

Berry Notes

Prepared by the University of Massachusetts Fruit Team

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UPCOMING MEETINGS

Current Conditions:

Strawberry renovation is complete. Keep renovated fields as well as new plantings regularly irrigated. Pull blossoms and set runners on new plantings. Also, check new fields for evidence of potato leafhopper burn and evaluate older fields for the level of foliar diseases, especially powdery mildew. **Highbush Blueberry** harvest is underway. Yields look to be good, w/ average to above average fruitset being reported. Leaf samples can be taken for tissue analysis from now to mid August to determine nutrient status of the bushes. This is especially important for blueberries since soil tests are not a reliable check on adequate nutrition. Scout fields for aphid infestations and treat if necessary. Aphids are the key vector for Blueberry Scorch Virus. Also, be sure to keep young blueberries well watered during the coming weeks to help bushes sustain their fruit-load and go into the winter free from water stress. **Summer Raspberry** harvest is still underway. Scout for Japanese Beetle which can cause fruit damage as well as foliar feeding. Sap beetles can be a serious problem in ripe raspberries. Malathion and pyrethrin-type (Evergreen and Pyganic) insecticides provide some control of sap beetles and have short pre-harvest intervals. White patches on fruit may be due to sunscald. **Grape** clusters are sizing up. Powdery and Downy mildew are common this year. Grape Berry Moth activity is increasing. Scout vineyards thoroughly and take corrective measures for these problems before veraison. Have your harvest materials and market plans in place before harvest begins.

- 2008 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 www.umass.edu/fruitadvisor.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a two-week period, July 9, 2008 through July 22, 2008. Soil temperature and phenological indicators were observed on July 22, 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 (1-Week Gain)
	1-Week Gain	Total accumulation for 2008		
Cape Cod	344	1,358	78°F	1.35"
Southeast	332	1,392	79°F	1.30"
East	350	1,441	70°F	2.00"
Metro West (Waltham)	347	1,355	77°F	1.70"
Metro West (Hopkinton)	345	1,402	84°F	0.98"
Central	n/a	n/a	n/a	n/a
Pioneer Valley	329	1,372	74°F	1.05"
Berkshires	360	1,424	n/a	2.43"
AVERAGE	344	1,392	77°F	1.55"

n/a = information not available

(Source: UMass Extension 2007 Landscape Message #19, July 24, 2008)

STRAWBERRY

Cyclamen Mites in Strawberry

Alan Eaton, UNH Extension

Shortly after renovation is the easiest time to see cyclamen mite injury, and the most effective time for control. Cyclamen mites are deep down in the crowns, feeding on the just-forming and opening leaf tissues. New leaves emerge as twisted, distorted, stunted, often purplish. When I see this, I ask myself if it could be herbicide injury. It is easy to confuse the two. The pattern in the field provides a good clue to distinguish the two. If injury is spotty; a plant here then there, then a skip... that suggests cyclamen mite. If damage is along entire rows (or the entire bed), that suggests herbicide injury to me.

One way to confirm cyclamen mites is to examine the crown under a microscope. For someone trained, with really good eyes and good light, 20X magnification **might** be enough. For me, I need a microscope. The

mites are very tiny, oval shaped things, straw-colored. Yes, I mean tiny. An adult two-spotted spider mite is about 1/2 millimeter long. An adult cyclamen mite is about 1/4 millimeter long. Since there are 25.4 millimeters to the inch, that's tiny.

I'll include control information now, lest I forget in the July issue. The reason post-renovation is the easiest time to control these is that you have to get the pesticide to run deep into the crowns, where the mites live. That means high gallonage, a wetting agent, and enough pressure to get good foliar agitation are required. Labels usually list 400 gallons per acre as the recommended rate of water. Both Kelthane and Thionex are registered. One properly done application should do it. (Source: UNH IPM Newsletter, Vol. 12, No. 6, June 27, 2006)

Leaf Tissue Sampling

Sonia Schloemann, UMass Extension

Leaf tissue analysis is a way of determining the actual nutritional status of plants. It is an excellent and inexpensive way of finding out if your fertilization program is working or if changes need to be made. The analysis provides information on foliar N, P, K, Ca, Mg, Mn, Fe, Cu, B and Zn levels for the leaves sampled and recommendations for corrective measures if needed. Combined with soil testing, leaf tissue analysis

can help pinpoint the source of problems and determine what measures may be needed to ensure proper nutrition of the crop. For strawberries sample from the first fully expanded new leaves after renovation. Collect 30 - 50 leaves per sample. Sample different varieties separately, if possible. Collect leaves from as many plants as possible in the sample area. Remove the petioles (leaf stems) from the leaves. Gently wash the leaves in tap water to rinse off soil

or spray residue. Allow the leaves to air dry until they are brittle before placing into a paper bag. The cost per sample (w/ Nitrogen) is \$20. A check made out to *the University of Massachusetts* must be sent in with the sample. Send sample(s) to the Soil and Plant Tissue

Testing Lab, West Experiment Station, Box 38020 UMass, Amherst, MA 01003 or call (413) 545-4768. Test results will be accompanied with recommendations. Go to <http://www.umass.edu/soiltest/> for more information on soil and tissue testing services at UMass.

Black Vine Weevil and Strawberries

Alan Eaton, UNH Extension

If you grow strawberries and don't have black vine weevil problems, thank your lucky stars. This insect can cause serious losses, and is difficult to control. The adults are active now, at night. They chew notches into the edges of leaves. Not too many pests do this, so seeing this injury should prompt you to do a little digging in the mulch, where the weevils hide during the day. They should begin laying eggs at the end of July, and continue for weeks, if not killed. In mild conditions, with some protection, they can overwinter and lay more eggs next spring!

The serious injury is from the larvae, which tunnel into crowns and feed on roots. They look like tiny, white grubs with no legs. The most serious feeding occurs in late spring, when the larvae are large.

Before I go farther, I should point out that BVW is the largest, hardest to control, and most serious of three nearly identical species. The other two are the strawberry root weevil (smallest of the three), and the rough strawberry weevil.

For several years we have had one chemical insecticide registered to control them, called Brigade (bifenthrin). It is only marginally effective, and sometimes causes serious mite outbreaks (presumably by killing off the predator mites). I rarely recommend it. Now we have a new chemical available, called thiamethoxam. One brand is called Platinum. Technically, it is registered to control the smallest of the three species, strawberry root weevil. I don't expect it will help too much for BVW. To control strawberry root weevil, you'd apply it when the larvae are small, probably about August 20-30th. A second product with thiamethoxam in it is called Actara. Cryptically, the label says it is for "weevil adult". I assume it may help control the little one (strawberry root weevil), but probably not much help for its larger relatives.

There are nematode products available to control the larvae of the three species of root weevils. Applied

carefully, at the correct rate, they can be effective. The proper timing would be mid-May or late August. When applying nematodes, it is critical to do so late in the day, and water them in immediately. Avoid hot weather and dry soil, because nematodes die in just a couple of minutes if they dry out. Also important: really shop around for a supplier, because nematodes are very expensive. It is also critical to use the correct species. Some nematodes go deeply into the soil, while other species tend to stay at the surface. The species you want for root weevil (any of the three species) control are: *Steinernema feltiae*, *Heterorhabditis bacteriophora*, or *Heterorhabditis megidis*. More important points for using nematodes: 1) triple rinse the sprayer first. 2) remove the screens from the sprayer. 3) moisten the soil first. 4) use low pressure. 5) you need some agitation, because they tend to settle in the tank. The correct rate for *Steinernema feltiae* is 3 billion per acre. For the other species, 1 billion per acre is acceptable. Yes, that's billion with a B: 1,000,000,000.

If you have the land available to do so, my suggestion to handle a serious BVW problem is to disc up the infested bed, and plant a new one 100 yards (farther is better) away. Before putting any strawberries into the old area, you must keep the area with the old bed in unfavorable crops for over a year. I think 2 years is better. That sounds simple, but there are lots of plants that the larvae of BVW can feed on. They all have to be kept out including the weeds: Achillea, Adiantum, Asters, Astilbe, Azaleas, Begonia, Bergenia, Blackberry, Calla lilly, Christmas fern, Cinquefoil, Cyclamen, Dandelion, Dock, Epimedium alpine, Epimedium grandiflora, Hemlock, Heuchera, Hosta, Hydrangea, Impatiens, Isoloma, Lily of the Valley, Lythrum (loosestrife), Mountain-Laurel, Phlox, Physostegia, Plantain, Primrose, Raspberry, Rhododendron, Rhubarb, Sedum acre, Sheep sorrel, Strawberry, Wood sorrel, Taxus (yew). (**Source:** *UNH IPM Newsletter, July 15, 2008 Volume IV, No. 7*)

Miticides on Strawberries

Alan Eaton, UNH Extension

Usually two-spotted spider mite (TSSM) doesn't give us too many problems in New Hampshire. If growers are careful not to over-use insecticides, predator mites

are fairly common in strawberries, especially *Amblyseius fallacis*, which loves to prey on TSSM. But if mites do become a problem, remember that we now have two new

choices for miticides on strawberry. The newest one is Oberon, with the active ingredient Spiromesifen. It controls the eggs & motile stages of mites, and has a pre-harvest interval of 3 days, re-entry interval of 12 hours. It is registered on many vegetables, too. Kanemite (Acequinocyl) is also registered now. It controls the motile stages, and has a pre-harvest interval

of one day and a re-entry interval of 12 hours. By the way, it is registered on apples, too. You're probably already familiar with the other miticide choices on strawberry: Acramite, Agri-mek, Savey, Zeal, Brigade, Danitol, Sunspray ultra-fine oil, and Trilogy. Brigade and Danitol are very rough on our predator mites. (*Source: UNH IPM Newsletter, July 15, 2008 Volume IV, No. 7*)

RASPBERRY

Bramble Borers

Kathy Demchak, Penn State University

This is an updated version of an article from 2005 (in case parts sound familiar to some of you). I'm continuing to get calls from growers with bramble borers of one type or another so hopefully this information will help with management. This is the time of year to be watching for indications that you have borers in your planting – hopefully before damage becomes extensive.

At this time of the year, especially on hot afternoons, wilting cane tips – often the first sign that you have borers in your planting - are fairly easily seen. When a borer is the problem, at first only a tip here or there is wilted while the rest of the tips appear normal. Once a wilted cane tip is noticed, look for other symptoms to help identify whether a borer is the problem. Symptoms may be two rings of punctures about 1/2-inch apart within the top 8 inches of the cane (raspberry cane borer), a cane swelling up to 3 inches long that is slight at first, but will be more obvious in late stages (red-necked cane borer, or less commonly raspberry cane maggot), or a large hole in the side of the cane (stalk borer, which isn't a common problem). There may be more than one type of insect present. Once the area of damage is found, if caught early, the eggs or larvae will still be located within several inches of the injury, so pruning out these canes 4-6 inches below the area of damage is the first step in preventing further damage. Plantings near woods and wild bramble populations are usually affected to the greatest extent.

With the insects mentioned above, wilted cane tips will continue to appear throughout the summer. Sprays that are applied need to be targeted towards the adults, because the larvae are protected inside of the canes. Sprays usually are applied late pre-bloom if damage is widespread, but the culprit should be identified first to ensure that the timing is correct. Red-necked cane borer adults are a slender 1/4-inch long black beetle with a reddish “neck” area (prothorax). They may be present from May through early August, and seen feeding on new canes and leaves especially when it's sunny. Raspberry cane borer adults are 1/2-inch long, have long antennae, and are mostly black with an orange section behind the head with black spots. By this time of the year, many of their eggs will likely already have been laid, unfortunately, hence the need to watch for cane symptoms.

Keep in mind that some pruning during the summer, with additional pruning of damaged canes during dormant pruning, may be all that is needed.

Crown borers, which have a considerably different life cycle, will cause tunneling in the crown area, but because of the timing and type of damage, tips may not wilt until damage is advanced. The adults are clear-winged moths that are about 1-inch long, and could be confused with yellow jacket wasps. They appear later in the summer (August).

Canes that died as berries were forming should be checked for signs of tunneling in the cane and crown area. Death of fruiting canes may have a variety of other causes including winter injury or a root rot. (*Source: Pennsylvania Vegetable & Small Fruit Gazette, Volume 12, No. 7*)

BLUEBERRY

Watch Out for Harvest-Season Insect Pests

Rufus Isaacs, Michigan State University

With blueberry harvest underway, regular scouting of fields is critical to ensure that harvested berries are insect-free. Four key insect pests can infest blueberries during harvest and management of these should be the focus of insect IPM programs until harvest is complete. These insect pests are cranberry fruitworm, Japanese beetle, blueberry maggot, and tussock moth.

Cranberry fruitworm. This pest is usually out of the fruit before harvest of most fields, but early varieties are the most at risk. This is because larvae not controlled after bloom can still be developing in the fruit when these early varieties are harvested. Regular field inspections, especially alongside woods or tree lines, are recommended to avoid harvesting infested fruit. If any berries are detected with the characteristic premature color change, and especially if

larvae are found inside, growers may consider skipping the edge of the field to avoid harvesting these berries. While the window for fruitworm management is closing for 2008, take good notes now and make sure fields that were not well protected from this pest are given extra attention in 2009.

Japanese beetle. Beetle emergence has begun for 2008. Adult beetle densities are generally low still, but we expect more emergence over the coming weeks. Preventing beetle contamination of blueberries is essential during harvest, so many growers adopt a cycle of management for this pest that follows the following sequence: harvest, irrigate, scout fields, apply insecticide only if needed. This is repeated through each of the harvests. There are a number of registered insecticides that provide very effective protection against Japanese beetle, and you can [view last week's article](#) for detail on this topic.

Blueberry maggot. Flies are emerging from their overwintering stage, and monitoring traps are catching them in many parts of southern Michigan. Using yellow sticky traps baited with attractive odor is a key component of blueberry IPM, as this allows growers to decide whether there is any risk to the field from blueberry maggot. Traps should be checked a few times each week through harvest so decisions can be made to not treat or treat depending on the number of flies detected. It is critical that accurate identification is made of flies trapped, and the photo below helps show the differences between blueberry maggot (fly on the left) and the native cherry fruit flies that can be around blueberry fields on wild cherry (fly on the right). The

cherry fruit fly does not infest blueberries and its wing pattern is different from blueberry maggot. Most insecticides that are active on Japanese beetle will also control blueberry maggot.

Tussock moth. In early July the eggs from the second generation of tussock moth hatch and the larvae crawl into the bushes to feed on leaves, preferring the darker, shady parts of the bush. As they grow, these larvae move higher in the canopy and can become mature, large, colorful (yellow, white, black, and red) larvae as the later ripening varieties mature. The key to preventing problems with this pest at harvest is good management of the first generation; tussock moth tend not to be a pest in fields that receive good control of fruitworms around bloom time when the early tussock moth generation larvae are out. If larvae are present now there are many broad-spectrum insecticides that will control this pest. Various selective insecticides can work too if they are applied early enough: B.t (Dipel, Javelin) or the growth regulators Confirm or Intrepid are effective at controlling younger larvae of tussock moth. Larvae must eat these insecticides for them to work, so covering the inside of the bush is essential. This goes for the broad-spectrum products too - because the larvae can be down in the bush canopy getting product to the center of the bush is needed if tussock moth is to be controlled. ((*Source: Michigan Blueberry Facts, July 8, 2008 Volume 2, No. 12*))

Japanese Beetles in Blueberries

Rufus Isaacs, Michigan State University



Adult beetles feed on ripe fruit and foliage.

Adult beetles are about 13 mm long with a metallic green thorax and shiny, brown wing coverings. Rows of white tufts are distinctive on the undersides of the abdomen. Male and female beetles

congregate on the tops of plants in sunlight, where they feed and mate.

Adult beetle emergence begins in early June in North Carolina and early July in Michigan. Mating occurs as soon as females emerge from the ground. Then they seek grassy areas with moist soil to lay eggs. Eggs are 1 to 2 mm in diameter, spherical and white, and are laid 5 to 10 cm deep in the soil in batches

throughout the female beetle's month-long life. C-shaped, cream-colored grubs with brown heads and three pairs of legs develop in the soil, becoming 3 cm long when fully grown.

Japanese beetle grubs can be distinguished from similar grubs by two rows of seven hairs in a V shape on the inside of the posterior segment. Beetles are best detected on blueberry bushes during calm, hot, cloudless afternoons. Traps for monitoring Japanese beetle are highly attractive but can increase the number of beetles flying into an area. In small plantings, beetles can be removed from bushes.



C-shaped grubs are found in soil under grassy areas

Control of attractive weed hosts and removal of grassy areas in and around fields during July and August can reduce field suitability for Japanese beetle. Biological control agents suppress populations in areas where the beetle is established. (Source: Michigan Blueberry Facts,

<http://www.blueberries.msu.edu/japanesebeetle.htm>



Japanese beetle grubs have hairs in a distinctive V pattern.

Fruit

- Anthraxnose** – *Colletotrichum acutatum* (fungus)
- Alternaria fruit rot** – *Alternaria tenuissima* (fungus)
- Botrytis fruit rot** – *Botrytis cinerea* (fungus)

The majority of fruit rot in blueberries is caused by three different pathogens *Colletotrichum acutatum*, *Alternaria tenuissima*, and *Botrytis cinerea*. In previous issues

we separately discussed these three pathogens in moderate detail. However, it is often

beneficial to group them because like other fungi they thrive on ripe to overripe fruit and high humidity. Furthermore, each can cause significant post harvest fruit losses. In Michigan, these pathogens can be seen as pre-harvest diseases (especially anthracnose); however, the majority of losses are incurred after harvest and during storage.

Symptoms

Immature green berries are generally asymptomatic for any sort of fruit rot, however the fungal infection can and likely occurs during this growth stage. The infection remains latent and fruit rot symptoms will not appear until the berries start to ripen. For anthracnose, berries will have sunken areas and start to shrivel, and under humid conditions, support copious orange,

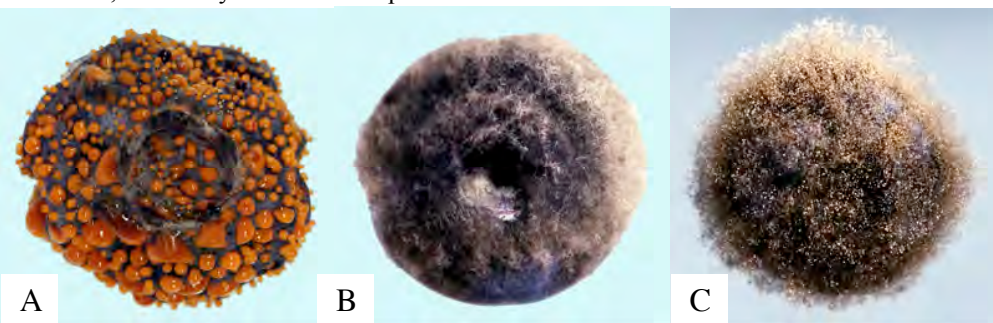


Figure 1. Advanced fruit rot symptoms on ripe blueberries kept under high humidity. A) Anthracnose B) Alternaria fruit rot C) Botrytis fruit rot.

Rots

Annemiek Schilder, Michigan State University

gelatinous spore masses (Figure 1A). *Alternaria* can cause sunken areas near the calyx cup eventually leading to a dense amount of dark green fungal mycelium covering the fruit surface (Figure 1B). After harvest, *Alternaria* is most commonly found as spreading, greenish gray fungal growth around the fruit scar. *Botrytis cinerea* or gray mold, is

uncommon in the field, however, it is characterized by gray fluffy hyphae covering the surface of the berry (Figure 1C).

Scouting

In terms of scouting for

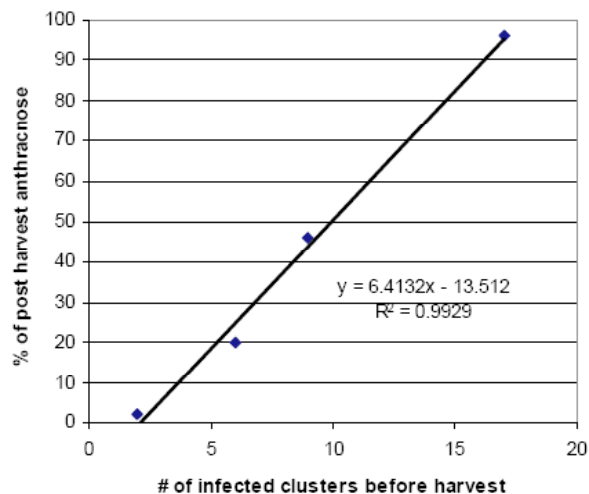


Figure 2. Pre-harvest anthracnose incidence correlated strongly with post-harvest rot incidence in 2007 in the four scouted blueberry fields in Michigan.

fruit rots, each of these pathogens can be distinguished from each other in the field and should be treated differently when applying control measures. In the summer of 2007 we made an effort to validate scouting for pre-harvest fruit rots to determine the risk of post-harvest losses, we collected healthy-looking fruit from all of the scouted plots. The fruit was then returned to MSU and placed under 100% humidity for a period of ten days. Figure 2 represents pre-harvest anthracnose incidence observed in the field and how it correlates to post-harvest rot levels in the lab. These data demonstrate that the higher the incidence of preharvest rotting observed in the field, the more significant the risk of post-harvest crop losses. Growers can do a rot test by placing ripe berries on a moist paper towel in a container with a lid, making sure that the berries do not touch each other and that the towel remains moist (but there is no standing water) for 10-14 days.

Management

Since these diseases do not often manifest themselves until harvest, preventative measures are necessary. If fruit rot problems were experienced in previous years, it is fair to assume that there will be disease pressure this year.

A fungicide spray program from pink bud to harvest will aid in preventing fruit infections from occurring. The 2008 Fruit Management Guide lists several fungicides that are effective against fruit rot diseases. Captan, Abound, Cabrio, Pristine, and Switch are effective against anthracnose; Switch, Aliette, and Pristine are quite effective against Alternaria rot; and Switch, Elevate, and Captevate are effective against

Botrytis gray mold. Do consider the pre-harvest interval as well as fungicide resistance management and systemicity in your choice of fungicides.



Figure 3. Michigan State University spore trap (Sporomatic 2000 Deluxe) designed to collect rain water and spores of rainsplash- dispersed fungi. The aluminum foil is to protect the sample from heating up due to sunlight.

Cultural control measures should be aimed at making the environment less conducive for pathogen growth and development, e.g., by pruning bushes to create an open canopy (this will also allow better spray penetration), good weed control, and timing of overhead irrigation to allow rapid drying of leaves and fruit. Timely harvests and rapid cooling and processing of fruit can reduce post-harvest losses. In the long term, pruning out of old or infected canes and twigs can be effective at eradicating or reducing overwintering inoculum. Another option is to plant resistant cultivars.

Future Options

Currently, Michigan State University is developing a predictive disease model based on weather information, which considers how much fruit wetness duration is required for infection at what temperature. In addition, we also would like to be able to predict when spores are spread through a field. To construct this model, rain water has been collected every week for a number of years from different blueberry fields and the number of spores present in the water counted under a light microscope (Figure 3). Weather data from stations of the Michigan Automated Weather Network will be used to analyze spore release patterns.

(Source: Michigan Blueberry Facts, July 8, 2008 Volume 2, No. 12)

GRAPE

What to Do When You Start Seeing Disease in the Vineyard

Annemiek Schilder, Michigan State University

We've had quite a variable season so far with rain and sun, humid and dry days after a particularly cool spring. Unusually rainy weather has provided plenty of opportunity for disease to become a problem in vineyards. Black rot, Phomopsis and downy mildew, have already been sighted this year. Our general

approach to disease management is to apply preventative fungicide sprays and careful and timely canopy and fruit zone management. But sometimes a situation can get out of control even in the best vineyards, particularly if rain and wind have prevented application of fungicides at critical times. In that case, prepare to treat post-

infection if necessary. Several fungicides provide good “post-infection” activity (e.g., the sterol inhibitors such as Elite and Nova). This means that they’ll stop disease development if applied after an infection period has occurred but before disease symptoms appear. However, very few fungicides have the ability to “burn out” (eradicate) active infections once symptoms have become apparent. At most you can expect to knock them back a little bit and suppress sporulation while you keep infections from spreading to healthy clusters and leaves. A few other points: Intervene as soon as possible and make sure coverage is good. If dealing with cluster infections, remove infected clusters (if possible) prior to spraying and leaf pull if time allows. It is unrealistic to expect any material to clean up a raging infection or to adequately penetrate a dense cluster zone. In addition to a post-infection material, remember that continued forward protection is also critical to protect clean fruit.

Phomopsis

Not much is known about post-infection activity of fungicides against Phomopsis, as we have not had systemic fungicides that work against this disease until recently and have relied on mancozeb, captan, and ziram to do the job. While Phomopsis, cane and leaf spot are generally not harmful to the vine, fruit infections are and can lead to fruit rot and premature fruit drop as the fruit ripens. If cane and leaf spot infections are noted, it is recommended to protect the fruit and other healthy tissues from infections during rains at least up to bunch closure. With the phosphorous acids (e.g., ProPhyt and Phostrol), we believe we have potential post-infection fungicide options but research needs to be done to show much post-infection activity they actually provide. The strobilurins Abound and Pristine are excellent protectants and may have very limited post-infection activity (approximately 24 hours at most). Because they are systemic and redistribute to some extent in plant tissues, they provide good protection of clusters and leaves.

Black rot

Both Nova and Elite have excellent post-infection activity and some forward action. The backward control is typically spoken of as extending to about 72 hours, that is, you’ll get control if they’re applied within 72 hours after the start of the infection period (rain). However, in two different field trials (and additional greenhouse experiments), Wilcox obtained good control when these materials were applied even five to eight days after the start of an infection period **if** excellent spray coverage was provided. This doesn’t mean you should relax after a “black rot rain” if the fruit were unprotected when it

started - the sooner you can spray afterwards, the better. However, you’re better off waiting for good spray conditions (within reason) than you are spraying in the wind or rain just to meet an arbitrary 72-hr deadline. Both Nova and Elite have some forward activity, although it’s limited (less than a week); tank-mixing mancozeb or ziram with a post-infection spray of one of these materials will improve the forward activity significantly.

Downy mildew

Phosphorous acid products such as Phostrol and ProPhyt provide post-infection control of downy mildew. Good coverage is critical. A dense cluster zone or where foliage is crunched up under bird netting (this is where we’ve had trouble in the research vineyard) can be difficult. Experience with these materials dictates that they are best used early in the infection cycle. Application on an abundance of healthy, sporulating lesions is not the best strategy. Also, phosphorous acid products are prone to resistance development. If downy mildew pressure continues at this high level, alternate phosphorous acids with a product of a different chemistry. Primary options would be Ridomil, copper, mancozeb, captan. Ridomil also provides excellent post-infection activity as well as good forward activity. But using it to try to “burn out” a bad case of active downy mildew is a recipe for resistance development.

Powdery mildew

There are several options to clean up powdery mildew infections including JMS Stylet Oil; Nutrol (monopotassium phosphate); potassium bicarbonate products like Kaligreen and Armicarb 100; and Oxidate (hydrogen peroxide). Sulfur has good activity against very young infections, but is not great once it’s easy to see that you have a problem to deal with. In Michigan trials, Sulfurix (calcium polysulfide) also worked very well as a post-infection contact fungicide, but is assumed to be injurious to sulfur-sensitive grapes. However, none of these materials will clean up and sanitize infected fruit. At best, they will only kill the powdery mildew colonies, leaving scarred fruit but halting the spread of infection to clean fruit. Regardless of strategy, it is probably wise to check fruit closely (look at cluster backsides, clusters jammed up against posts, etc.) shortly after treatment and treat again at the proper interval if powdery mildew infection persists. These materials work strictly by contact, and it’s virtually impossible to contact every square inch of every berry.

JMS Stylet Oil

Of the products listed, only JMS Stylet Oil has provided the best eradication of active infections and is the only material that provides any forward protection. In addition to its post-infection and eradicated activities, the best information available indicates that Stylet Oil provides at least three days, sometimes more, of forward

protection under dry weather conditions. However, the oil residue apparently washes off in as little as 1/3 inch of rain, after which most of the protective activity is gone. Thorough coverage is absolutely essential for this or any of the other post-infection post-infection materials to work. Direct spray at the fruit zone with lots of water. Experience dictates that Stylet Oil works if it makes contact with the infected berries. If the clusters are packed in, if leaf pulling hasn't been done, spray coverage will be compromised and powdery mildew will persist. In the case of JMS Stylet Oil, read the label thoroughly as it is incompatible with a number of key materials including sulfur. Note that JMS Stylet Oil has both a standard and an organic formulation. They differ in the inert ingredients. Also be aware of warnings about application in hot weather (phytotoxicity risk). A study found that Stylet Oil may reduce brix accumulation in fruit when applied multiple times late in the season, so alternating with different fungicides is recommended.

Nutrol, Kaligreen, Armicarb

These are alternatives to when the use of sulfur precludes the use of oil. According to Wilcox, Nutrol, Kaligreen and Armicarb function in the same topical, eradicated, "salt on a slug" mode. Again, these do not provide forward protection and they work best when powdery mildew infection is in the very early stages.

Oxidate

Oxidate in Michigan trials has shown fair to moderate activity against existing powdery mildew infections, but not sufficient to warrant recommendation. The Oxidate label calls for consecutive sprays at 128 fl. oz per 100 gallons and recommends consecutive sprays. Time may be a factor - getting the leaf pulling done and getting consecutive cluster sprays on is time prohibitive for some growers. There have been several questions on

tank mixing Oxidate. BioSafe Systems feels that tank mixing Oxidate with either DF or a liquid sulfur should be no problem. To be sure, you might do a jar test first as per the Oxidate label.

Things to remember with respect to post-infection treatments:

- 1 Apply treatments as soon as possible after symptoms are seen. (Regular and careful scouting is a prerequisite.)
- 2 If disease symptoms are showing up on leaves and shoots, you can assume that there is plenty of disease pressure to infect the fruit as well.
- 3 Spraying fungicides on raging infections is less effective and can encourage fungicide resistance development in the pathogen.
- 4 Waiting a little longer to ensure good spray conditions is a better option than spraying immediately under poor spray conditions.
- 5 Remove infected clusters (if possible) and leaf pull to ensure good spray coverage of fruit zone and reduce humidity around clusters
- 6 Apply fungicides at the highest labeled rate to ensure good post-infection activity.
- 7 Ensure thorough coverage of leaves and bunches, particularly for contact fungicides.
- 8 Ensure forward protection of healthy plant parts by tank-mixing or applying materials that have good protective activity.
- 9 Always read the label for the pre-harvest interval, incompatibility with other products, and other restrictions..
- 10 Scout again to see if your treatment was effective, keeping in mind that some developing infections may continue to manifest themselves over a couple of days after the spray. (*Source: Michigan Fruit Crop Advisory Team Alert, Vol. 23, No. 4, July 22, 2008*)

Upcoming Meetings:

July 24, 2008. **Tractor and Farm Safety Workshop.** Lancaster Fairgrounds, Lancaster NH. Dr. Sam Steel, Farm Safety Specialist from Penn State University will use displays and demo models to present Tractor Roll-Over Safety, Tractor PTO Safety, ATV Safety for Farms and Farm Safety for Children. For info, contact Steve Turaj at steven.turaj@unh.edu or 603-788-4961.

July 24, 2008. **Mid-Season Grape Twilight Meeting** Coastal Vineyards, S. Dartmouth MA. 4:00-7:30. Dr. Tony Wolf and Dr. Richard Kiyomoto will discuss the current season with particular emphasis on best management practices leading into fruit ripening. Cost: \$25 per person. For info or to register, contact Sonia Schloemann at sgs@umext.umass.edu or 413-545-4347. Co-sponsored with the Massachusetts Farm Winery & Growers Assoc.

July 31, 2008. **NOFA-NH Farm Tour & Potluck Dinner: Native Plants in the Landscape.** Found Well Farm, Pembroke, NH. 6pm. For info, contact NOFA-NH at 603-224-5022 or info@nofanh.org or visit: www.nofanh.org

- Aug. 4, 2008. **Organic Vegetable Twilight Farm Tour.** Vegetable Ranch, Concord NH. 6-8pm. Larry Pletcher will host an educational tour with UNHCE Specialists Becky Grube and Alan Eaton. CoSponsored by UNH Cooperative Extension and NOFA-New Hampshire. For info, contact Elizabeth Obelenus at 603-224-5022 or Sadie Puglisi at 603-225-5505 ext. 323.
- August 6, 2008. **Currant Growing Workshop.** More details follow.
- August 6, 2008. **2008 Grape Workshop & Vineyard Tour.** Allysons Orchard, Walpole NY. 10:00 – 4:00. Contact Becky Grube becky_grube@unh.edu or Lorraine Berkett lorraine.berkett@UVM.EDU for more info.
- Aug 8-10, 2008. **NOFA's 34th Annual Summer Conference.** Amherst, MA. Workshops on organic farming, gardening, land care, homesteading and more. For info, contact Julie Rawson at 978-355-2853 or julie@nofamass.org or visit www.nofamass.org.
- Aug 13, 2008. **Pumpkin Diseases Twilight Meeting.** Yankee Farmer Farmstand, Greenfield, NH. This meeting will focus on pumpkin disease management, but also offers a chance to see the Yankee Siege Trebuchet in action. The trebuchet throws pumpkins for hundreds of yards for entertainment (but is one method for getting infected pumpkins out of the field??). For info, contact George Hamilton at 603-641-6060 or george.hamilton@unh.edu
- Aug 19, 2008. **Vegetable Twilight Meeting.** Tasseys Farm, Shelburne, NH. More details to follow. For info, contact Steve Turaj at 603-788-4961 or steven.turaj@unh.edu
- Aug. 20-21, 2008 **NASGA Summer Tour** Columbus, Ohio. See <http://www.nasga.org/> for more information
- Aug 21, 2008. **NOFA-NH Farm Tour & Potluck Dinner: Land Use Partnership & New Farmers.** Two Mountain Farm, Andover, NH. 6pm. For info, contact NOFA-NH at 603-224-5022 or info@nofanh.org or visit: www.nofanh.org
- Aug 27, 2008. **NH Vegetable and Fruit Growers' Twilight Meeting.** Woodman Horticultural Farm, Durham NH. 4:30-7:30pm. See and hear about the latest UNH research on vegetable crops, ornamental horticulture, fruit crops, and more. Contact: Suzanne Hebert at suzanne.hebert@unh.edu or 603-862-3200.
- September 18, 2008, **On Your Way to Growing Greener: Using Biological Control in Greenhouses 9:15 AM – 3:45 PM Sturbridge Host Hotel and Conference Center, Sturbridge, MA** *Sponsored by: University of Massachusetts, University of Connecticut, University of Rhode Island and Northeast SARE* **Featuring Stanton Gill, (University of Maryland) and Suzanne Wainwright-Evans, (Buglady Consulting).**
- Topics will include: Why Should Growers and Retailers Consider Biological Control in Their Greenhouses, Practical Steps in Starting a Biological Control Program: Is it for you? What crops should you start with? Sources and Quality Control of Natural Enemies, Which Natural Enemies are Best for Fungus gnats, Spider mites, Thrips and Aphids: How to use them, Compatibility, Where and how to release them, What rates to use, *Examples of Live Specimens!*, Using Banker Plants, "Future" New Products, Case Studies: Real Experiences of Greenhouse Growers, Panel of Wholesale Growers and Grower Retailers Cost: \$35 (includes Handouts, Refreshments, Lunch) Four pesticide recertification credits for attendees from CT, MA, RI, ME, NH and VT
- Sept 19-21, 2008. **Common Ground Country Fair.** MOFGA Common Ground Education Center, Unity, ME. For info, visit www.mofga.org. **AC, O.**
- September 23, 30, October 7, 14, and 21. **Building a Successful Small Farm Operation** in Orleans County, NY. Contact Paul Lehman of Niagara County CCE or Lynn O'Brien of Allegany/Cattaraugus County CCE for more information.
- 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
- 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.

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