

# Berry Notes

Prepared by the University of Massachusetts Fruit Team

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## Current Conditions:

**Strawberry** fields remain quiet at this time of year. Dayneutral varieties are still fruiting. Some annual production fields are being planted now. Late summer and early fall is a good time to fertilize both new and established 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. **Highbush Blueberry** harvest is about done. A few late varieties may still be active. Survey fields for weak bushes and determine whether or not Blueberry Stunt or Scorch may be the cause (see more on this below). 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. **Summer raspberry** harvest is done. Be on the lookout for Orange Rust on black raspberries and blackberries. **Fall raspberries** is in full swing. Botrytis fruit rot is still a threat, especially if wet weather returns. Be sure to provide irrigation (drip preferred) so the canes can size up the fruit. Also check for mites and leafhopper damage. **Grapes** are approaching harvest. Harvest for early season table grapes is already underway. Scouting for disease and insect levels and taking corrective action are still important activities now. Downy Mildew seems to be prevalent in susceptible varieties again this year. Prepare for wine grape harvest by checking fruit ripening parameters regularly. Mite infestations can build up quickly at this time of year. Be sure to check the underside of your leaves.

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## ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a two-week period, August 5 through August 18, 2010. Soil temperature and phenological indicators were observed on or about August 18, 2010. Accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments from the beginning of the current 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	2010 GROWING DEGREE DAYS		2009 GDD on this date	Soil Temp (°F at 4" depth)	Precipitation (1-Week Gain)
	2-Week Gain	Total accumulation			
<b>Cape Cod</b>	321	2,221	1,580	82°F	0.75"
<b>Southeast</b>	329	2,227	1,531	76°F	0.40"
<b>East</b>	342	2,404	1,702	79°F	2.02"
<b>Metro West</b>	336	2,245	1,613	75°F	0.24"
<b>Central</b>	--	--	--	--	--
<b>Pioneer Valley</b>	319	2,209	1,556	74°F	0.35"
<b>Berkshires</b>	305	2,044	1,591	75°F	1.49"
<b>AVERAGE</b>	325	2,225	1,614	77°F	0.88"

(Source: UMass Extension 2010 Landscape Message #21, Aug 20, 2010)

-- = information not available

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## STRAWBERRY

### Optimizing Strawberry Production with a Reduced Tillage System

Laura McDermott, Cornell Cooperative Extension

This project, supported by a NESARE Partnership grant, seeks to address weed control during the establishment year of a perennial matted row strawberry system while also reducing cultivation and herbicide inputs and improving soil health.

Strawberry weed control, especially in the establishment year, remains a formidable barrier to achieving optimal productivity. In an effort to address this problem, strawberry growers in the northeast have been exploring alternative production systems. Some of these systems, like annual cropping of day-neutral berries, show great promise. Other systems, like plasticulture berries, have challenges with increased input costs, plastic mulch disposal, and control of runners. Biodegradable plastic, although useful, is not yet approved for organic production. Additionally, the biological nature of this product means that the rate of decomposition is somewhat unpredictable when used on certain soil types.

A recently completed (Nov. 2009), Cornell University project that focused on controlling weeds in strawberries during the establishment year by transplanting dormant berry plants into a killed cover crop showed great promise, but revealed a significant barrier. Most growers had difficulty planting through the cover crop. This resulted in slower establishment during the first month and possibly caused skips. Additionally, research has shown that control of weeds during the first weeks of the growing season makes the most difference to yield in a matted row system<sup>1</sup>. There have also been studies that

support the use of cover crops as a way to decrease incidence of plant disease<sup>2</sup>.

We are investigating whether using a reduced tillage approach will result in better weed control and less need for herbicides for establishment year matted-row, June-bearing strawberries while providing an excellent transplant zone. We will also observe if there is better drainage in compacted soils; improved vigor and yield during the first bearing year and a lower overall cost of production while working towards improving soil health.

The reduced-till system uses a sub-soiler to loosen soil deeply followed by coulters and a rolling basket that prepare a 6-10" wide seedbed. This technique allows the longer rooted strawberry plant to be correctly planted while still having minimum soil disturbance between the rows. By only tilling this narrow area, the chance of new weed seeds being brought to the surface for germination is reduced. Because the strawberry plants will get off to a good start, they should out-compete weed competitors in the tilled zone. The addition of the shank allows for improved water drainage therefore reducing disease pressure from soil borne diseases like Phytophthora fruit rot. The use of reduced tillage tools usually requires a single trip across a field for it to be fitted for planting – an important advantage that translates into less labor, reduced fuel consumption and a decreased risk of soil compaction.

Reduced soil erosion due to reduced tillage helps keep fertilizers and pesticides in the field where they can be utilized rather than ending up in surface or ground water.

Soil erosion in a matted row system is only a concern during the establishment year and immediately after renovation. Soil structure can be improved in minimum till production systems by maintaining large soil aggregates which allow better water infiltration, improved root growth, oxygen exchange and improved soil microbial health. There is also potential for the Zone Builder to be used during the renovation of established beds as well, thereby increasing the utilization of the machine. The time and production costs saved using the reduced till system, along with the inherent advantages of planting into a killed cover crop will result in much greater adoption of reduced till in strawberry plantings. The fact that this implement can be used for many other crops on a diversified vegetable farm makes it even more attractive to growers.



There are three treatments in this study; conventional tillage, no-till and zone tillage.

1. Normal field prep done by farmer including fall tillage and rye cover crop planted in at the rate of 80#/acre along a 20' section of row, for 24 rows.
2. Plants were planted in spring 2010.
3. The first treatment would be the control, the cover crop is completely incorporated prior to planting and the entire 8 rows are fitted traditionally.
4. In the second set of 8 rows, treatment 2, berry plants were planted directly into the cover crop using transplanting equipment slightly modified for no-till.
5. For the third set of 8 rows, treatment 3, the Unverferth ripper/stripper created a 6" tilled zone in the cover crop and the berries will be planted in that zone.

6. In both treatment 1 and 2, rye was mowed later and higher to allow weed seeds to germinate and then was killed chemically. Plants were installed after cover crop was killed.
7. Weed population has been monitored during June 2010 and data will be taken in Sept 201 and June 2011.
8. Yield data will be gathered during June 2011.



This work is sponsored by NE SARE: <http://nesare.org/>

For more information about this project or other reduced till work, please contact

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2 Seigies, A.T., Pritts, M.P., and Kelly, M.J. 2006. Cover crop rotations alter soil microbiology and reduce replant disorders in strawberry. HortScience 41:1303-1308

(Source: *New York Berry News*, Volume 09, Number 8 August 12, 2010)



## 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:** Spots on leaves start out circular and dark red to purple. Eventually the center may turn brown, spots may coalesce, and entire leaves may become affected and die, giving the whole plant a scorched appearance. Some common fungicides are effective against this disease, which can be easily confused with 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



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

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.



**Leaf scorch (left) and angular leaf spot (right) when held up to the light. The same two leaves appear in each photo.**

**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 V-shape, 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 2010 New England Small Fruit Pest Management Guide]. (*Source: Pennsylvania Fruit Times Vol. 28, No. 7*)

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## RASPBERRY

### Management of Botrytis Gray Mold in Fall Raspberries

*Annemiek Schilder, Michigan State University*

Gray mold, caused by the fungus *Botrytis cinerea*, is one of the most important diseases affecting fall raspberries. Fall raspberries are usually at greater risk of infection than summer raspberries because of the prevailing weather conditions, such as lower temperatures, heavy dews and frequent precipitation. Cool, wet weather and heavy rains in the late summer and fall that keep the plants wet for extended periods are conducive to development of the fungus and infection of the fruit. Typical symptoms include a brown discoloration of the fruit and the presence of a gray fuzzy mold, which can rapidly develop and spread to neighboring healthy berries. Symptoms tend to be more severe inside the canopy and on clusters that are closer to the ground. Even if berries look perfectly healthy at harvest, they can change to a moldy mass within 24 to 48 hours. To know how much disease pressure you have and assess the efficacy of your spray program, pick 10 or 20 random ripe berries and place them in a covered dish on moist paper towel at room temperature. If berries stay 90 percent free of visible mold for three days, they are in good shape.

*Botrytis cinerea* is a ubiquitous fungus that is able to grow and sporulate profusely on dead organic matter. It overwinters in old infected canes and plant debris. The spores are airborne and can travel long distances on the wind. When the spores land on plant surfaces, they germinate and can invade the plant tissues directly or through wounds. Overripe berries and bruised berries are particularly susceptible to infection. Latent flower infections, even though they do occur, are not as important in raspberries as they are in strawberries.

Cultural methods are very important for control of *Botrytis* gray mold. Choosing a site with good air flow

can reduce humidity in the canopy considerably. Low-density plantings, narrow rows and trellising can also reduce a buildup of humidity. Good weed control and moderate fertilizer use to avoid lush growth are also important. Selecting a resistant cultivar or, at the minimum, avoiding highly susceptible cultivars will help to reduce the need for control measures. During picking, avoid handling infected berries, since spores can be transferred on hands to healthy berries. Timely harvesting and rapid post-harvest cooling can also help to reduce losses to *Botrytis* gray mold.

Several fungicides are labeled for control of *Botrytis* in raspberries. Sprays close to harvest help to reduce post-harvest rots. **Switch** (cyprodinil + fludioxonil) is a reduced-risk fungicide with excellent systemic and protectant activity against gray mold. It has a zero-day pre-harvest interval (PHI). Another good option is **Elevate** (fenhexamid), which is a reduced-risk, locally systemic fungicide with a zero-day PHI. Since these fungicides are in different chemical classes, they can be alternated for fungicide resistance management. My recommendation is to save Switch and Elevate for critical sprays, e.g., during wet periods and for sprays closer to harvest. Other fungicides that may be used in the spray program are **Pristine** (pyraclostrobin + boscalid: zero-day PHI), **Captevate** (captan + fenhexamid: three-day PHI), **Captan** (captan: three-day PHI), **Rovral** (iprodione: zero-day PHI) and **Nova** (myclobutanil: zero-day PHI). To improve the efficacy of Rovral, an adjuvant should be added. Pristine and Nova also provide excellent control of late leaf rust, which sometimes infects the leaves and fruit of fall raspberries. (*Source: Michigan Fruit Crop Advisory Team Alert: Vol. 24, No. 16, August 25, 2009*)

## **Monitoring and Controlling Bud Mites in Highbush Blueberry**

*Rufus Isaacs, Keith Mason, John Wise, Michigan State University*

With harvest ending in some west Michigan blueberry fields, and bushes forming flower buds for the 2011 season, it is time to consider bud mite management for fields that are infested with this pest. The first step is to sample fields that had poor bud development this season, to determine whether treatment for bud mites is required. This article describes identification, sampling approaches and the available control options. Blueberry bud mite (*Acalitus vaccinii*) has been identified as the cause of some problems with poor growth and low yield in Michigan blueberry fields. Sampling by crop scouts, MSU Extension and the Berry Crops Entomology program has detected this pest across most of the major blueberry production regions in our state. However, only some fields have sufficient populations to cause economic levels of injury, and only some cultivars are susceptible. For example, in Grand Junction, we have seen Rubel bushes with high infestation and damaged growth growing next to Bluecrop plants that showed no visible symptoms. Because of this, **bud mite management is warranted only in fields where 1) poor growth/damage have been seen, AND 2) high bud mite populations are verified by magnified analysis of bud samples.** This mite is microscopic (left image), white or clear, and feeds inside buds in the winter (middle image), causing damage to developing tissues and resulting in symptoms that include blistered red bud scales in spring, misshapen flowers, small leaves and fruit, or few berries per cluster (right image). Berries on infected shoots may also appear roughened and malformed.

The wide variability in symptoms among varieties adds to the difficulty in diagnosing this pest injury. It is important to take shoot samples in the late summer and fall as buds are being set or early spring to identify infestations. Bud mites move to fruit buds formed this year to find places to spend the winter, so fields should be sampled by taking 10 randomly-selected shoots and sampling the top five fruiting buds on each shoot for a total of 50 buds per field. These should be examined to verify that bud mites were the problem with the bushes, because some poor fruiting/growth symptoms are quite similar to the catch-all category of “winter damage.” Sampling can be done with a hand lens if you know what to look for, or can be done under a microscope by trained personnel. Send samples to your scout, local extension office, crop consultant, or to the **MSU diagnostic lab ([www.pestid.msu.edu](http://www.pestid.msu.edu))** for checking. While there has been no research to develop a specific economic threshold, if 10 percent of the sampled buds are infested with bud mite, and the field is a susceptible variety, chemical control should be considered. This pest can be

challenging to control with pesticides because of its small size and the difficulty of getting miticide residues into the tiny cracks and crevices it inhabits. The immediate post-harvest timing is recommended for targeting this pest because the mites are relatively exposed before the buds have formed completely for the winter. Effective control is extremely difficult once the mites are protected under bud scales, and so prompt action is needed if a planting requires control of bud mites.

**Chemical control options for bud mite** - Registered miticide options for blueberry bud mite are limited, but there are effective registered miticides available (Table 1). Endosulfan-containing products such as Thiodan 3 EC, Thionex etc. are the most effective miticides for this pest, and these should be applied immediately post-harvest, with reapplication two to three weeks later in heavily infested fields. This will control the mite populations and prevent colonies feeding on buds through the winter. Although the label recommends waiting six to eight weeks between the sprays, this was developed for southern US conditions, and in Michigan we often do not have that long between the end of harvest and formation of next year’s buds. That’s why we recommend growers tighten up this period between sprays to get the second Thiodan spray on before complete bud formation. The label recommends that sprays be applied at high pressure (150 to 200 psi) and high gallonage to obtain effective coverage and penetration. Unless the interior spaces of the bud scales are wetted, it is unlikely that good control will be achieved. Use of a surfactant to improve the spreading and penetration of the spray is expected to increase control of bud mites.

**Upcoming label changes for Thiodan/Thionex etc.** - During 2010, the U.S. Environmental Protection Agency completed a reassessment of the risks associated with all food-related uses of endosulfan (Thiodan/Thionex etc.). In a July 23 announcement, the agency announced remaining time allowed for use on many crops, including highbush blueberry. Due to the importance of bud mite control in blueberries, there is a phase-out period negotiated through July 2015. The new restrictions will not take effect until next year, and there will be a four-year phaseout before complete restriction to allow time for alternatives to be developed and registered.

**Other miticides** - Trials of new alternatives to Thiodan including Sulforix have been completed at MSU in recent years. We have also tested some highly-effective new miticides that are not yet registered in blueberry. From our recent trials we expect these to provide control equivalent to endosulfan once they are labelled.

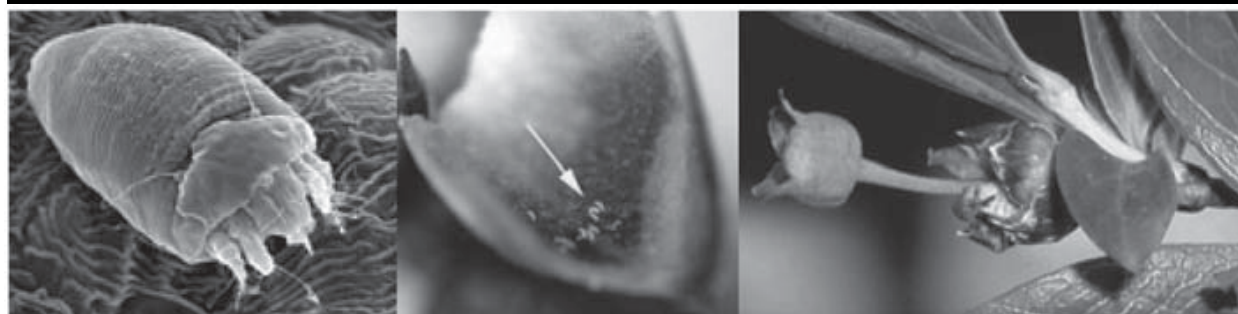
We have found that Sulforix provides moderate control of bud mites when applied in the fall. Many growers are using this for a disease control spray at the end of the season and can expect some level of mite suppression if used at this timing. However, applications timed for leaf drop because of the focus on disease control are later than the ideal timing for bud mite control. By this timing most of the mites will be inside the bud scales and much harder for the spray material to reach.

An additional option for population suppression of bud mites is the application in spring of a delayed-dormant application of oil. A high grade, ultrafine oil applied at 0.5-1% by volume can help to reduce populations in the spring.

Our pesticide trials at the Trevor Nichols Research station have compared the various options for bud mite control in recent years. Table 1 shows the average level of control (compared to untreated bushes) found in these trials for the main registered options for bud mite control.

**Table 1. Miticide rates, timings, and efficacy for blueberry bud mite**

Compound	Rate / acre	Application Timing	Avg. % control
Thiodan 3 EC, Thionex, etc.	2 qt	Post-harvest	93%
Sulforix	1 gal	Pre- or post-harvest	60%
Summer oil	1% v/v	Delayed-dormant (spring)	27%



**Other management options** - Pruning infested shoots from bushes is a cultural control that should be done to reduce infestation. In some southern states, bushes are “topped” to cut off bud-mite infested shoots. Many growers leave prunings in the row middles and chop them in the row, but in fields infested with bud mite, the removed wood should be taken out of the field and burned or buried. Chopping this wood in the row middles may spread the mites back onto the bushes. Biological control agents have been observed feeding on bud mite colonies.

These include predatory mites and predatory thrips. There are also some fungi that specialize in feeding on mites and these have been found inside bud scales sucking the juices out of these tiny mites. While we still know little about the ability of these beneficial insects to control bud mites, it is likely that they are helping to suppress pest mite populations in Michigan blueberry fields. (*Source: Michigan Fruit Crop Advisory Team Alert, August 10, 2010 -- Vol. 25, No. 15*)

### Herbicides in Blueberry

Gary Pavlis, Rutgers University

A grower asked a very good question this week regarding the use of Roundup. I've mentioned that July and August is an excellent time to eliminate problem weeds because now is the time when there is movement of plant substrates down to the roots. That means Roundup will move to the root and kill weeds more efficiently. The grower asked if the dosage of Roundup should be changed if mulch or woodchips are used in the blueberry

field and if soil type would have an effect on efficacy or possible damage.

I'm sure this question was asked because an increase in organic matter due to mulching does effect herbicide efficacy. So does soil type. An increase in organic matter and/or an increase in soil weight (sandy -> clay) requires higher rates of pre-emergent herbicides. This is not so with Roundup because the material is sprayed directly on

the weed. I talked to Monsanto, the maker of Roundup and they agree with the information above. A 2% solution, i.e. 22/3 oz. of Roundup, 41% a.i./gallon will kill most problem weeds.

Growers should be aware of problems observed in numerous fields concerning the use of Solicam. This herbicide has been used more and more recently with excellent results, however there may be a potential for problems. I stated in an earlier newsletter that I had seen plant leaves with yellow-white veins, and stems that were yellow-white. These symptoms are definitely due to Solicam. Affected plants were usually in the poorest part of a block. Additionally, it should be noted that the

symptoms probably are water related because extensive irrigation moved the chemical down into the root zone. This chemical remains in the soil for a longer time than most other herbicides used in blueberries and thus has the potential to build up. My feeling at present is to recommend that anyone using Solicam should consider rotating an alternate herbicide in the coming year. This is especially true if you saw the symptoms described. Remember that leaves with green veins and yellow interveinal areas are not due to a herbicide but most probably iron deficiency due to a high pH. (*Source: Blueberry Bulletin, Vo. 26, No. 20, August 9, 2010*)

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## GRAPE

### **Don't let Downy Mildew Get You Down**

*Anemiek Schilder, Michigan State University*

Downy mildew has gotten a relatively early start this year with first sightings from mid to late June, depending on location and cultivar. Downy mildew is caused by the fungal-like organism *Plasmopara viticola* and can seriously damage leaves and clusters of susceptible cultivars. Leaf infections may lead to premature defoliation, which can reduce winter hardiness and sugar accumulation in the fruit in severe cases. Cluster infections usually translate into direct losses, as the infected cluster stems and berries will become necrotic and fail to develop. This is often the case with Chancellor, which is highly susceptible to downy mildew. First symptoms on the leaves may be yellow or light-green spots that may have a greasy appearance (oil spots). On older leaves, lesions are smaller and more angular as they are delimited by leaf veins. White sporulation usually develops on the underside of the leaf after warm nights with high relative humidity. Infected clusters and tendrils may also be covered with a fluffy white growth.

#### **Biology of the pathogen**

The pathogen overwinters as thick-walled spores (oospores) in fallen, infected leaves on the ground. Oospore germination is favored by moist soils and temperatures over 50°F, and typically starts several weeks before bloom in this region. Oospores develop a second spore type, sporangia, which are splashed by rain or carried by wind to young leaf and shoot tissues. The sporangia release zoospores (swimming spores) that need a film of water (rain or dew) to infect plant tissues. Infection by zoospores is relatively rapid and a wetness duration of two to three hours is often sufficient. Zoospores infect the plant exclusively through the stomates (breathing pores on the leaf), which are mostly located on the lower leaf surface. Young leaves and berries are particularly susceptible, but become resistant to infection as they age.

Lesions appear within 5 to 17 days after infection. The fungus then proceeds to sporulate on infected tissues under warm, humid conditions (>98% humidity and >55°F) at night. The optimal temperature for sporulation is 65-72°F. On leaves, sporulation typically occurs on the underside of the leaf or rarely along veins on the upper leaf surface (this is in contrast to powdery mildew, where sporulation mostly occurs on the upper surface). Lesions typically sporulate three times before they die and turn necrotic.

Rain is the principal factor driving epidemics. Temperature plays a less important role by retarding or accelerating the development of the disease. The most serious epidemics occur when a wet winter is followed by a wet spring and a warm summer with cloudy days and intermittent rainstorms every 8 to 15 days. Since the generation time of the fungus can be as short as 5 days under optimal conditions, this can lead to “explosive” disease development. Once the weather turns warm and dry, the downy mildew fungus goes “on vacation” and may not be very active until favorable conditions return in late summer and early fall.

#### **Disease monitoring**

Since downy mildew can develop explosively under conducive conditions, frequent disease monitoring is important even when fungicide sprays have been applied. Scout several rows in various places in a vineyard. Visually scan leaves and clusters, and also look for symptoms on tendrils and shoots. Early in the season, lesions may be most visible on leaves and shoots close to the ground, but later on, they may appear higher in the canopy. If you see yellow lesions, turn the leaf over to look for white sporulation on the lower leaf surface. If no sporulation is present, it may be that the lesions are still young and conditions have not been right yet for



sporulation. Occasionally, low-level paraquat herbicide injury may resemble downy mildew lesions, but these spots do not show sporulation. Also, in the case of herbicide injury you'll see typical necrotic lesions associated with paraquat injury on the same or nearby leaves. If you are not sure of the cause, remove symptomatic leaves and place them in a plastic bag with a moist paper towel at room temperature (68-75°F) overnight. If it is downy mildew, white sporulation should become visible on the underside of the leaf within 1 or 2 days.

### Control options

Fungicide sprays for downy mildew are recommended for susceptible varieties, especially in vineyards where the disease has been found. Keeping the disease from defoliating vines may also be important after harvest to allow the vines to build up maximum reserves for the winter. If downy mildew has been found in your vineyard, don't allow the disease to develop to epidemic proportions before taking action. Listed below are some characteristics of fungicides that may help you decide which ones are most appropriate. At this point, it may be too late to use fungicides with extended pre-harvest intervals.

- **Abound** (azoxystrobin), **Pristine** (pyraclostrobin + boscalid), **Sovran** (kresoxim-methyl) (strobilurins; systemic or locally systemic; 14-day PHI). Very good to excellent preventive activity (~14 days), limited post-infection activity, so would be better applied on a preventative basis. Strobilurins will also reduce sporulation in existing lesions, thus slowing the epidemic. Abound is phytotoxic to apples, Pristine is phytotoxic to 'Concord' and some other Labrusca-type grapes; Sovran is phytotoxic to some sweet cherry varieties.
- **Aliette, ProPhyt, Phostrol, Agri-Fos** (salts of phosphorous acid) (phosphites; highly systemic; 0-day PHI; Aliette: 15-day PHI), good to excellent preventive and curative activity. systemic and highly mobile within the plant. They have at least 4 days of curative activity and 7-10 days of protective activity. These products do not eradicate active lesions, but can reduce spore production. Use higher rate if applying after infection period. Research in New York has shown good to excellent disease control on a 14-day schedule, except on highly susceptible varieties, which may require more frequent sprays. There is a risk of phytotoxicity when applied to plants under stress or at high temperatures. Do not tank-mix with copper products, Quintec, surfactants or foliar fertilizers. There are many other generic versions available – compare by looking at the phosphorous acid equivalent.
- **Captan** (captan) (phthalimides; protectant; 0-day PHI): good preventive activity; not allowed on juice grapes by some processors.
- **Copper** (copper) (inorganics; protectant; 0-day PHI; 24-day REI): good preventive activity, some grape varieties are sensitive to copper, especially under cool, slow-drying conditions. Specific formulations can be used in organic vineyards.
- **Dithane, Penncozeb, Manzate** (mancozeb) (EBDC's; protectant; 66-day PHI): good preventive activity; however, the long PHI precludes their use late in the season. Also, EBDCs are not allowed on juice grapes after bloom by some processors.
- **Forum** (dimethomorph) (carboxylic acid amines; systemic, 28-day PHI): new fungicide for control of downy mildew in grapes. Use Forum as a preventive application before infection occurs. The minimum application interval is 7 days. Performance may be improved by using Forum as a tank mix with another fungicide. The addition of a spreading/penetrating adjuvant is prohibited. Do not make more than 5 applications per year, and no more than one application before switching to a fungicide with a different mode of action. Forum has not been evaluated for disease control in Michigan but is used widely in Europe for control of downy mildew.
- **Gavel** (zoxamide + mancozeb) (benzamides and EBDC's; protectant; 66-day PHI): broad-spectrum protectant fungicide. Addition of an agricultural surfactant will improve fungicide performance. Do not make more than 8 applications per acre per season. Consider Gavel and all other EBDC fungicides in observing the maximum seasonal use rate recommendations for mancozeb. Gavel was effective against downy mildew in grape trials in Michigan, but its use is limited later in the season because of the 66-day pre-harvest interval.
- **Presidio** (fluopicolide) (acylpicolides; systemic, 21-day PHI) is a new systemic fungicide which very good protective, curative, eradicated, and antispore properties. Presidio is compatible with many fungicides and insecticides and is rainfast in 2 hours. No more than two sequential applications are allowed. A tankmix with another fungicide with a different mode of action must be used with Presidio for fungicide resistance management.
- **Revus** (mandipropamid) (carboxylic acid amines; systemic, 14-day PHI) is a fungicide which is active against diseases caused by downy mildew. Revus Top is a pre-mix of mandipropamid and difenoconazole, a powdery mildew fungicide. It has preventative and limited curative properties. A maximum of four sprays and two sequential sprays is

allowed. The addition of a spreading/penetrating type adjuvant such as a non-ionic based surfactant or crop oil concentrate is recommended. Do not apply Revus Top to Concord or Noiret grapes due to phytotoxicity concerns.

- **Ranman** (cyazofamid) (Quinone outside inhibitors; locally systemic, 30-day PHI) is a new fungicide for control of downy mildew in grapes. Ranman has limited systemic activity, so it should be applied in a preventive mode. Apply on a 10-14 day schedule when conditions are favorable for disease development.
- **Ridomil Gold Cu** (mefenoxam + copper) (phenylamides and inorganics; systemic + protectant; 42-day PHI), **Ridomil Gold MZ** (mefenoxam + mancozeb) (phenylamides and EBDCs; systemic + protectant; 66-day PHI). Ridomil Gold has excellent preventive and curative activity (i.e., it will stop development of lesions before and after symptoms start to show). It also stops or reduces sporulation in developing and existing lesions. It has up to 21 days of protective activity. However, the pre-harvest interval may preclude their use at this time of the season. Consider your earliest estimated harvest date to decide if these are still an option.

- **Serenade** (*Bacillus subtilis*: biocontrol agent; protectant; 0-day PHI): moderate to good preventive activity, especially when applied with Nu-Film-P or similar spreader-sticker. Good coverage is important for control. Serenade has no maximum seasonal application rate. Organic formulation can be used in organic vineyards.
- **Tanos** (famoxadone and cymoxanil) (strobilurins and cyanoacetamide-oximes; systemic, 30-day PHI): has curative and locally systemic properties against downy mildews. Tanos rapidly penetrates into plant tissues and is rainfast within 1 hour of application. It must be tank-mixed with a contact fungicide labeled for that crop (e.g., mancozeb, captan or copper). A maximum of 9 applications of Tanos including other group 11 (strobilurin).
- **Ziram** (ziram) (dithiocarbamates; protectant; 21-day PHI): good preventive activity. Apply on a preventive basis. Susceptible to wash-off by rain. (*Source: Michigan Fruit Crop Advisory Team Alert, August 10, 2010 -- Vol. 25, No. 15*)

## Evaluating Grape Samples for Ripeness

*Joe Fiola, University of Maryland*

It is critical to properly monitor and assess the fruit characteristics and maturity to make the appropriate management, harvesting, and winemaking decisions to produce the best quality grapes and wine possible. The last “Timely Viticulture” described how to take a proper sample that best represents the actual ripeness stage of the variety in that vineyard. The next step is set the priorities that will optimize fruit quality and give you the opportunity to make the best possible wine and then evaluate your sample based on that criterion.

- **The critical principals here are that high quality wine is the confluence of fruit derived flavor and aroma components and for red grapes also the reduction of immature tannins.**
- **These do not necessarily correspond to “desired” sugar and acid ranges.**
- **The highest priority needs to be the quality and quantity of varietal aroma/flavor in the fruit.**
  - *Simply stated, to obtain a desired characteristic aroma or flavor in the wine, it must be present in the grapes at the time of harvest!*
  - *By regular, continuous sampling you will learn through experience the succession of aromas, flavors & textures each variety goes through.*
  - *Depending on the degree of ripeness red grape characteristics can range from green and herbaceous to fruity and “jammy.”*

- *Therefore the individual sampling must be diligent to monitor for that aroma and/or flavor in the sample.*

- **The next highest priority, especially for red wines, is the texture of the grape tannins in skin and the seed.**
  - *These quality and quantity of the tannins determine the structure, body, astringency, bitterness, dryness, and color intensity of the wine. Mature tannins are critical to the production of quality red wines.*
  - *The degree of ripeness and polymerization of the tannins will determine the astringency and mouth feel of your wine.*
    - *This can range from the undesirable, hard and course tannins of immature grapes, through to the desirable, “supple and silky” profile of mature grapes.*
- **Procedure:**
  - *Select a few random grapes and place them in you mouth. DO NOT look at the cluster when you are choosing the grapes because you will tend to pick more ripened berries.*
  - *Without macerating the skins, gently press the juice out of the berries and assess the juice for sweetness (front of tongue) and acid (back sides of your tongue). With experience (and*

comparison against numbers from lab samples) you will be able to reasonably guesstimate the Brix and TA level of the grapes.

- Next gently separate the seeds for the skins and “spit” into your hand. The color of the seeds gives you a clue to the level of ripeness. Green seeds are immature, green to tan and tan to brown seeds is maturing, and brown seeds are mature. Ripe seed tannins are desirable as they are less easily extracted and more supple on the palette.
- Finally macerate the remaining skins and press them in your cheeks to assess the ripeness of the skin tannins. You will be able to “feel” the astringency (pucker) of the skins. The less intense the astringency the more ripe the grapes.
  - A good way to practice is to first sample an early grape variety such as Merlot and then immediately go to a later variety such as Cab Sauvignon, and you will feel the difference in the acidity, astringency and ripeness.
- **Of course, other factors must still be considered, such as the total acidity and pH**
  - Generally you would like to harvest white grapes in the 3.2-3.4 pH range and reds in the 3.4-3.5 range, as long as the varietal character is

appropriate as described above. Remember the enologist can do a good job adjusting acidity but it almost impossible to increase variety character in the wine.

- **Brix or sugar level is good to follow on a “relative” scale but levels can greatly vary from vintage to vintage.**
  - In some years the grapes will be ripe and have great varietal character at 20 Brix and another year they may still not have ripe varietal character at 23 Brix.
- **Disease/Rot - Monitor to see if the grapes are deteriorating do to fruit rots or berry softening.**
- **Look at the short and long range forecast.**
  - If it looks good and the grapes have the ability to ripen further, then there may be a benefit to letting them hang a bit longer.
  - If the tropical storm is on the way.....
  - When grapes are close to optimal ripeness, it is more desirable to harvest before a significant rainfall than to wait until after the rain and allow them to build up the sugar again afterwards.

(Source: Maryland Timely Viticulture, Late August 2009)

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## GENERAL INFORMATION

### Bee Pastures May Help Pollinators Prosper

Marcia Wood, ARS News Service, Agricultural Research Service, USDA

Beautiful wildflowers might someday be planted in “bee pastures,” floral havens created as an efficient, practical, environmentally



Entomologist James Cane examines wildflowers in a Logan, Utah, test plot. (Photo courtesy Peggy Greb.)

friendly, and economically sound way to produce successive generations of healthy young bees.

The pesticide-free pastures could be simple to establish, and—at perhaps only a half-acre each—easy to tend, according to U.S. Department of Agriculture (USDA) entomologist James H. Cane. He's based at the Pollinating Insects Biology, Management, and

Agricultural Research Service (ARS) in Logan, Utah. ARS is USDA's principal intramural scientific research agency.

Bee pasturing isn't a new idea. But studies by Cane and his collaborators, conducted in a research greenhouse and at outdoor sites in Utah and California, are likely the most extensive to date.

Two bee businesses are already using the findings to propagate more bees.

The research indicates that species of pastured pollinators could include, for example, the blue orchard bee, *Osmia lignaria*. This gentle bee helps with pollination tasks handled primarily by the nation's premier pollinator, the European honey bee, *Apis mellifera*. Cane estimates that, under good conditions, blue orchard bee populations could increase by as much as four- to fivefold a year in a well-designed, well-managed bee pasture.

Cane and colleagues have studied wildflowers that might be ideal for planting at bee pastures in California. In particular, the team was interested in early-flowering annuals that could help bolster populations of blue

Systematics Research Unit operated by USDA's

orchard bees needed to pollinate California's vast almond orchards.

The research, funded by ARS and the Modesto-based Almond Board of California, resulted in a first-ever list of five top-choice, bee-friendly wildflowers for tomorrow's bee pastures in almond-growing regions. These pasture-perfect native California plants are: Chinese houses (*Collinsia heterophylla*), California five-spot (*Nemophila maculata*), baby blue eyes (*N. menziesii*), lacy or tansy phacelia (*Phacelia tanacetifolia*), and California bluebell (*P. campanularia*).

Cane has presented results of his research to almond growers at workshops.

Read more about the research in the August 2010 issue of *Agricultural Research* magazine, available online at: <http://www.ars.usda.gov/is/AR/archive/aug10/bee0810.htm>. This

*pollinator research supports the USDA priority of promoting international food security. (Source: New York Berry News, Vol. 9, No. 8, August 2010)*



*Blue orchard bee on a California five-spot flower, *Nemophila maculata*. (Photo courtesy Jim Cane.)*

### National Expansion and Innovations with Elderberry Plantings

*Steven A. McKay, Cornell Cooperative Extension Columbia, MA*

In June I had an opportunity to attend a meeting in Missouri on commercial plantings of elderberry in the US. A group of extension workers has been cooperating with growers for more than 10 years on selection of varieties, developing cultural practices and value-added products, and marketing. A group of producers is developing a coop, and there is a large commercial processor who is producing wine from fruit and flowers, as well as juice. I'd like to share some of the developments and information which continue to confirm the potential of this crop for development.

**Varieties** of elderberries have been evaluated from different parts of the country and the world. Researchers have found that the varieties respond uniquely to the environments where they grow. This means that they need to be tested in the sites where they are to be grown before large numbers are planted. An example is with the Adams varieties which were developed in New York. They perform beautifully in New York, but have problems where they were tested in Missouri. Researchers at Cornell are establishing some new variety trials where they will test plants from Europe and around the country to see how they perform.

US varieties are often selections from plants growing in the wild, or only removed a few generations from the wild. Researchers today look for plants in the wild that have abundant flowers, and appear to have heavy yields and desirable growth habits. The varieties most recently selected from the wild in Missouri are 'Wyldeewood' and 'Bob Gordon'. They are very heavy yielders, efficient for harvest, and well suited to processing. We do not yet know how they might do in the Northeast.

In the U.S., commercial elderberries belong to one of two species, *Sambucus canadensis* (native American) or *Sambucus nigra* (European). The native American

elderberries tend to send out runners, and quickly fill in a row with runners. European varieties don't tend to runner as easily. The reason we are interested in runners is to establish hedge rows of elderberry. With hedgerows, the plant may be machine harvested.

**Machine harvest** is desirable as labor becomes harder to find and manage. Scientists are trying to develop/select plants that can be cut to the ground in the winter by machine, and that will send up abundant new flowering shoots each year. It is also desirable that the fruits or flowers develop and are ripe at the same time so that one run through the orchard is possible with the machine.

Other **cultural practices** important to elderberry include, site management, propagation, fertilization, and irrigation. Site pH should be from 5.5 to 7.5, and soil should have high organic matter. The area should have good water and air drainage, and plants set three to five feet apart in rows ten to twelve feet apart. Plants are easily started from cuttings six to eight inches long with three to five buds placed in the field in the fall or early spring. They develop plants that could have a crop in the second year. About 1/2 pound of actual nitrogen per plant can be applied in a split application in May and June. Irrigation water is supplied at one inch per week, and attention must be given to weed control.

**Pest problems** are not extensive with elderberries. Mites are a big problem in the Midwest, but growers have found that hedgerow production, where plants are cut to the ground annually reduces the problem. I believe that cold winters in the East help control the pest. A borer sometimes attacks emerging flower stems and causes them to wilt and die before they even can open. Wildlife pests such as deer and birds can also take a toll on the plants.



**Harvest/postharvest/value-added products** are all important topics for elderberry production. Flowers can be harvested when fully open, and used to make tea or elderflower extract. Whole cymes, or clusters of fruit are harvested as they turn dark-colored. They are frozen and shaken to remove the berries. Whole berries are then stored frozen until ready to use. Jams, purees, wines, and juices are top value-added products made with elderberries. The products are desirable not only because of their flavor and beauty, but also for health benefits.

Elderberries are high in antioxidants with an ORAC value of about 15,000 units as compared to blueberries that fall in the range of 4,000 units. Elderberries have been shown to be beneficial in stimulating the immune system, and fighting disease. They also have benefits for heart and circulatory health and protect cells from damage, which are benefits associated with high antioxidant foods. Please contact our office for more information on producing this crop. (**Source:** *New York Berry News, Vol. 9, No. 8, August 2010*)

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## UPCOMING MEETINGS:

**August 19-21, 2010.** *North American Fruit Explorers.* Best Western Motel/Conference Center, Lafayette, IN. To view the program and registration form, check: <http://web.extension.illinois.edu/edwardsvillecenter/foodcrophort3031.html>. For additional details or questions: contact Ed Fackler at [cefackler@gmail.com](mailto:cefackler@gmail.com) or 812-366-3181.

**August 23.** *Massachusetts Farm Winery and Growers Association Summer Twilight Meeting.* Alfalfa Farm & Winery, 276 Rowley Bridge Road, Topsfield MA. Topics include review of new legislation that allows wine sales at MA Farmers Markets and review of Canopy Management Practices on Disease Management and Fruit Quality. 1 pesticide credit. Cost: \$25 includes dinner. Please direct any questions to [leesidemi@gmail.com](mailto:leesidemi@gmail.com), or (781) 585-1999

**August 26, 2010.** *NH Agricultural Experiment Station Field Day.* Woodman Farm, Durham NH. 8:15am-Noon. Farm manager, faculty & student researchers, UNH Cooperative Extension staff, and others will present some of the research, teaching and extension activities at the farm. This includes research on a tree fruit, vegetable and ornamental crops. Agricultural producers and others with an interest in local agricultural research and outreach are encouraged to attend. Beverages and light snacks will be provided from 7:15-8:15am, and the program will take place from 8:15am-noon. For flier and directions: [http://extension.unh.edu/Agric/Docs/Research\\_Field\\_Days\\_2010.pdf](http://extension.unh.edu/Agric/Docs/Research_Field_Days_2010.pdf)

**Sept 14, 2010.** *High Tunnel Construction with Ed Person, Ledgewood Farm Greenhouse Frames.* Edgewater Farm, Plainfield NH. 5 pm. For info, call 802-257-7967 or email [vernon.grubinger@uvm.edu](mailto:vernon.grubinger@uvm.edu).

**Sept 22, 2010.** *GAPs on a Wholesale/Retail Vegetable Farm.* Paul Mazza's Fruits and Vegetables, Essex VT. 5 pm. For info, call 802-257-7967 or email [vernon.grubinger@uvm.edu](mailto:vernon.grubinger@uvm.edu).

**November 5, 6, & 7 2010.** *Maine Organic Farmers & Gardeners Association Farmer to Farmer Conference.* Point Lookout Resort, Northport, ME. Registration closes Oct. 8<sup>th</sup>. For more information see <http://www.mofga.org/Default.aspx?tabid=293>

**November 8-10, 2010.** *Southeast Strawberry Expo,* at the Wyndham Hotel in Virginia Beach, VA. Workshops and farm tour on Nov. 8, educational sessions and trade show on Nov. 9-10. For more information, visit [www.ncstrawberry.com](http://www.ncstrawberry.com) or contact the NC Strawberry Association, 1138 Rock Rest Rd., Pittsboro, NC 27312, 919-542-4037, [info@ncstrawberry.com](mailto:info@ncstrawberry.com). Exhibitor inquiries welcome.

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