150 vendors in an expansive trade show, and networking opportunities with and expected 1,500 participants. This conference offers valuable information for growers of all levels of experience from prospective growers or new entry beginners to well seasoned experienced growers, different sized operations from homestead to large commercial farms, and a range of growing systems including organic, IPM, conventional, greenhouse/tunnels, and many others. This year's conference has incorporated some new programming. Come see what's doing and how attending this conference can help your farm. See the website for program and registration information as it becomes available. Go to <https://newenglandvfc.org>.

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