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CROP NOTES:

Strawberries: Fields remain quiet at this time of year except day neutral varieties that are fruiting. Maintain a good pest management program in day neutrals with particular attention to tarnished plant bug and spotted wing drosophila. Late summer and early fall is a good time to fertilize both new and established June-bearing strawberry fields. Typically strawberries will need 20–50 pounds of nitrogen at this time of year. Amounts depend on how much was applied at renovation and the organic matter content of the soil. Evaluate established fields for the foliar diseases or other problems that could carry over to next year. Also scout fields for weed problems that can be addressed in the fall.

Brambles: Summer raspberry harvest is complete and spent floricanes should be removed to allow for good light penetration to primocanes. This can increase flower bud formation along the length of the canes. Continue tipping the new primocanes of black raspberry and blackberry to encourage lateral branching. Monitor for two-spotted spider mite and control if necessary. Fall raspberries are in full production and SWD management is the most important activity at this time. SWD populations are increasing rapidly now in many areas following some much needed rain. 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. Be sure to provide irrigation (drip preferred) so the canes can size up the fruit. Also check for mites and leafhopper damage. Blueberries: harvest is winding down. Late season varieties showed increased SWD infestation levels where rigorous management was not employed. Survey fields before fall dormancy for weak bushes and determine whether or not Blueberry Stunt or Scorch virus may be the cause. Contact the UMass Extension Plant Diagnostic Lab for help with virus testing. Only non-nitrogen fertilizer applications should be made this late in the season if leaf tissue tests indicate deficiency. Also, be sure to keep your blueberries watered during the coming weeks to avoid drought stress as they go into dormancy. Scout fields for weeds to prepare for late season management strategies.

Grapes: are in veraison and approaching harvest for early ripening table grapes. Scouting for disease and insect levels and taking corrective action are still important activities now. Prepare for wine grape harvest by checking fruit ripening parameters regularly.
ENVIRONMENTAL DATA
The following growing-degree-day (GDD) and precipitation data was collected for an approximately two week period, July 14 through July 27. Soil temperatures and phenological indicators were observed on or about July 27. Total accumulated growing degree days (GDD) represent the heating units above a 50° F baseline temperature collected via our instruments for the 2016 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.

<table>
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<tr>
<th>Region/Location</th>
<th>GDD</th>
<th>Soil Temp (°F at 4&quot; depth)</th>
<th>Precipitation (in inches)</th>
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<td>2016 Total</td>
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<td>Shade</td>
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n/a = information not available

(Source: UMass Landscape Message #17, July 29, 2016)

Implications of Drought Status on Small Fruit
Sonia Schloemann, UMass Extension

According to the U.S. Drought Monitor, as of August 2, 2016 almost 92% of Massachusetts is under moderate to severe drought. This means that fruit and vegetable growers must pay close attention to irrigating all crops. In general, providing 2” of water per week is recommended and delivering this water via drip irrigation is best. Overhead irrigation is susceptible to more evaporation and also delivers water to more than just the root zone of the crop.

For strawberries, the post renovation period, where plants are regenerating their canopy, is an important time to keep plants well watered. Drought stress can weaken plants and lead to later problems. Blueberries will be setting fruit buds soon for next year’s crop. Avoiding drought stress in these shallowly rooted plants is very important to insure a good crop next year. Summer raspberry harvest is done and with spent floricanes removed, plants will need somewhat less water than during the harvest period. However, they still need at least 1” of water each week to remain healthy. Fall (primocane fruiting) varieties are in full production now and have a high water demand (at least 2”/week). And grapes are at veraison (berry coloring) and will be ripening fruit soon. Grape vines are very deep rooted and therefore more drought resistant than some other fruit types. However, if they go in to drought stress and then experience sudden precipitation from fall storms, the berries in some varieties (especially table grapes) are likely to split like cherry tomatoes. To avoid this happening, irrigating now with at least 1” water per week will keep vines on a more even keel and less vulnerable to the effect of later rains.

STRAWBERRY

Late Season Strawberry Care – Including Foliar Disease Management
Kathy Demchack, Penn State Univ.

This is the time of year when your strawberry plants are initiating flower buds for next year’s crop. So, anything you can do take care of your plants now will help to increase next year’s yields. Failure to take care of them now could set the stage for poor yields next year. So, what do we need to do? 1) Make sure the plants have adequate water (1-2” per week). 2) Make sure the plants have sufficient nitrogen (20 to 30 pounds applied during the mid-August to mid-September time frame, or slightly more on sandy soils). If you’ve experienced a lot of rain
since renovation, you may want to apply the nitrogen a bit earlier than usual, especially if plants are light green and are not growing as fast as usual. Nitrogen you applied at renovation may have been washed through the soil, especially if it was in a nitrate form. 3) Keep an eye out for foliar diseases (as you’ve probably noticed, there are a lot of them out there this year), and apply an effective fungicide for any fungal diseases. Injured leaves = less photosynthesis = less food for flower buds and healthy root growth, and a lot of inoculum overwintering can damage your plants, including fruit, next year. The trick is correctly identifying which leaf disease(s) you have, and knowing whether any the symptoms you are seeing are caused by fungus or a bacteria. Fungicides only work on diseases caused by fungi. So... here’s a description of leaf diseases I’m seeing most frequently this year, in order from most common to least common, at least for 2009.

Leaf scorch (left) and angular leaf spot (right) when viewed with light shining down on the leaves.

**Leaf scorch:** Spots on leaves start out circular and dark red to purple. Eventually the center may turn brown, spots may coalesce, and entire leaves and become affected and die, given the whole plant a scorched appearance. Some common fungicides are effective against this disease, which can be easily confused which angular leaf spot, on which fungicides will have no effect.

**Angular leaf spot:** At first, light green “windowpanes” between the veins show up on the leaf when it is held up to the light. From the top, these areas may have a blackened appearance at first. Later on, as affected areas enlarge and coalesce, the leaves may develop a reddish tinge, with leaf tissue eventually dying and turning brown. This disease (along with gray mold) was responsible for a lot of caps on the fruit turning brown or black this past spring. Fungicides don’t affect this disease, but copper can help (see cautions below). Since leaf scorch and angular leaf spot are easily confused, here are some photos to help tell the difference. These photos are of the same two leaves, held differently so sunlight either shines down on them, or through them. The primary disease affecting the leaf on the left is leaf scorch, and the one on the right, angular leaf spot. In the first one, where sunlight is shining down on the leaves, the leaves appear very similar. In the second photo, where leaves are held up so that sunlight shines through the leaf, you can see that light does not shine through the leaves with leaf scorch on the left, but the “windowpane” effect of angular leaf spot can be clearly seen in the leaf on the right. Note that in these two leaves, there is some of each disease present on each leaf, but the disease causing most of the spots is different.

**Powdery mildew:** Usually the first symptom noticed is leaf curling, where leaves fold inward along their length. There may be a purple tinge to the leaves. White powdery growth on the upper leaf surface may or may not be seen, but if you look at the leaves under magnification, as with a 16x hand lens, you may be able to see the growth of fungal mycelia on either leaf surface. On the leaf undersides, be careful not to confuse strawberry leaf hairs (they’re straighter and thicker) with the mycelia.

**Phomopsis leaf blight:** As lesions grow, they form a Vshape, with the wide portion of the “V” at the leaf’s edge.

**Common leaf spot:** I’m seeing less of this all the time - most of today’s common strawberry varieties have resistance. Spots are small (1/8 to 1/4 inch across), and develop white to gray centers, which may fall out.

Once you’ve figured out which disease(s) you have, how do you treat them? First, any cultural controls that improve air circulation will help greatly. Keep rows narrowed, and keep plantings weeded. As a general rule of thumb, Nova and Pristine work well on any of the above diseases except for angular leaf spot – just be sure to tank-mix or alternate chemistries, such as with Captan, as both are susceptible to resistance development. Captan or Captevate work quite well on leaf scorch, common leaf spot,
and phomopsis leaf blight, but not powdery mildew or angular leaf spot. Copper helps with angular leaf spot, but phytotoxicity is a concern, so follow precautions on the package and discontinue use if phytotoxicity appears. For more info on these diseases and their biology, efficacy ratings, and management options, see the most recent version of the Mid-Atlantic Berry Guide [or 2015 New England Small Fruit Pest Management Guide]. (Source: Pennsylvania Fruit Times Vol. 28, No. 7)

Evaluation of Strawberry Varieties for High Tunnel Production
Wenjing Guan, Purdue University

We are familiar with strawberries grown as a perennial crop in Indiana. Bare root strawberry plants are set in the spring. Fruit is first harvested in the second year and the planting is renovated annually. Using this system, strawberry seasons last for three to four weeks from middle May through June. The traditional system has been replaced with an annual plasticulture system in the southern United States ever since the 1980s. In the annual plasticulture system, strawberry plugs (rooted runner tips) are transplanted in plastic covered beds in late summer or fall. Fruit are harvested in spring in the next year. After the fruiting season, the plants are removed. The annual plasticulture system is favored in the south because it has a longer harvest period and produces strawberries with better quality. In Indiana, trials established to test the annual plasticulture system had limited success because of short fall season and harsh winter. However, this impression might be changed with the use of high tunnels. Studies have shown that high tunnels extended strawberry season, increased yield and improved berry quality. To test feasibility of growing strawberries in high tunnels with the annual production system, a trial was conducted at Southwest Purdue Agricultural Center from August 27, 2015 to May 31, 2016 to test yield, quality and harvest period of ten strawberry varieties (Figure 1). In this article, we will discuss findings of the trial.

Varieties tested in the trial include:

- Albion
- Benicia
- Camarosa
- Camino Real
- Chandler
- Festival
- Radiance
- San Andreas
- Sweet Ann
- Sweet Charlie

Overall, the trial achieved great success. A total of 1,295 lbs of strawberries were harvested from 660 plants (66 plants of each variety) in a 30 x 96 high tunnel. For most of the varieties, peak harvest season started in middle April and lasted till the end of May. ‘Albion’, ‘San Andreas’ and ‘Sweet Ann’ are day-neutral varieties, they started to produce berries in middle October. Although the yield in fall can hardly justify commercial production. The only exception might be ‘Albion’ that produced the most berries in October, November and December (0.17 lb/plant).

The top yielding variety in this trial was Radiance that produced 2.86 lb berries per plant, following by San Andreas (2.37 lb/plant), Chandler (2.17 lb/plant) and Benicia (2.08 lb/plant). ‘Camarosa’, ‘Sweet Ann’ and ‘Sweet Charlie’ had the lowest marketable yield (1.42 lb/plant, 1.62 lb/plant, and 1.69 lb/plant, respectively). ‘Radiance’ produced the most strawberries, it was also the variety that had the longest harvest period. A few ‘Radiance’ strawberry ripened in November, December and during the coldest period in January and February. Primary harvest took off in end April. In the spring, harvest of ‘Sweet Charlie’ and ‘Benicia’ started in early April, about 10 days earlier than other varieties.

We harvested some very large berries with individual berry reached 2.7 ounces. Average weight of berries ranged from 0.54 to 0.97 ounces according to varieties. ‘Sweet Ann’ produced the largest berries, followed by ‘Albion’ and ‘Radiance’. ‘Chandler’ and ‘Camarosa’ had the smallest-sized berries. During the peak harvest, ‘Festival’ and ‘Camarosa’ were the sweetest. ‘San Andreas’, ‘Radiance’ and ‘Festival’ had relatively firmer berries while fruit of ‘Chandler’ were much softer, easily being damaged through handling.

Unmarketable fruit of most of the varieties were less than 15% of the total yield except ‘Sweet Ann’ (21%) and ‘Camarosa’ (18%) in this trial. Most of the cull fruit were

Figure 1. Strawberries grown inside a high tunnel at Southwest Purdue Agricultural Center. Photo was taken on April 16 2016.
caused by gray mold. Other disease and pest problems we have encountered include powdery mildew, yellow stripped armyworms and two-spotted spider mites. In winter, we used row covers for frost protection. Pollination was carried out by wind.

The 2015/2016 season was featured by warm fall and mild winter that was favorable for strawberry production. In the 2016/2017 season, we will continue to test the strawberry production system with the focus on developing ideal fertility plans.

For more information regarding production practices of the trial, please contact Wenjing Guan at guan40@purdue.edu or 812-886-0198.

We acknowledge McNitt Growers for donating strawberry plugs for the trial. (Source: Facts for Fancy Fruit, Issue 16-09, July 22, 2016)

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RASPBERRIES/BLACKBERRIES

Red Druplet Disorder of Blackberry
Gina Fernandez, North Carolina State University

Now that we are reaching peak harvest and peak summer temperatures, red drupelet disorder is starting to appear in harvested fruit. After the fruit is harvested, individual black drupetlets will revert back to a red color. Red druplet disorder is also called reversion, reddening or red cell. Penny Perkins-Veazie has worked on this problem for several years. Here are some of her thoughts:

- Harvest before 10 am, get to cooler within an hour of harvest.
- Remove heat quickly or delay field heat development.
- Forced air cool may need to be set 5 F higher than usual to avoid excess coldness at top of pallet.
- Semi truck loads tend to have more red drupe at front end (near rig) and at top due to air movement and nearness to cooling units.
- Least susceptible variety continues to be Navaho. Those showing problems are Natchez, Tupi. Ouachita can be problematic if rainfall has been high and harvest is going into afternoon.
- I’m not sure about PrimeArk 45 or Osage. The new ‘crispy’ type does not seem to get red drupe, indicating a firmness/cell wall component in color reversion.
- A 15% red drupe (color reversion) in the load is considered the limit to avoid rejection.
- Trellising or using E-W row orientation helps to keep fruit in shade longer, decreases exposure to light/heating. (GF: our shift/RCA trellises seem to have less red and white druplets in general)
- We are not yet sure of production practice issues on red drupe although some reports with tunnel grown blackberries indicate keeping nitrogen rates lower and avoiding heat buildup help with the problem.
- Environmental possibilities for exacerbating the problem seem to be water stress (high rainfall within a few days of harvest, or high rainfall in spring followed by very hot temperatures), nitrogen imbalance, and possibly calcium/potassium availability.

Max Edgley, from the University of Tasmania, has an excellent slide show on this disorder. Max attended the Rubus and Ribes Symposium last year and has shared some of his findings [here](https://teamrubus.com/).

(Source: Team Rubus Blog, July 6, 2016)
Broad Mites in Blackberries — a 2016 update

Kathy Demchak, Penn State Univ.

Broad mites have potential to be a problem on blackberries once again this year, with damage already being noted in some other states. Generally symptoms show up on just a few plants first, so it is important to recognize them before the problem becomes widespread.

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

There is a window of opportunity to greatly slow the spread of broad mites if symptoms are noticed early and plants are rogued. An article written on this topic last fall for the Fruit Times newsletter provided details on the situation and images to help with diagnosis of damage. Additional newsletter articles can be found in the April 25, 2016 issue, and the July 14, 2016 Alert of the Arkansas Fruit and Nut News.

Syngenta has issued a 2(ee) label for use of Agri-Mek SC for broad mite control on caneberrys in 7 states (AR, FL, IL, IN, NC, PA, and SC, effective from July 6, 2016 to July 6, 2020; in addition to a supplemental label that already was issued for spider mites on caneberrys. This is a welcome addition, as the number of miticides labeled for use on blackberries is somewhat limited, and none currently are labeled for management of broad mites.

Broad mites are found primarily in the tender terminal growth of blackberries, unlike 2-spotted spider mites which are found on the lower leaves. Because of this fact, materials that have translaminar activity (i.e., can make their way into the plant tissue), which Agri-Mek does have, are needed for effectiveness against broad mites. Agri-Mek is also reported to provide residual control that lasts 21 days. It’s also important to get good coverage of the correct area of the plant.

Agri-Mek SC has a 7-day PHI, so the time to treat is either early before harvest starts (but ONLY if broad mites are present – don’t just spray “in case”), or in the case of floricane-fruiting varieties, after harvest is over. Work conducted at the Univ. of Arkansas showed good efficacy of this material, but it was found that a second application may be needed to control mites that hatched after the first application. Apply Agri-Mek SC at a rate of 3.5 fl oz/acre mixed with non-ionic (NIS) activator type wetting, spreading and/or penetrating spray adjuvant (read activator label, usually use 0.5% NIS v/v). Scout weekly using a 20X magnification lens to check for presence of active broad mites: immatures are white and adult females are amber with white hour glass shape on back. The life stage that is the least likely to be confused in appearance with other species, however, is the eggs, which are clear with white dots, and sometimes described as “jeweled” in appearance.

Greatly-magnified young blackberry fruit with broad mite female (right) and eggs (left of center). Photo credit: Sara May, Penn State Univ.
Remove a leaflet from the first expanded terminal leaf from each of several randomly selected primocanes in each planting and inspect for broad mites on the underside of each leaflet. Also, walk your blackberry field looking for the first terminal damage (leaf bronzing or cupping). If this pest is present, it is time to apply a miticide, and reapply 7 days later (if live mites are still present), when there is an average of between one to five active broad mites per leaflet or you first detect terminal leaf damage. Only 2 applications of Agri-Mek SC are allowed in a year, as resistance development to miticides is a serious concern with broad mites as well as other mites. (Source: PA Fruit Times, July 29, 2016)

**Late Leaf Rust of Raspberry**

*James Travis, Penn State Univ.*

Late leaf rust can be a problem on fall-bearing raspberries. The disease infects red and purple raspberries but not black raspberries or blackberries. This rust, unlike orange rust, is not systemic.

**Symptoms:** Yellow masses of spores are noticed primarily on fall fruit of primocane-bearing varieties, making the fruit unmarketable. Because symptoms on the fruit do not usually develop until late in the season, infections in plantings of summer-bearing varieties may go unnoticed. Powdery yellow spores also form on the undersides of leaves, causing badly infected leaves to drop prematurely, but this symptom is generally not noticed until infected fruit is seen.

**Disease Cycle:** There are several species of late leaf rust fungi worldwide. In our region, *Pucciniastrum americanum* is believed to be the causal agent. White spruce and Engelmann spruce serve as alternate hosts, and their closeness to a planting may increase the likelihood of occurrence. Spores are produced on infected spruce needles in early summer and can infect raspberries. High humidity is necessary for infection to take place. The raspberries will show symptoms shortly afterward. However, spruce are thought not to be necessary for the rust to survive in a planting once infected since this disease has occurred in successive years in plantings with no spruce in the vicinity. Spores are disseminated by wind but may also be physically moved from infected to uninfected plantings by people or machinery.

**Disease Management:** Clean nursery stock is important since planting stock can be the initial source of inoculum. Control is aided by cultural practices that increase air circulation within the planting such as thinning canes, keeping rows narrow, and practicing good weed control. Prune fall bearers to the ground; do not keep canes around for a summer crop and rake and dispose of all old leaves. Removing floricanes and infected primocanes in winter will reduce the amount of inoculum. This disease has been especially problematic on summer-bearing Festival and fall-bearing Heritage and Jaclyn. Fall-bearing Josephine and spring-bearing Nova and Esta red raspberries tend to be resistant. Because this fungus is not systemic, eliminating the disease from plants is possible. Refer to Table 7.5 [or the 2015 New England Small Fruit Management Guide] for pesticide recommendations. (Source: Penn State Small Scale Fruit Production Guide)
BLUEBERRY

Impacts of Heat
Mary Concklin, UConn

The heat this summer has impacted fruit and the plants. These blueberry leaves with the red center were interesting because of the pattern which did not fit a biotic disorder or nutritional problem. When the leaf was moved in the picture to the right it became apparent the upper leaf was protecting part of the lower leaf and that this disorder was related to the environment. Several diagnosticians in the country weighed in and said it was related to extreme heat and they had seen this same pattern in azaleas and rhododendrons. (Source: CT Small Fruit Update, July 29, 2016)

Putnam Scale in Blueberries
Cesar Rodrigues-Saona, Rutgers University

Crawlers are now present on trap tapes that were placed on infested bushes. This is the start of Putnam scale emergence. If using Esteem, then treatments can be applied now. If using Diazinon, then wait until next week. Not matter what the insecticide is, use enough volume.

Life history: Scales feed on plant sap, decreasing plant vigor and fruit yield. Adult scales are protected from insecticide sprays by a waxy covering. These insects are common in older canes when not removed, and located mostly under loose bark. In New Jersey, the Putnam scale has two generations a year. It overwinters as second-instar nymphs under loose bark. Spring activity begins in early February. Eggs from the first generation are laid in late April, and immature “crawlers” begin to appear in mid-May. Peak crawler emergences occur in late May and early June. Peak crawler emergences for the second generation occur in early to mid-August (this time of year).

Monitoring and Management: Growers that have a scale problem need to treat post harvest for the 2nd generation of crawlers (use Diazinon or Esteem). Crawlers can be monitored by wrapping black electricians’ tape covered by double sided sticky tape around canes. Use a hand lens to see crawlers on the sticky tape. Sprays should coincide with crawler emergence. (Source: Blueberry Bulletin, Volume 30, No. 15, August 18, 2014)
Powdery Mildew on Blueberries – Not Symptoms You’d Expect
Kathy Demchak and Cassandra Swett, Penn State Univ.

Powdery mildew, a warm-weather high-humidity disease, is present in some blueberry plantings. Lowbush, highbush, and rabbiteye blueberries are all affected. Symptoms on blueberries are different from those on most other plants, and could be mistaken for a virus or bacterial disease. The powdery mildew organism, Microsphaera vaccinii, at first causes a yellow mottling on the upper leaf surfaces (Photo 1), but eventually the mottled areas develop into red spots with a lighter margin; both of these symptoms could be mistaken for a virus. Symptoms on the lower leaf surfaces consist of water-soaked areas (Photo 2) that turn reddish; these symptoms might make one think that the plants have a bacterial disease. The typical “powdery” patches as seen on other crops may be present, but often are not.

Since disease development is favored by warm, dry weather, symptoms start to appear in mid-summer. The fungus overwinters in dormant buds, so inoculum can build up over time if not managed. In most cases, this disease has minor impacts on growth and fruit production, primarily causing infected leaves fall off prematurely. In rare cases impacts on growth can be severe.

Generally powdery mildew incidence on blueberries is not sufficiently severe to warrant a fungicide spray. However, if leaves are severely affected, fungicides such as Orbit, Tilt or Quash (all in activity group 3), or Pristine (activity groups 7 and 11) may be used. Be sure to follow label directions to avoid development of resistant fungal strains. Cultivars vary in resistance, but information on this subject is limited.

Thanks to Tracey Olson at the PA Dept. of Agriculture for bringing the presence of this disease to our attention and for providing photos for this article. (Source: PA Fruit Times, August 28, 2015)

Photo 1: Early powdery mildew symptoms on upper surface of blueberry leaf. Credit: Tracey Olson, PA Dept. of Agriculture

Photo 2: Powdery mildew symptoms on lower surface of blueberry leaf. Credit: Tracey Olson, PA Dept. of Agriculture

GRAPE

Grape Berry Moth
Alice Wise and Wayne Wilcox, Cornell University

Grape Berry Moth continues to frustrate many growers. Is it spray coverage or spray timing? Or maybe we don’t have a good handle on the biofix date for the NEWA model (a topic for discussion this winter). And here is the ‘happy’ news from the NEWA website. Background: according to the model, 1620 GDD is the threshold at which treatment is required if >15% of clusters are infested. We are well past 1620 GDD. And so the model states: ‘If 1620 DD occurs prior to August 5 [which it did], you can expect continuous pressure from grape berry moth through harvest. Model results are not good predictors of timing of population pressures.

Multiple additional insecticide applications may be necessary in high pressure vineyards to address the extended egg-laying and overlapping generations. Continuous coverage is necessary to avoid excessive crop loss.

NOTE: Insecticide applications after mid-September will have limited effectiveness in preventing damage.’

Locally, a number of growers are talking about Bt applications, preferring to use softer materials at this point in the season. Organically approved Dipel is one of the more common Bt products (Bacillus thuringiensis subsp. kurstaki strain ABTS, 4 hr REI, 0 d PHI). Biobit is another Bt labeled for NY grapes. Entomologists recommend back-to-back applications with 5-7 day intervals.

Coverage is the absolute key to success as the larvae have to eat the residue. Entrust (spinosad, 4 hr REI, 7 d PHI) would be another organic option. The label states back-to-back applications may be necessary (due to rapid breakdown of the product) with an interval of at least 5 days and recommends no more than 2 consecutive applications. A third option would be the reduced risk material Delegate (spinetoram, 4hr REI, 7 d. PHI). As with the others, back-to-back applications...
are recommended with no more than 2 consecutive app’s. Final comment: due to the expense of these products and the need for repeat applications, it is wise to focus treatments on areas that really need it.

Note that Entrust and Delegate are also labeled for spotted wing drosophila, more information to come on that topic. (Source: LI Fruit & Vegetable Update August 4, 2016/3)

Don’t Let Bunch Rots Ruin Your Grapes
Annemiek Schilder, Michigan State University

This 2014 growing season, Botrytis bunch rot may be a bigger menace than usual due to prevailing moisture and high humidity. Botrytis bunch rot is caused by the fungus *Botrytis cinerea* and is the most common cause of pre-harvest losses of wine grapes. Another problem may be sour rot, caused by acetic acid bacteria, yeasts and certain fungi. Sour rot can explode after heavy rainfall during fruit ripening, resulting in swelling and bursting of berries, especially near woods. Fruit flies get in on the melee and help spread the microbes on their bodies. Botrytis and sour rot can be present in the same cluster, in addition to Phomopsis and black rot, so it is important to distinguish the culprits. Bunch rot often begins in one or a few berries, and can consume most of the cluster under the right conditions. Sometimes when rot is prevalent or developing faster than expected, the harvest date has to be moved up to avoid excessive losses.

There are various fungicides available for control of Botrytis bunch rot while very few aid in sour rot control. Sour rot is best controlled by leaf pulling around the clusters between bunch closure and verasion to reduce humidity and increase sun exposure. While biocontrol agents like Serenade (*Bacillus subtilis*), Actinovate (*Streptomycetes lydicus*) and Blightban (*Pseudomonas fluorescens*) may help by competing with sour rot microbes, leaf pulling is the main control method. Growers in Ontario apply potassium metabisulfite to “dry out” the clusters and kill yeasts and bacteria.

For Botrytis treatments, Michigan State University Extension advises growers to make sure to alternate fungicides in different chemical classes to avoid fungicide resistance development. The Fungicide Resistance Action Committee (FRAC) code indicates the mode of action; any fungicides with the same FRAC number share the same mode of action. A conventional standard that has been quite effective in our fungicide efficacy trials is a Pristine/Vangard alternation: bloom (Pristine), bunch closure (Vangard), verasion (Pristine) and two weeks before harvest (Vangard). Adding another chemical class (e.g., Elevate) would be even better from a fungicide resistance management perspective. Biological control agents and reduced-risk products also can be used, particularly during lower risk periods (e.g., bunch closure) or when approaching harvest to avoid fungicide residues.

Below is a list of products with efficacy against Botrytis bunch rot.

**Elevate**: fenhexamid, FRAC group 17, locally systemic; zero-day pre-harvest interval (PHI). Good to excellent preventive and limited post-infection activity.
Endura: boscalid, FRAC group 7, systemic, 14-day PHI. Good to excellent preventive and post-infection activity. Use at an 8-ounce rate for Botrytis control.

Flint: trifloxystrobin, FRAC group 11, locally systemic, 14-day PHI. Moderately good preventive and limited post-infection activity. Works better at higher rate.

Inspire Super: difenoconazole + cyprodinil, FRAC groups 3 and 9, systemic, 14-day PHI. It is mainly the cyprodinil component that provides Botrytis control. Good to excellent preventive and post-infection activity.

Luna Experience: fluopyram + tebuconazole, FRAC groups 7 and 3, systemic, 14-day PHI, 10-day REI for leaf pulling, trying and training in wine grapes. Good to excellent preventive and post-infection activity.

Pristine: pyraclostrobin + boscalid, FRAC groups 11 and 7, systemic, 14-day PHI. Good preventive and post-infection activity, but only at the high rate of 18.5-23 ounces per acre.

Rovral: iprodione, chemical group, FRAC group 2, locally systemic, seven-day PHI. Moderate to good preventive and limited post-infection activity; activity is improved by addition of oil or non-ionic spray adjuvant.

Scala: pyrimethanil, FRAC group 9, systemic, seven-day PHI. Good to excellent preventive and post-infection activity.

Switch: cyprodinil and fludioxonil, FRAC groups 9 and 12, systemic, 14-day PHI. Provides good Botrytis control. Preventive and post-infection activity.

Topsin M: thiophanate methyl, FRAC group 1, systemic, 14-day PHI. Good preventive and post-infection activity.

Vanguard: cyprodinil, FRAC groups 9, systemic, seven-day PHI. Good to excellent preventive and post-infection activity.

Reduced risk and biocontrol agents:

Botector (Aureobasidium pullulans): biocontrol agent, locally systemic, zero-day PHI. Good to excellent preventive and limited post-infection activity.

Regalia: giant knotweed extract, FRAC group NC, induced resistance, zero-day PHI. Good to excellent preventive and limited post-infection activity.

Serenade (Bacillus subtilis): biocontrol agent, protectant, zero-day PHI. Fair to moderate protectant activity. Organic formulation can be used in organic vineyards. (Source: MSU Fruit Crop Advisory, August 6, 2013)

Grape Anthracnose

Bruce Bordelon, Purdue University

With all the rain we’ve had in 2015 it is not surprising to see more disease problems than normal. One disease that is widespread this year is grape anthracnose, aka black spot or Bird’s eye rot. There have been numerous reports from both commercial vineyards and home grape plantings. This disease is not uncommon, but is seldom widespread except in very wet years. All the rain we’ve had this year is making the disease worse than normal. In addition, the newer cold hardy grape cultivars from Minnesota appear to be highly susceptible to anthracnose. There are now several acres of Frontenac, Marquette and La Crescent planted in the state.

Anthracnose can infect all green grape tissues, (Fig. 4). Symptoms first appear early in the year on the first few internodes of new shoots. They are deep lesions with dark margins and a gray center. If the disease spreads to young tissue, it can distort and kill the shoot tips, giving the shoots a burned appearance. Leaf lesions often cause the leaf to distort and curl. Centers of the spots often fall out, leaving a shot-hole appearance. fig grape anthracnose The disease spreads to developing berries. Berry lesions appear as a dark spot with a gray center, giving the disease its common name, Bird’s eye rot. Bird’s eye rot is mostly cosmetic, as it does not affect the eating or processing quality of the fruit, (Fig 5). Severe infection, however, can reduce vine vigor and yield.
Managing anthracnose can be relatively easy. The best control method is to apply a delayed-dormant application of liquid lime sulfur or Sulforix (calcium polysulfide). This fungicide effectively kills the developing spores (primary inoculum) at the beginning of the season and prevents the disease from becoming established. If this spray is missed and the disease becomes established, control is more difficult. Lime sulfur will burn tender foliage so it must be applied just as buds are swelling, but before the leaves are exposed. After bud break, mancozeb, captan and the strobilurin fungicides such as Abound or Sovran can provide some control and keep the disease from spreading. But the single application of lime sulfur usually provides nearly complete control. That’s why it’s important for growers with a significant problem this season to plan ahead for an early season fungicide application next year. *(Source: Facts for Fancy Fruit, Vol. 15, Issue 9, August 14, 2015)*

**GENERAL INFORMATION**

**Dry Soil Conditions Impact on Nutrient Availability**

*Deanna Németh, Ontario Ministry of Agriculture and Rural Affairs*

Although the past week brought some much needed rain, many locations in Ontario were experiencing prolonged dry soil conditions. These extended periods of very dry soil conditions can reduce Nitrogen (N), Phosphorus (P) and Potassium (K) availability to plants.

**Nitrogen**

For N, low soil moisture decreases soil microbe activity. Microbes play an important role in breaking down organic matter and converting organic N to inorganic nitrate nitrogen, a process called mineralization. In dry soils with low N mineralization, there could be less plant available N in the form of either ammonium (NH$_4^+$-N) or nitrate (NO$_3^-$-N) nitrogen. In dry soils, the risk of NO$_3^-$-N loss through leaching or denitrification is reduced. While this means there is more soil N available to crops, plant uptake can be reduced. When the rains return there can be a sudden increase in soil nitrogen. If this occurs late in the season it may be detrimental for perennial crops going into dormancy.

**Phosphorus**

Reduced soil microbial activity in soils with low moisture can reduced organic matter decomposition and the mineralization of organic P to inorganic P. Phosphorus moves from higher concentrations in the soil to lower concentrations in plant roots by diffusion. As soils become drier, less diffusion occurs. This is because the water film around the soil particles becomes thinner, making diffusion to the plant root more difficult.

**Potassium**

Decreased movement of K to the plant roots occurs in dry soil. As soil dry, clay minerals become dry and shrink, trapping K tightly between mineral layers. Once trapped, K is unavailable to plant roots for uptake. This K is released and plant available again when the soil moisture increases. Reduce K uptake during extended dry soil conditions can show up as low K levels in tissue samples or high K levels in a post-harvest soil sample. Taking soil samples in a dry year and comparing it to normal years can provide valuable information to for what to expect if future dry years occur again.

**Crop nutrient removal in dry conditions**

Plant N, P and K uptake under extended periods of dry soil conditions may be less. As a consequence of this it
is likely that nutrients applied from fertilizers and organic sources may still be available the following year. Soil testing in the fall of 2016 is the best to estimate the remaining nutrients available for the next 2017 crop. In dry years, a recent soil sample is a better estimation for next year’s crop nutrition program than a sample that is older (e.g. more than 3 or 4 years old).

A fall soil test will help in accounting for nutrients carried over from 2016 to the 2017 crop. Nutrients that could be carried over and should be credited from one year to the next include:

- Mobile nutrients like nitrate nitrogen, sulfate, and boron in the soil
- Immobile nutrients previously applied like phosphorus, potassium and zinc
- Nutrients in crop residues

For more information, contact:

Deanna Németh, Horticulture Sustainability Specialist, OMAFRA
Christoph Kessel, Soil Fertility Specialist, Horticulture, OMAFRA

*Reference:
Soil and Fertility Handbook. OMAFRA Publication 61, 2006
IPNI Plant Nutrition Today, W. M Stewart, No. 7, Fall 2012 (Source: Ontario Specialty Crop Update, July 29, 2016)

Reminder to Growers in the Northeast to Observe ENTRUST SC Resistance Management

Teresa Rusinek, Cornell Cooperative Extension

Last year, Dow AgroScience, manufacturer of Entrust, sent out a letter to University researchers and extension personnel asking for assistance in alerting growers to the over use of Entrust against Spotted Wing Drosophila and Colorado potato beetle. Their letter addressed issues with “noncompliance with labelled resistance management restrictions for Entrust SC in organic cropping systems”.

The letter stated that “they have been made aware that Entrust SC is allegedly being used at a greater frequency than the label allows per crop. Dow is monitoring the situation to understand if these were isolated cases or more widespread occurrences... if the non-compliance issue continues then Dow will pursue corrective action which could include a withdrawal of the product from the Northeastern United States.

Dow is concerned that resistance to Entrust SC (group 5 insecticide) will translate into pest resistance to their conventional spinosadanalogue products, Radiant SC and Delegate (also Group 5 chemistry), resulting in the loss of efficacy for conventional growers as well. The possibility of resistance developing in Colorado potato beetle and Spotted Wing Drosophila to Entrust will eliminate one of the most effective tools organic growers have in managing these pests. Withdrawal of Entrust from the Northeast would also eliminate its use for a host of other hard to control pests.
The threat of resistance to this material is real. Already, Western Flower Thrips, a serious pest in ornamentals, vegetable, field crops and greenhouse production, are known to be resistant to spinosaid. Resistance management directions on the label state that rotation to other insecticide classes should occur after two consecutive applications, check the label for details. Please pay attention to resistance management directions on the label for each crop so we do not lose this material. *(Source: New York Berry News, Issue 4, July 2016)*

**Northeast SARE Farmer and Partnership Grant Programs - Tips for Writing a Compelling Application**

*Carol Delaney, NE- SARE Farmer Grant Specialist*

Northeast SARE will be offering two free webinars on writing a Farmer Grant and a Partnership Grant proposal. **September 1 at 11 a.m.--**an introduction to Partnership Grants. Especially useful for nonprofits and their staff interested in applying.  

Register for the Partnership Grant webinar.

**September 1 at 12:30 p.m.--**an introduction to Farmer Grants. Geared toward commercial farmers and their agricultural service providers.  

Register for the Farmer Grant webinar

**Questions?** Call 802-656-0471 or send email to carol.delaney@uvm.edu

This online workshop is recommended for anyone thinking of applying for a Farmer Grant. The deadline this year is November 29 for awards in the spring.

Register at: https://attendee.gotowebinar.com/register/3376350996119085058

**2016 Extension Disaster Education Network Webinar Series**

*eXtension staff writers*

Flood-damaged home in Galena, AK

Please join us for this webinar series on a variety of disaster-related topics. Extension experts will focus on practical tips and information you can use to be prepared for disasters--from planning to evacuation. **Webinars are free and open to everyone.**

We will begin with a national drought update and new resources for addressing the impacts. We will discuss the impacts of disaster on youth. We'll also examine biosecurity plans, checklists, and protocols. We'll feature discussions on animals in radiological emergencies, livestock diseases and prevention, and farm evacuations. Disasters also impact communities and our work sites, so we'll also talk about developing community response teams and personal and office emergency plans.

Webinars will be on the second Tuesday of each month (except October, when we will meet on the first Tuesday) at 1 PM Eastern time. The webinars are brought to you by the **EDEN eXtension community of practice** and by the **Extension Disaster Education Network**.

For more information and to see the list of webinars, go to: http://articles.extension.org/pages/73442/2016-extension-disaster-education-network-webinar-series.
UPCOMING MEETINGS:

August 10, 2016 - Twilight Meeting: Equipment for Mechanical Cultivation & Product Washing and Packing, 4pm to 6pm. Tangerini’s Spring Street Farm, 139 Spring St, Millis, MA 02054. For more information contact Lisa McKeag at lmckeag@umext.umass.edu or 413-577-3976 or go to http://ag.umass.edu/events/twilight-meeting-equipment-for-mechanical-cultivation-product-washing-packing.

August 10, 2016 - NH Vegetable & Berry Growers Meeting. Heron Pond Farm, Rte 107A, South Hampton, NH 5:30 – 7:30pm www.heronpondfarm.com. For more information click here or contact George Hamilton at 603-862-3200 or george.hamilton@unh.edu.

August 15th, 2016 - IPM Climate and Weather Conference, 9am - 4:15pm. Albany County Cornell Cooperative Extension, 24 Martin Rd., Voorheesville, NY 12186. Organized and hosted by the New York State Integrated Pest Management Program (NYS IPM). Cost: $45. Pre-registration closes on August 10. If you have questions, please contact Amanda Grace at arw245@cornell.edu or 315 787-2208 or visit https://nysipm.cornell.edu/resources/nys-ipm-conferences/climate-and-weather-conference.

August 17 – 18, 2016 – North American Strawberry Growers Association Summer Tour, Quebec City Quebec Canada. For more information go to http://www.nasga.org/n-american-strawberry-growers-summer-tour.htm.

August 29, 2016 - NH Vegetable & Berry Growers Meeting. 5:30 - 7:30pm Followed by potluck dinner. Pork Hill Farm, 45 Pork Hill Road, Ossipee, NH www.porkhillfarm.com. For more information click here or contact George Hamilton at 603-862-3200 or george.hamilton@unh.edu.

September 28, 2016 - UNH Agriculture Research Field Day, 4:00 – 6:00pm. NH Agricultural Experiment Station’s Kingman Farm, Madbury NH. For more information click here.

November 2, 2016 - Managing Phosphorus in Organic Residuals Applied to Soils 8:45-4pm. Holiday Inn, 265 Lakeside Ave.Marlborough, MA 01752. Approval has been requested for the following professional certifications: CGCS, CSFM, MCH, MCLP, and AOLCP. For more information contact: Kelly Kraemer, 413-545-5221, kkraemer@umass.edu or visit: https://www.regonline.com/phosphorus

Massachusetts Berry Notes is a publication of the UMass Extension Fruit Program, which provides research based information on integrated management of soils, crops, pests and marketing on Massachusetts Farms. No product endorsements of products mentioned in this newsletter over like products are intended or implied. UMass Extension is an equal opportunity provider and employer, United States Department of Agriculture cooperating. Contact your local Extension office for information on disability accommodations or the UMass Extension Director if you have complaints related to discrimination, 413-545-4800.