



# Berry Notes

Prepared by the University of Massachusetts Fruit Team

Oct. 2008 Vol. 20, No. 14

[www.umass.edu/fruitadvisor/berrynotes/index.html](http://www.umass.edu/fruitadvisor/berrynotes/index.html)

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**New England Small Fruit Pest Management Guide –**

This guide has been extensively updated and is now available for purchase for \$12 plus \$4 shipping and handling. Orders (including credit card purchases) can be placed via the UMass Fruit Team website at <http://www.umass.edu/fruitadvisor/fruitsubscriptions.htm>. (Scroll down for links to pest mgmt guides.)

**ENVIRONMENTAL DATA**

The following growing-degree-day (GDD) and precipitation data was collected for a two-week period, September 17, 2008 through September 30, 2008. Soil temperature and phenological indicators were observed on September 30, 2008. 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	2008 GROWING DEGREE DAYS		Soil Temp (°F at 4" depth)	Precipitation (2-Week Gain)
	2-Week Gain	Total accumulation for 2008		
Cape Cod	151	2,585	68°F	5.75"
Southeast	122	2,493	65°F	4.60"
East	121	2,600	60°F	3.25"
Metro West (Waltham)	122	2,601	53°F	4.00"
Metro West (Hopkinton)	79	2,568	68°F	2.45"
Central	88	2,323	62°F	2.06"
Pioneer Valley	113	2,451	62°F	2.76"
Berkshires	130	2,696	64°F	1.66"
AVERAGE	116	2,540	63°F	3.32"

(Source: UMass Extension 2007 Landscape Message #24, Oct. 2, 2008)

# STRAWBERRY

## Strawberry – Powdery Mildew

Jay W. Pscheidt, Oregon State University Extension

**Cause:** *Sphaerotheca macularis* f. sp. fragariae, a fungus that overwinters on infected plant tissue including living leaves. This fungus is favored by conditions that produce high humidity but dry leaves.

Conidia are able to begin germination after 6 hours and complete it within 24 hours, irrespective of temperature. Lesion expansion is related to temperature but does not seem to be related to relative humidity. It is a highly specialized pathogen that forms a close association with the host. Conditions that favor the host also favor the pathogen. Much of the fungus remains on the outside of infected plant parts but sends in rootlike structures, haustoria, to obtain nutrients. The white growth seen is composed of both mycelium and fungal spores. ‘Hood’, ‘Totem’, and ‘Benton’ are moderately resistant or tolerant to mildew; ‘Shuksan’, ‘Sumas’, and ‘Linn’ are moderately susceptible; ‘Olympus’, ‘Redcrest’, ‘Independence’, ‘Puget Summer’, ‘Firecracker’, ‘Whonnock’ and ‘Northwest’ are very susceptible.

**Symptoms:** Edges of infected leaflets curl up, exposing undersides that often are reddened and coated with a grayish white powdery mildew fungus. Diseased leaves later turn purplish or red. In irrigated fields, the fungus also may attack fruit. Some day-neutral cultivars are susceptible to fruit infection in fall even though leaves may appear healthy.

### Cultural control:

1. Destroying old leaves by renovating plants after harvest may help reduce inoculum.
2. Plant resistant cultivars.

**Chemical control:** The disease needs to be controlled on highly susceptible cultivars after summer renovation so plants remain vigorous until they cease growth and go dormant in late fall. Many of these products, such as soaps, oils and sulfurs, may influence mite problems in the field.

1. Abound at 6.2 to 15.4 fl oz/A. Do not apply more

than 2 sequential applications or more than 4 applications per year. May be applied on the day of harvest. 4-hr reentry.

2. Bicarbonate-based products. Might supplement a normal program when powdery mildew is first observed. Do not mix with acidifying agents. Thorough coverage is essential. Easily washed off by rain, so reapplication is necessary.



Note the curled leaves and gray patches on underside of leaves.

- a. Armicarb 100 (85% potassium bicarbonate) at 2.5 to 5 lb/100 gal water. 4-hr reentry.

- b. Kaligreen (82% potassium bicarbonate)

at 2.5 to 3 lb/A. 4-hr reentry.

- c. MilStop (85% potassium bicarbonate) at 2.5 to 5 lb/A. 1-hr reentry.

- d. Remedy (by Bonide) is registered for home use.

3. Cabrio EG at 12 to 14 oz/A. Do not use more than twice sequentially or more than five times per year. May be used at harvest. 12-hr reentry.



Powdery mildew symptoms has a grayish-white appearance on underside of leaves.

4. E-Rase RTU (Jojoba seed oil) is registered for home use. May solidify below 50°F. H O

5. JMS Stylet Oil at 3 quarts/100 gal water. Do not use during freezing temperatures, above 90°F, or when plants are under heat or moisture stress. Do not use when foliage is wet because good coverage is essential. 4-hr reentry.

6. Kumulus DF (80% sulfur) at 5 to 10 lb/A. 24-hr reentry.

7. M-Pede at 1 gal/50 gal water is registered on strawberry for soft-bodied insects and has shown good activity against powdery mildew on several other crops. 12-hr reentry.

8. Microthiol Disperss (80% sulfur) at 5 to 10 lb/A. Activity depends on temperature: it may not be as effective below 65°F and may burn plants if applied above 85°F. Do not use a spreader sticker. 24-hr

reentry.

9. Pristine at 18.5 to 23 oz/A. Do not use more than 2 consecutive applications or more than 5 times/year. Can be used day of harvest. 12-hr reentry.
10. Procure at 4 to 8 oz/A. Do not apply within 1 day of harvest or more than 32 oz/A/year. See label for crop rotation restrictions. 12-hr reentry.
11. Rally 40 W at 1.25 to 5 oz/A. Applications may be made up to the day of harvest. Do not apply more than 30 oz/A/season. 24-hr reentry.
12. Safer Garden Fungicide (Ready To Use 0.4% sulfur) thoroughly sprayed over the entire plant. Do not use when the temperature is over 85°F or within a few weeks of an oil spray. Do not use on fruit that will be used for canning or within 1 day of harvest.

**Biological control:**

Sonata (Bacillus pumilis strain QST 2808) at 2 to 4 quarts/A is registered for suppression only. As such it is not recommended for use in the PNW. May be applied up to and including the day of harvest. 4-hr reentry.

**References:**

- Nelson, M. D., Gubler, W. D. and Shaw, D. V. 1996. Relative resistance of 47 strawberry cultivars to powdery mildew in California greenhouse and field environments. *Plant Disease* 80:326-328.
- Miller, T. C., Gubler, W.D., Geng, S. and Rizzo, D.M. 2003. Effects of temperature and water vapor pressure on conidial germination and lesion expansion of *Sphaerotheca macularis* f. sp. fragariae. *Plant Disease* 87:484-492.

(*Source: The Oregon State University Extension Plant Disease Control Guide on-line at [HTTP://plantdisease.ippc.orst.edu/](http://plantdisease.ippc.orst.edu/)*)

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**RASPBERRY**

**Floricanes Removal in Raspberries and Blackberries**

*Kathy Demchak, Penn State University*

Prior to the mid 1990's, recommendations said to remove floricanes right after fruiting. Around that time, research with 'Titan' red raspberries showed that the plants had less winter injury when canes were removed during either December or early March, rather than in September. This was presumably because the plants had the opportunity to move carbohydrates from the spent canes to the crown, thus increasing the plants' carbohydrate reserves, which increased the plants' ability to tolerate cold temperatures. This is probably of most value in situations where winter injury is a problem.

However, in certain other situations, such as when cane diseases are an issue, it may be more valuable to remove the floricanes along with the disease inoculum on them, and improve air circulation. This is especially important for growers who are growing under low-spray, no-spray, or organic systems where cultural controls to manage diseases take on critical value.

So, here's what I'd like growers to do, both to decide whether to remove canes now, and to help with managing diseases. Take a look at your planting, and see whether you can see symptoms of cane diseases. Look for gray sunken lesions on canes (anthracnose), purplish to dark brown areas (cane blight or spur blight) on various brambles and *Gnomonia* stem canker on

blackberries). Lesions that are large, expanding, or numerous are especially worrisome. If your canes look healthy, you can leave the floricanes there. If you have disease symptoms out there, or you've been delaying floricanes removal in past years but suspect that disease symptoms are getting worse over time, take the floricanes out now. This practice should be re-evaluated each year, as conditions for disease development will differ from year to year.

If you see disease symptoms, fungicides applied after taking the floricanes out will help. Certain Captan formulations, Pristine, and Cabrio are labeled for use in the fall for anthracnose and spur blight control. Additional information on disease symptoms and epidemiology, along with rates and labeled formulation of fungicides for post-harvest use are listed in the Mid-Atlantic Berry Guide for Commercial Growers [and New England Small Fruit Pest Management Guide].

This guide is available as a hard copy through most county Extension offices (\$18), or on-line for free at <http://pubs.cas.psu.edu/freepubs/MABerryGuide.htm>. You can also order a printed copy from Penn State's Publication Distribution Center by calling 814-865-6713 for \$18 plus tax and a \$5 shipping and handling.

(*Source: Fruit Times Vol. 27, No. 9, Sept. 30, 2008*)

## Blueberry Bud Mite

Rufus Isaacs and John Wise, Michigan State University

### *Post-harvest is the optimal time for blueberry bud mite control*

Over the past five years, 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 grower groups, extension educators and the Small Fruit Entomology program 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 have been verified by magnified analysis of bud samples.

This mite is microscopic (Figure 1), and feeds inside buds in the winter, 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 (Figure 2). The wide variability in symptoms among varieties adds to the difficulty in diagnosing this pest injury. Berries on infected shoots may also appear roughened and malformed. While these symptoms may be indicators of infestation, it is best to take shoot samples in the late fall or early spring to identify infestations. Bud mites are moving to fruit buds formed this year to find places to spend the winter, so sampling should include the top 6 inches of shoots with fruit buds. These should be examined to verify that bud mites are the problem, because some of the symptoms are quite similar to the catch-all category of 'winter damage'. This 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 local extension office, to your crop consultant, or to the MSU diagnostic lab ([www.pestid.msu.edu](http://www.pestid.msu.edu)) for checking.

This pest can be difficult to control with pesticides because of its small size and the difficulty of getting

miticide residues into the tiny cracks and crevices it inhabits. However, the immediate post-harvest timing (i.e. now) is recommended for targeting this pest because the relatively exposed situation 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.



Registered miticide options for blueberry bud mite are limited (Table 1), but include effective options. Thiodan 3 EC is the most effective miticide for this pest, and should be applied once immediately post-harvest, and again 2-3 weeks later. Although the label recommends waiting 6-8 weeks between the sprays, this label was developed for southern US conditions, and in Michigan we 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. It is recommended that sprays be applied at fairly 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. Trials of new alternatives to Thiodan including Sulforix have been done at MSU and 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 and can expect some level of mite suppression if used at this timing, but applications at leaf drop are later than the ideal timing for bud mite control. 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 at 0.5-1% by volume can help to reduce populations in the spring.

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 mite back onto the bushes.

Thiodan 3 EC	2 qt	Post-harvest
Sulforix	1 gal	Pre- or Post-harvest

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

(Source: Michigan Blueberry Facts, Vol. 2, No. 15, August 9, 2008)

Compound	Product rate / acre	Application Timing
Summer oil	1% v/v	Delayed-dormant

## GRAPE

### What I Learned about MN Varieties in Vermont and New Hampshire

Mark Chien, Penn State University

I had a wonderful and educational tour of vineyards and wineries in Northern Vermont recently thanks to an invitation from Dr. Lorraine Berkett at the University of Vermont and Dr. Becky Grube at UNH. It was a good chance to experience the University of Minnesota cold hardy hybrids in action, in the field and tasting rooms.

I was very impressed!

This matters for wineries in cold regions such as NE and north central Pennsylvania where these varieties make wine culture possible where it previously was not. While these grapes are not high end vinifera competitors, they make attractive and delicious wines. As one would guess for cold regions the best are white wines but the reds are getting better.

Our hats are off to Peter Hemsted and his team at UMN for developing these varieties, and to Elmer Swenson, who was the original pioneer breeder. The best of these wines are almost completely lacking in “grapey” flavors that indicate their native species heritage. If well grown and made, they may even fool some vinifera snobs.

The wine industry in Vermont is just gaining some traction. There are seven commercial wineries in the state but the potential for many more. Agriculture and agritourism are huge industries in Vermont and cheese is one of its main products and attractions. What goes better with cheese than wine?



These MN varieties are hardy to -30F and below so they can stand the winter chill and most have a short vegetative cycle so they ripen quickly. It was the first week of August and the Marquette at one vineyard was past 50% veraison. It is very important to develop and maintain a healthy and balanced vine in this environment where numerous stresses can challenge the vine (cold, frost, hail, rain, drought, etc). Site selection and sound viticulture planning is probably the best way to enhance vine sustainability. Achieving a balanced vine is very important to successful viticulture in cold regions. Excellent drainage

(natural and applied) and moderate fertility will help to grow better wine. A proper soil evaluation can reveal these qualities.

Understanding the performance of the MN varieties will help you to plan how to adapt the best viticulture to each one. There isn't a lot of accumulated information about these varieties but there are enough growers with a few years of experience to really help you.



All of New England has had a dreadfully soggy growing season to date. July had 9” of rain and one day I was there it rained 3” in some places. I expected to see disease problems everywhere. What I saw was virtually nothing in these cold hardy AND disease resistant MN varieties. There fortitude is even more

impressive given the relatively few sprays used and sometimes inadequate spray delivery technology. For this reason alone, these varieties should be considered, perhaps

even outside of cold regions. It also has a lot to do with the hard work of my host, Lorraine Berkett, the plant pathologist for grapes at UVM, educating growers about disease control. We saw a little bit of black rot on fruit and tissue necrosis that looked like botrytis with concentric rings of spores.

Vines were almost always trained on a high wire cane system, either single canopy or GDC. This is a very appropriate method given the naturally droopy growth habit of these varieties. The best vineyards were shoot positioned once or twice and had evenly spaced shoots cascading down to the ground. This greatly enhances canopy performance. Some leaf removal definitely helped exposure for aeration, sunlight and spray materials. We encountered the usual problems with weed control and in some cases it was reducing vine vigor to the point of concern. Vines varied in size dramatically for different reasons.

I noted the direct connection between availability of funds and the quality of viticulture. Quality is another word for labor. At this level of production, small farm wineries, you just have to have the labor to do the work in the vineyard when it's needed. This takes planning, organization and execution. It is also important that you know what you are doing so you can pass on correct instructions to the crew. Guessing often ends up as mistakes, sometimes irreconcilable in the wine.

We tasted some very impressive wines. These wines tasted great and were, in most cases, very well made. As one might guess, the whites were better than reds and such a cold region is made for whites. Aromatic white varieties displayed attractive floral aromas and fruity flavors and no Labrusca character.

La Crescent was consistently a very attractive aromatic white wine with tons of fruit and reminiscent of an edelzwicker-type blend of Gewurztraminer-Riesling and other Germanic varieties. It would be a killer tasting room wine. The best we may have tried was a 2007 from Champlain Valley Vineyards. Ray Knutsen has crafted a delicious white wine with zesty flavors and acidity with wonderful balance. Probably the best wine I tasted was a blended white called Black Sparrow made from a blend of Prairie Star/Frontenac Gris/La Crescent. It made me think of a NZ Sauvignon Blanc (although Chris likens it to a Pinot Gris. Sorry, it's better than that). It was a wine that could be poured with pride anywhere.



A real revelation was the late harvest and ice wines. At Shelburne Vineyards we tasted the 2007 Vidal ice wine, a true version of this classic style made in accordance with Ontario ice wine standards. It was concentrated yet silky smooth with lots of peach, apricot and honey flavors. The Rhapsody is made from Arctic Riesling, a variety I guarantee you have not tried yet this was a delicious, Riesling-like wine with intense, peachy flavors. The later harvest La Crescent has a wonderful floral bouquet and pear and apple flavors. These are wines comparable in quality to those being made in Ontario, which has used them as the foundation stones for their hugely successful wine industry. The same could happen here. Granted, these wines are very challenging to produce but they have the conditions and grapes to do it. Wow! These are really nice wines! Not by Vermont standards, by anyone's standards.

Uh, yes, we can make very high quality white wines here from the MN varieties. These commercial examples are my first experience and I consider it to be a revelation, epiphany, wake-up call, or whatever you want to call it. It is exciting because it creates possibilities and opportunities.

I'm not sure what to do about red wines. I was unable to taste a varietal Marquette although UMN samples in the past have displayed great promise in terms of ripeness, non-grapiness and balanced acidity.

I'm guessing that blending is the secret but I don't yet know with what grape. As Marquette is more widely grown and made, they will figure it out. Frontenac seems to be a weaker red variety now, perhaps best suited for a nouveau-style wine, blush or port. There was excitement about St Croix but I did not taste a varietal example.

Andy Farmer is operating a very well managed nursery in Poultney, VT. We visited his fields and they are immaculate. Northeastern Vine Supply would be a good source for these plant materials. His vines were lush and healthy and very well tended. Lincoln Peak Vineyards is also a source of MN grape plants.

The people here are either brave or crazy or both. But one cannot help admire them for their fortitude and persistence under challenging conditions. They are true pioneers, forging a commercial wine industry with real and really good wines in a place where it was not realistically possible even a decade ago. It is thrilling to be here and share in their enthusiasm.

Viticulture and enology have a long way to go but they have gained a toe-hold with the MN varieties. Maybe on the very best sites (i.e. warm) more tender hybrids or even hardy vinifera can be grown. The wines I tried are a positive

indication of what can be done. I can't imagine that they will only get better with more experience in the fields and cellars.

UVM and UNH (as well as UMass) are doing their best to support the fledgling wine industry. UVM has planted a USDA NE-1020 wine grape variety trial. It is well executed and managed. It should provide valuable data about the MN and other varieties to wine growers in the region.

One can only hope that two states that rely so heavily on agriculture and tourism to drive the economy have the vision to realize what a potential gold mine the wine community can be to these industries. They really deserve the support of the land grant institutions and state legislator and agencies.

Burlington is a beautiful region, especially in the summer, with mountains, meadows and lakes. If you

are interested in these varieties I strongly suggest a working vacation here to taste wines and walk the vineyards.

Many thanks to my hosts Lorraine Berkett and Becky Grube and their colleagues and staff for their warm hospitality.

**Information resources:**

Lincoln Peak Vineyards:

<http://www.lincolnpeakvineyard.com/index.php>

Shelburne Vineyards: <http://www.shelburnevineyard.com/>

Northeastern Vine Supply:

<https://www.nevinesupply.com/index.html>

Cold Climate Grape Production web site at UVM:

<http://www.uvm.edu/pss/grape/>

(*Source: PA Wine Grape Network, 2008 Articles; August, 2008*)

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## GENERAL INFORMATION

### 2008 Michigan Small Fruit Insect Summary

*Rufus Isaacs, Keith Mason, Steve Van Timmeren, Michigan State University*

Insects have continued to give grape, blueberry, strawberry, and raspberry growers some challenges in 2008. Spring rains and windy conditions made control of some early season insects difficult, especially if timing of application was critical. Some vineyards had frost damage that led to low cropload and so some vineyards have had a minimal pest management program this year. This season was slower than 2007, but more like an average year in terms of weather and crop development, although there was a long dry spell in mid-summer that held back populations of some pests. Overall, 2008 has seemed like an average year for insect pests in Michigan's small fruit crops.

#### Blueberry

This year the Guthion phaseout started to restrict the use of this key insecticide, and so blueberry growers have been testing alternatives for fruitworm control including Intrepid during bloom and Imidan, Asana, and Sevin applied after bloom. The insect growth regulator Intrepid was registered early in 2008, and this was used widely during bloom in place of Confirm. All indications from our research and from talking with growers during the season are that the 12 oz rate of Intrepid was very effective against cranberry fruitworm, and we expect this product to replace Confirm. Growers who used this product during bloom had superior control of fruitworms compared with those that did not. The alternatives to Guthion mentioned above that were used after bloom also worked well for cranberry fruitworm if applications were timed correctly. We have also conducted trials at grower/cooperator farms

with Assail and Delegate, two new insecticides registered for blueberry. A program with Intrepid in bloom followed by Assail and then Delegate after bloom was as effective at controlling cranberry fruitworm as a standard Confirm followed by two Guthion sprays.

The Achilles heel of fruitworm control programs in 2008 seemed to be accurate timing. Some fields did not get protected in time for various reasons, and the result was seen a few weeks later as fruitworm infestation became visible. Reports of cherry fruitworm infestation were more common this summer, and this is a pest where the early activity of this insect is catching growers by surprise. Understanding the monitoring and early activity of cherry fruitworm is part of an ongoing research project at MSU and we will focus on reporting about our results on fruitworm management this winter at grower meetings. Another big challenge to good insect management this spring was Mother Nature. A few 80°F days coupled with windy and rainy conditions made fields in bloom quickly move through petal fall, leaving fruit exposed to cranberry fruitworm egg-laying, but not suitable weather for growers to apply protective sprays. Depending on the stage of development of the varieties, this caused some fields to experience higher fruitworm infestation this season.

Blueberry maggot activity was variable across blueberry fields this year as usual, but we did see a long and high level of activity at some of the non-managed farms that we trap flies at. In particular, traps at the Trevor Nichols Station in Fennville trapped very high numbers and continued catching flies much later than usual. A potential explanation is that

the dry 2007 summer caused flies to stay in the ground for an additional season (blueberry maggot has the flexibility to do this), leading to a higher and longer emergence this year. Growers following a good IPM program that are monitoring and responding to fly activity should have been able to achieve high control of this pest.

As usual, Japanese beetle activity started in early July and continued through into September. Growers have learned the host spots on their farms over recent years and know what products work the best to prevent this beetle from being present at harvest time. We have also seen more fields using the combined system of bare ground in summer, to remove egg-laying sites for beetles, followed by a winter rye cover crop. Seeding this after harvest gives it time to grow through the fall and provide soil stability in winter and spring before mowing and tilling again the next year.

A new pest that has been growing in abundance over the past few years is Putnam scale. This insect creates a small brown scale, one to two millimeters in diameter, over itself for protection and moves onto leaves, stems and fruit in mid-late summer. A few processing sheds and fields visited during August had infestations with one or more scales on berries, and reports of this insect over the past few years have come from across the main production region in west Michigan. For photos of this pest, see the MSU blueberry website [www.blueberries.msu.edu/scales.htm](http://www.blueberries.msu.edu/scales.htm). This is a pest that growers and consultants should be monitoring for, and if fields have been infested in 2008, a spring application of oil to suffocate the overwintering scales should be planned for early 2009. Coupled with an active pruning program, this can go a long way to minimizing the activity of scales in blueberry.

### **Grape**

The season started off with frost damage hitting some vineyards during the flea beetle and cutworm activity period. This cold weather cut back populations of these pests and also took away their food in some sites. By the time secondary buds pushed, the danger from these pests was largely over. We also observed grape cane gallmaker and banded grape bug (see a photo at [www.grapes.msu.edu/bandedbug.htm](http://www.grapes.msu.edu/bandedbug.htm)) early in the year, but levels of these pests were below economic thresholds.

Potato leafhopper moved into Michigan this spring on the rain fronts, but most of the pressure dropped off quickly, with little reinfestation. Consultants reported scouting vineyards and seeing such low numbers that insecticides weren't warranted, while for others a single treatment prevented this pest for the season.

Grape berry moth populations started lower this year in the first generation, perhaps because of the low survival

in late 2007. Despite the slow start, populations have caught up through the season and this is now close to the average level of infestation we have monitored over the past five years. Vineyards in the Traverse City area are reporting more infestation from this insect, and this insect will require attention next year in some sites to prevent the berry splitting and associated diseases that can use the holes to enter berries. We have been testing Grape berry moth control programs on-farm this season and have seen good activity from eight oz/acre of Intrepid applied to high risk vineyards in mid-July to cover the long period of egg-laying by this pest. Additional studies testing two new products from DuPont, Altacor and Avaunt, applied for berry moth control have looked as good as the conventional program, though pre-harvest samples remain to be taken in these Concord vineyards.

Japanese beetle pressure in vineyards was not as high in some previous years, though some growers needed to protect their vines with insecticides to prevent leaf damage. This was especially true in some winegrape vineyards with susceptible varieties or small vineyards with low leaf area. Berry moth sprays were also timed to catch Japanese beetles and we heard variable opinions on levels of this pest from "not too bad" to "much worse this year." Populations of this pest are usually very variable, and the level you experience will depend on where your vineyard is located, how good the local landscape is for supporting Japanese beetle (was there moist grassy land nearby last year?) and the weather conditions this year. In the northwest growing region, Japanese beetles have been seen in very low numbers, but it is clear that these beetles are getting established in this region.

Over the past few weeks, a few reports have come in of mite bronzing on labrusca vines and high grape leafhopper infestations in some vineyards around Lawton. This emphasizes the need to remain vigilant in scouting vineyards and planning an IPM program for your 2009 season that can prevent these problems next season.

### **Strawberry**

Potato leafhopper populations were moderate, but still caused leaf curling symptoms on fields, especially young ones, that did not get protected. During harvest, sap beetle populations were high in some sites, with reports this summer of growers being forced to close U-pick farms. Cyclamen mite was found this year too, emphasizing the need to purchase plants from reputable nurseries that minimize the chance of you bringing this pest into your farm.

Finally, a big thank you to all the growers who provided research sites for our on-farm projects and also opened their farms for extension meetings this summer. See you in 2009! (**Source:** *Michigan Fruit Crop Advisory Team Alert. Vol. 23, No. 18, September 16, 2008*)



## Michigan Overview of Small Fruit Diseases During the 2008 Growing Season

Annemiek Schilder, Michigan State University

The 2008 season was challenging for small fruit growers, as frequent precipitation and fluctuating temperatures promoted many fungal diseases, especially those that rely on rain for spore dispersal and infection. At the same time, the inclement weather did not allow growers to apply fungicide sprays at the optimal time and also led to washing off of fungicides that were applied. Together, these factors made for a less than optimal season for fruit growers.

### Blueberries

Snow cover over the winter provided an ideal habitat for overwintering mummy berries, with sufficient moisture for mummies to germinate in the spring. After a cold period in April which delayed germination and apothecium development, conditions turned more favorable. The weather was conducive to the development of shoot strikes, which were first noticed in early May. Conditions during bloom were good for dissemination of spores to the flowers by bees due to an extended bloom period. Fruit infections were also severe, particularly in sites with a history of mummy berry and in unsprayed or insufficiently sprayed areas. In a fungicide efficacy trial, we saw extremes of 115 shoot strikes and 579 mummified berries per bush in unsprayed plots – a record. Some growers may have been taken by surprise by the level of mummy berry infection as levels have been relatively low over the past five years. Mummified berries were even noticed in clamshells with Michigan blueberries sold in supermarkets this summer.

Anthraxose fruit rot incidence was moderate this year, it appears that the cold spring and early summer limited sporulation and infection. *Alternaria*, *Botrytis*, and *Phomopsis* were also found affecting fruit in post-harvest rot tests.

The cold wet weather and freeze events also led to bacterial twig blight infections (bacterial canker) caused by *Pseudomonas syringae*. It was characterized by dark brown to black twigs, which at first sight looked like *Phomopsis* twig blight. In some fields, the dark-blighted twigs were more common in lower lying areas and occurred despite a tight fungicide program. However, no fungi were isolated from these twigs and bacteria streamed out of the vascular bundles after incubating the twigs in moist chambers. This was the first time that we have seen this disease in Michigan. Cold, wet conditions and frost injury promote infection. While *Phomopsis* cankers were apparent on last year's canes (due to heavy rains in August of 2007), we did not see a lot of cane death or twig blight this season.

Virus and virus-like symptoms were more obvious in

some bushes this year, which is typical in cool years. However, some odd symptoms were also noticed, like unthrifty bushes with purple blossoms in the spring and leaf reddening and necrosis later in the season. While it initially was thought that herbicide damage could have played a role in the development of leaf curling and necrosis, the patterns of affected bushes indicated a possible virus problem. The symptoms were also widespread in many fields. Various ELISA tests were done on plant samples but were negative except for blueberry shoestring virus. Investigations are ongoing as to the cause of this baffling symptom.

Another rare blueberry disease in Michigan was seen in 2008, namely red leaf, which is caused by the fungus *Exobasidium vaccinii* and reduces growth and productivity. This fungus systemically invades plants and causes the leaves to turn fully or partially red. It is a very striking disease. Infected plants continue to produce infected canes every year.

### Grapes

Due to the cool, wet spring and rainy summer, black rot and downy mildew were particularly prevalent on leaves and clusters in unsprayed or insufficiently sprayed vineyards this year. Black rot, *Phomopsis*, and downy mildew all need rain/wetness for spore dispersal and infection, so this season was particularly conducive to disease development as a whole. In most commercial vineyards, however, growers managed to control black rot and downy mildew well, despite the frequently difficult conditions for spray applications.

Downy mildew on fruit clusters and leaves of grapes showed up early. Regular rain events in late spring and summer encouraged infection. In the 'Chancellor' research vineyard at TNRC in Fennville, 100 percent cluster infection occurred in the unsprayed control. Downy mildew also got an earlier start in many 'Niagara' vineyards than in recent years. Most growers did apply fungicides for downy mildew. Some growers that had missed the opportunity to apply Ridomil because of the long PHI used ProPhyt or Phostrol for control.

Despite the rain, *Phomopsis* disease pressure was not as high as expected, possibly due to the cold weather in late spring and early summer, which can suppress sporulation and infection. However, cane, leaf, rachis, and fruit infections are still plenty common in susceptible cultivars, like Vignoles and Niagara. In vineyards where black rot was common, it may have outcompeted *Phomopsis*.

Powdery mildew showed up relatively late in most vineyards, but became severe in some wine grapes due to warm dry conditions prevailing in late summer. Cases of berry infection were reported in 'Concord' vineyards and

most likely occurred due to ascospore infection from overwintering inoculum after rain events right after bloom. This is the time when the berries are most susceptible. There was potential for severe powdery mildew due to early rains which would have promoted ascospore release. However, too much rain and cool weather may have slowed down powdery mildew in the early part of the summer. Once it has gained a foothold, powdery mildew prefers warm, dry weather, and frequent rains that may actually lower disease incidence by washing powdery mildew spores off the leaves and causing bursting of spores in water droplets. Leaf, rachis, and berry infections were noted in wine grapes in unsprayed areas. On the other hand, growers were more acutely aware of the problem and sprayed more diligently as well. Powdery mildew on 'Concord' leaves was less severe than in prior years and late enough to be of little consequence.

This has been a moderately favorable year for Botrytis bunch rot and sour rot so far. Dry weather in August has generally helped keep these diseases at bay. However, recent heavy rains may turn that situation around. Frequent rains promote bunch rots. Any wounds created by insects or cracking of berries in tight bunches can encourage Botrytis development. Tight-clustered cultivars also provide a moist environment for infection and sporulation, which further spreads the disease. Botrytis bunch rot can be distinguished from sour bunch rot by the presence of grayish brown spore masses at the stem end or along wounds in the berries, and the absence of the vinegary odor associated with sour bunch rot. In addition, sour rot often has fruit flies colonizing rotting clusters.

A relatively rare disease of grapes in Michigan, anthracnose, caused by the fungus *Elsinoe ampelina*, was again observed at several sites this year. The fungus primarily attacks table grapes, but can also infect 'Niagara', 'Concord', and 'Vidal' and 'Frontenac' wine grapes. Symptoms on the canes

somewhat resemble those of Phomopsis, but lesions are typically more sunken with raised edges. On leaves, the center of older lesions drops out, giving the leaves a puckered and "shot hole" appearance. Lesions on green berries are reddish brown or grayish with darker margins, and do not expand much upon ripening. This disease is favored by cool, rainy springs.

#### **Strawberries and Brambles**

Cool wet conditions favored foliar diseases of strawberries like common leaf spot, Phomopsis, and angular leaf spot, as well as leather rot on fruit of strawberries. Angular leaf spot caused blackening of calyxes in some strawberry fields. Leaf spot, spur blight, and anthracnose cane spot were commonly seen on raspberries. Fire blight also occurred on raspberry in some locations, killing back shoot tips and sometimes fruit clusters on raspberries. Botrytis gray mold on the fruit was also common, both on strawberries and raspberries. It was mainly a postharvest problem on raspberries.

Oddly shaped strawberries (button berries) were probably caused by tarnished plant bug if they occurred later in the season (on everbearing strawberries), although freeze injury of flowers may have to blame in June-bearing strawberries. Some fields suffered from frost injury where frost protection was not feasible.

White drupelets, usually indicative of sun scald were also noticed, particularly in tunnel-grown raspberries. Due to the warm weather, mites were a problem in tunnels. Fungal diseases are not very common in tunnels since there is rarely free water on plant surfaces to allow for infection. However, it is possible to get some Botrytis infection of fruit if the relative humidity is very high (greater than 95 percent) for multiple days in a row- *Botrytis conidia* can germinate under those conditions, although they prefer a film of water. Leaf distortion, crinkling and plant stunting resembling virus symptoms were caused by potato leaf hopper. (Source: Michigan Fruit Crop Advisory Team Alert. Vol. 23, No. 18, September 16, 2008)

### **Specialty (minor-use) Crop Pesticide Prioritization in the 2008 IR-4 Food Use Workshop** *Satura Miyazaki, John Wise and Bernard Zandstra, Michigan State University*

Due to the current review of crop protection chemicals under the Food Quality Protection Act and the high cost to industry of product registration, specialty (minor) crops and sometimes, minor uses on major crops are at risk of having few available products or being lost for pest management. To mitigate this problem IR-4 (Interregional Research Project No.4), funded by USDA-CSREES, facilitates pesticide registration for specialty crops by conducting field residue trials, and occasionally, efficacy trials. Specialty crop research needs are prioritized each year during a national workshop since resources are limited. The primary objective of this workshop was to have the participants identify the most important research projects for the 2009

IR-4 research program.

Research priorities for the year-2009 field residue program for fruits, vegetables, field crops and herbs grown in the United States and Canada were assigned at the Food Use Workshop held September 16-17 in Sacramento, California. The workshop was attended by Drs. Bernard Zandstra, Mary Hausbeck, Satoru Miyazaki, and John Wise of Michigan State University, along with other specialty crop/use researchers, extension specialists, representatives of commodity and industry groups across the country, and personnel from EPA, USDA, IR-4 plus the AAFC (Canadian counterpart of minor use program) personnel.

Representatives from United Kingdom, and Japan were also present.

More than 200 people attended the two day meeting. Participants were provided with a complete list of all pesticides “nominated” with desired priority (i.e.; A or B rating) by regions for consideration prior to the meeting. This “nomination” process, introduced two years ago, greatly streamlined project selections and allowed the participants to spend more time reviewing only the worthy projects. As a group they ranked products based on need, performance, safety, availability of alternatives, and compatibility with the IPM program. Only a limited

number of projects could be assigned “A” (13 per discipline). An “A” priority guarantees IR-4 to begin the field residue program immediately the following season, with expectations that a complete data package be submitted to the EPA within 30 months. Thirteen fruit projects important for Michigan were assigned A priorities. (See the table below). Any “B” priority projects must be upgraded to A priority either by an Priority Upgrade Proposal or by regional upgrade. The following new candidate priority “A” projects listed are preliminary until affirmed at the IR-4 national planning meeting on October 28-29. A complete listing can be found on the IR-4 web-site ([www.ir4.rutgers.edu](http://www.ir4.rutgers.edu)).

### Priority A's for Fruits

Insecticides		
Product	Crops	Target insect(s)
Diflubenzuron (Dimilin)	Peach, Plum	Oriental fruit moth, peach twig borer, katydid
Thiamethoxam (Actara, Platinum)	Caneberry	Aphid, leafhopper, adult root weevil
Spirotetramat	Blueberry	Aphids, scale insects
Spirotetramat	Cranberry	Cranberry tipworm
Chlorantraniliprole	All crops*	Lepidopteran and certain fruit fly pests
Fungicides		
Product	Crops	Target disease(s)
Kasugamycin (Kasumin)	Cherry	Bacterial canker
V-10135	Caneberry	<i>Botrytis</i>
V-10135	Blueberry	<i>Monilinia, Botrytis</i>
Herbicides		
Product	Crops	Target weed(s)
Sulfentrazone (Spartan)	Apple	Nutsedge, broadleaf weeds
Simazine (Princep, Princep Caliber 90)	Pear	Weeds
Clethodim (Envoy, Select)	Cherry	Annual grasses
Ethephon (Cerone, Ethrel, Prep)	Peach	Fruit thinning
Ethephon (Cerone, Ethrel, Prep)	Plum	Thinning agent
Flumioxazin (Broadstar, Chateau, Gangster)	Caneberry (Blackberry)	Broadleaf weeds, annual grasses

\* IR-4 “Crop Extrapolation” action will bridge existing residue data-base to cover remaining crop registrations. (Source: Michigan Fruit Crop Advisory Team Alert. Vol. 23, No. 18, September 16, 2008)

### Upcoming Meetings:

**October 16, 2008.** *Day-Neutral Strawberry Production Workshop* - at the Penn State’s Horticulture Research Farm at Rock Springs, PA, which is located on Rt. 45, west of Pine Grove Mills, PA.. Presenters will be Kathy Demchak from Penn State University, and Dr. Harry Swartz and Willie Lantz from the University of Maryland. The event is free, and includes a lunch (probably involving strawberries), and refreshments. However, we do need to limit attendance to 45 people. Please call 814-863-7716

**October 23, 2008.** *Berry Pest Management Workshop*, Civil Defense Center, Route 54, Bath, NY. Berry Extension Support Specialist Cathy Heidenreich will review berry pest management methods and resources, and introduce new management tactics, strategies, and products for pests found in berry crop production. An overview of the most common pests for each crop will be followed by a discussion of season long pest management strategies for each berry crop. DEC recertification credits pending. Those wishing to receive credit must bring their pesticide license to the meeting. Registration is required by Friday October 17th. Cost to attend is \$15 per person. This fee includes light refreshments and handouts. For more information or to register contact CCE Steuben at 607-664-2300.

**October 28-29, 2008.** *Cornell Strategic Marketing Conference*. Wappingers Falls, NY. Updated conference information & registration materials now available at <http://marketingpwt.aem.cornell.edu>. For more information contact:

Todd Schmit, Dept. of Applied Economics and Management, 607-255-3015, [tms1@cornell.edu](mailto:tms1@cornell.edu) or Les Hulcoop, Cornell Cooperative Extension-Dutchess County, 845-677-8223, [lch7@cornell.edu](mailto:lch7@cornell.edu).

- Nov. 1, 2008.** *Heirloom Fruit Workshop*, Old Sturbridge Village, Mass. 9 a.m - 7 p.m. The workshop will take place on November 1, 2008 beginning at 9:00 am at Old Sturbridge Village, with a visit to a local orchard in the afternoon, followed by an heirloom apple tasting event. A \$25 fee per person includes the costs of materials and lunch. Reservations may be made by contacting Old Sturbridge Village at [www.osv.org](http://www.osv.org) and must be made by October 22, 2008. We look forward to your involvement; please call Gary Nabhan at 928-225-0293 or email him at [gpnabhan@email.arizona.edu](mailto:gpnabhan@email.arizona.edu) if you have questions.
- Nov. 6-8, 2008** *Southeast Strawberry Expo*, at the Hilton Charlotte University Place, Charlotte, NC. Includes Strawberry Plasticulture Workshop for New Growers, farm tour, educational sessions, and trade show. For more information, email [info@ncstrawberry.com](mailto:info@ncstrawberry.com)
- Nov. 14, 2008.** *Grape Disease Management Review*, Newport Vineyards, Middletown, RI. Featured Speaker Dr. Phillippe Rolshausen, UConn. For more information contact Peggy Siligato at [Siligato@uri.edu](mailto:Siligato@uri.edu).
- Nov. 18, 2008.** *Diagnosis, Visual Assessment and Management of Plant-Parasitic Nematodes of Vegetables and Small Fruit in the Northeast*, Lehigh County Cooperative Extension Office, Allentown, PA. For more information contact Beth Gugino at [bkgugino@psu.edu](mailto:bkgugino@psu.edu).
- Dec. 8-10, 2008,** *North American Raspberry & Blackberry Conference* in Grand Rapids, MI, as part of the Great Lakes Expo. For more information, email [info@raspberryblackberry.com](mailto:info@raspberryblackberry.com).
- Dec. 9-11, 2008.** *Great Lakes Fruit, Vegetable and Farm Market Expo*, DeVos Place Convention Center, Grand Rapids, <http://www.glexpo.com/>.
- Feb. 3-5, 2009.** *2009 Mid-Atlantic Fruit and Vegetable Convention*, Hershey Lodge and Convention Center, Hershey, PA. For more information contact William Troxell at 717-694- 3596 or visit [www.mafvc.org](http://www.mafvc.org).

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