



Berry Notes

Prepared by the University of Massachusetts Fruit Team

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UPCOMING MEETINGS

Strawberries – fruiting fields are progressing into bloom. Be sure to keep an eye on weather forecast for frost warnings in your area. Bloom fungicide applications are important now to control fruit rots. Scout fields for clipper and two-spotted mite. Tarnished plant bug are active now, so field scouting should include TPB, too. Avoid insecticide applications during bloom. **Raspberries** – summer bearers are showing some fruit buds. This is still the pre-bloom period. Some foliage is showing raspberry fruitworm feeding injury. Remember to avoid insecticide applications during bloom. But, be ready for fungicide applications to control botrytis gray mold during bloom. Fertilizer applications can be made now. Mature planting should receive 40-80 lbs N/acre on summer bearers and 70-100 lbs N/acre in fall bearers in a split application between now and early July. Use higher rates on sandier soils or if excessive rain falls. **Blueberries** - bloom is nearly complete. Cranberry fruitworm traps should be set out at this time. Hold insecticide applications until after bloom is complete. Giberellic acid applications may aid in overcoming poor pollination. See article in the last issue on how to use GA. Scout fields for signs on mummyberry strikes and apply fungicide as needed. Remember frost damaged tissue is more susceptible to infection. Also, be ready for bloom fungicide applications to control other fruit rots. Apply fertilizer in a split application w/ 50-60 lbsN/acre in mature plantings. Make second application in 4-6 weeks. **Grapes** range from 5” shoot to 10” shoots depending on location and variety. Frost may have damaged some primary shoots. Growers will need to begin their spring fungicide program. Fertilizer and herbicide applications made before heavy rain may need to be repeated where material may have washed or leached away. **Currants** and **Gooseberries** are at fruit-set. Watch for Imported Currant Worm and Currant Borers at this time. Also watch for powdery mildew infections. Fertilize now in a split application w/ same rates as blueberry.

2008 New England Small Fruit Pest Management Guide now available – 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 one-week period, May 21, 2008 through May 27, 2008. Soil temperature and phenological indicators were observed on May 27, 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	2007 GROWING DEGREE DAYS		Soil Temp (°F at 4" depth)	Precipitation (1-Week Gain)
	1-Week Gain	Total accumulation for 2008		
Cape Cod	57	223	62°F	0.50"
Southeast	70	272	63°F	0.03"
East	70	278	65°F	0.33"
Metro West (Waltham)	53	218	64°F	0.13"
Metro West (Hopkinton)	65	252	68°F	0.03"
Central	63	224	54°F	0.09"
Pioneer Valley	62	310	64°F	0.22"
Berkshires	40	265	64°F	0.37"
AVERAGE	60	255	63°F	0.21"

n/a = information not available

(Source: UMass Extension 2007 Landscape Message #13, May 29, 2008)

STRAWBERRY

Three Big Foliar Diseases of Strawberry

Bruce Bordelon, Purdue University

1. Fungal leaf spot is caused by *Mycosphaerella fragariae*. This fungus infects leaves, petioles, runners, and even fruit stalks (pedicels), berry caps or calyxes. Small, dark purple to reddish-purple, round spots, 1/8 to 1/4 inch in diameter develop on the upper leaf surfaces (See Fig. 1). As the lesion develops, the center of the spots becomes tan, eventually turning gray or even white, while the margins remain dark purple. Later in the season, dark pepper-like specks appear in older lesions. These black specks are either sclerotia, tiny fungus balls that allow the fungus to survive inclement condition, or perithecia, that contain the sexual spores of the fungus.

Long wet periods (several days) and warm temperatures (over 50°F) favors disease development in the spring and in summer after renovation. During conditions such as these, the fungus can also infect fruit, causing what is called "black seed disease." Berries usually have one or two spots but may more can develop. Fruit does not rot but discolors under the spot; however, there is no decay of an infected berry.

2. Leaf scorch, caused by the fungus, *Diplocarpon earliana*, attacks the above ground portions, including the leaves, petioles, runners, pedicels, and calyxes of strawberry plants. The fungus most frequently infects

strawberry leaves at any stage of development. The symptoms of leaf scorch are very similar to the early stages of leaf spot in that small, dark purple spots develop on upper leaf surfaces. Unlike leaf spot, the leaf spots of leaf scorch remain dark purple, and never develop a dying or dead center. Spots have an irregular outline and may run together, causing the entire leaf to develop a reddish or light purple color. In severe cases, foliage is reduced considerably, and plants may be stunted. Round to angular dark-purple spots, up to about 1/4 inch in diameter, are scattered over the upper leaf surface. As the spots gradually enlarge, they resemble small drops of tar due to the production of large numbers of minute, black, fungal fruiting bodies called acervuli. Fruit may become infected, as well. Infected fruit has elongated, slightly sunken, reddish areas or streaks; these lesions usually disappear as the fruit ripens.

3. Leaf blight, or Phomopsis leaf blight is caused by the fungus *Phomopsis obscurans*. Although infections are occurring now, symptoms often do not become visible until after harvest. The disease can weaken strawberry plants through the destruction of older foliage. Weakened plants can result in reduced yields the following year. Phomopsis leaf blight symptoms begin as circular spots that also appear similar to leaf spot disease of strawberry. However, as the disease progresses, irregular, zoned lesions may form. In later stages of disease development, lesions, especially ones

along veins, may become V-shaped, with the widest part of the V toward the margin of the leaflet. These V-shaped lesions are characteristic of the disease.

Managing Leaf Spot, Leaf Scorch and Leaf Blight

Begin planting by choosing disease resistant cultivars. Cornell University Tree Fruit and Berry Pathology web site provides a comprehensive list of commonly used strawberry cultivars, and their known disease susceptibility and resistances. This table can be found at:

<http://www.nysaes.cornell.edu/pp/extension/tfabp/factshs/smallfr/stbapx.html>

It is important to note that due to the presence of different races of the pathogens, strawberry cultivars rated as resistant in one location may be susceptible in another.

After choosing your cultivars, purchase certified, disease-free plants from a reputable nursery. Plants should be planted in full sun in well-drained soil with good air circulation. Reduce competition and increase air circulation by properly spacing plants and preventing weed growth by cultural or chemical methods.

Limit nitrogen fertilizer applications to renovation time after harvest. Nitrogen fertilizer increases tender, susceptible leaf growth, encouraging disease.

Problem	Material	Rate/Acre	Comments
Leaf spot, Leaf blight, Leaf scorch	Nova 40WP	2.5-5oz	Nova is very effective for control of Phomopsis leaf blight. Leaf spot is also listed on the label.
	Abound 2.08F	6.2-15.4 fl oz	A strobilurin fungicide with good to excellent broad-spectrum activity against leaf spots and fruit rots.
	Cabrio 20EG	14 oz	This strobilurin fungicide is a very broad-spectrum and has excellent activity against leaf spots and fruit rots.
	Pristine 38WG	18.5-23 oz	This fungicide is very broad-spectrum and has excellent activity against leaf spots and fruit rots.

Follow a fungicide spray schedule recommended for the control of leaf diseases and fruit rots. See the Midwest Commercial Small Fruit and Grape Spray Guide at <http://www.hort.purdue.edu/hort/ext/sfg/>

Cuprofix Disperss at 2.5 to 5 lb/A. 24-hr reentry.
Kocide DF at 2 to 3 lb/A. 24-hr reentry.
Nu-Cop 50 DF at 2 to 3 lb/A. 24-hr reentry.

The above chemicals should be rotated with either:
Captan 80 WDG at 1.9 to 3.75 lb/A. May be applied up to the day of harvest.
 OR
 Fixed copper. Monitor plants and discontinue if signs of phytotoxicity appear.
Champ Formula 2 at 1.3 to 2 pints/A. 24-hr reentry.

Remember, fungicides are a tool to prevent serious disease from occurring in the first place. In plantings with severe disease incidence, destroy (mow, rake, and burn) all diseased strawberry debris at renovation time immediately after harvest. (*Source: Facts for Fancy Fruit, Volume 8, Issue 4, May 2008*)

Insect and Mite Management on Strawberries

Greg Loeb, Cornell University

During the prebloom period the **strawberry bud weevil (clipper)** is the main arthropod pest to watch out for. Clipper often is a more severe problem along borders of plantings, near woods. The adults emerge from their overwintering sites (woods or weedy strawberry fields) when temperatures reach 60°F and migrate to strawberry fields to feed on strawberry pollen by puncturing the unopen flower. In recent years we have learned that many strawberry cultivars, such as

Jewel and Seneca, can tolerate a fair amount of bud loss from this pest without reducing yield, although at sufficient densities, it can still be a problem. As a rough rule of thumb, treat for clipper when you observe more than one clipped primary or secondary flower bud or more than 2 tertiary buds per truss, on more than one truss per foot of row. **Note that once flowers are open they are no longer at risk from clipper.** Lorsban (chlorpyrifos), Brigade (bifenthrin),

and Danitol (fenpropathin) are labeled for clipper in New York.

Also during the prebloom period (and extending through harvest and sometimes after renovation) **two-spotted spider mite** can be a problem in some plantings. Look for whitish or yellowish stippling on leaves. Current threshold is 5 mites per leaf or about 25% of leaflets have at least 1 mite. This is likely a conservative threshold for a healthy planting meaning they probably can handle higher densities of mites without causing economic damage. There are several compounds labeled for mites on strawberries in New York: Kelthane [dicofol], Vendex [hexakis], Agri-mek [abamectin], Savey [hexthiazox], Acramite, Zeal Miticide 1, Kanemite, Danitol [fenpropathrin] and Brigade. Acramite is only labeled for nonbearing plantings. Kelthane, Danitol and Brigade are hard on predatory mites. Agri-mek label calls for 2 applications, 2 weeks apart. Note that Kelthane has a status of registered – discontinued which means that it is not being shipped or sold in NY but stock on hand can be used until the registration has lapsed. This is scheduled to occur at the end of 2008. **For all these materials, coverage is very important, especially on the underside of leaves.**

Tarnished plant bug (TPB) is the key insect pest of strawberries during bloom to near harvest. Both adult bugs and the nymphs cause injury (deformed fruit) but nymphs are probably of the greatest concern for June-bearing cultivars. The economic threshold is half a nymph per flower cluster (you sample by tapping cluster over a white plate and counting nymphs that fall off). It is worth sampling for this pest on a regular basis since it varies in population size from place to place and from one year to the next. Early-season varieties may escape major damage from nymphs. Also, our research indicates that very productive cultivars appear to experience less significant injury from TPB. Insecticides labeled for control of TPB in strawberries in NY include malathion, Brigade, Danitol, and Prynone [pyrethrin]. Spraying a pesticide when nymph counts are below threshold costs you money and can kill beneficial arthropods unnecessarily. **Good weed management can help reduce problems with TPB.**

Cyclamen mite is a potentially serious pest that seems to cause problems some years and then not be very noticeable in others. The mites get active in the spring with populations peaking after bloom. The mites like to feed on young leaf tissue (just as the leaves are unfolding). The mites themselves are difficult to see without a good hand lens. Look at the base of the mid-vein, top side of leaf, for a very young leaflet. Cyclamen-damaged leaves tend to be stunted and crinkled. Thionex [endosulfan] is labeled for use against cyclamen mites. Use lots of water for thorough coverage. Treatment should be carried out either

prebloom or during bed renovation where it is easier to achieve coverage of the crown leaves.

Strawberry sap beetle (SSB). This small, brownish beetle seems to be increasing as a pest in New York strawberries. Both the adult beetles and the larvae feed on ripe and overripe fruit. The larvae are the most worrisome since infested fruit can be picked and sold. We still are exploring the best ways to control SSB. Sanitation in the strawberry field and other fruit crops such as peaches and cherries may help keep populations down. Two pyrethroids are labeled in New York for its control: Dantitol and Brigade. Both pyrethroids are effective under controlled laboratory conditions but their efficacy in the field is spotty. Note that Brigade does not have a preharvest interval while for Danitol it is 2 days. However, Brigade is more expensive. For both materials, good coverage is likely to be important for its control. **Note that SSB does not move into strawberry fields from their overwintering sites until fruit begins to ripen.**

Spittlebug starts appearing on leaves, stems, and flowering racemes about bloom time and extending into harvest. They overwinter as eggs in the soil and hatch out as temperatures rise in the spring. The nymphs crawl up the plant and begin feeding on the xylem tissue (the water conducting vessels of the plant). There are not a lot of nutrients in xylem and therefore nymphs need to process a lot of sap, extracting the few nutrients out for their use and excreting the remaining water. This water is frothed into white spittle, which helps protect the nymphs from desiccation and natural enemies. You can often find several nymphs within a spittle mass. Feeding by spittlebugs, if extensive, can stunt plants and reduce berry size. Perhaps more importantly, the spittle masses are a nuisance to pickers. Threshold for spittle bug masses is 1 mass per foot row. Thionex, Provado, Brigade and Danitol are labeled for use against spittlebugs. **Weedy fields tend to have more problems with spittlebugs.**

Root weevil (there are several species) is the last strawberry pest I want to discuss in this issue. The larvae feed on roots and crowns and when abundant can cause serious damage to plantings. Beds with heavy infestations show distinct patches or spots that appear stunted and have reduced yields. Drought stress aggravates the injury from larval feeding. Chemical control (Brigade) is targeted at the adults that emerge in mid- to late June. Look for characteristic adult feeding damage on leaves (notching from the edge) to help determine timing. Note that the adults are active at night rather than the day time. The adults feed for a few days before starting to lay eggs. Some growers have also had success controlling root weevil larvae using parasitic nematodes. These can be applied either in the spring (late April and early May) and/or in the fall. Use sufficient water to get good penetration. **Rotation out of strawberries is the best remedy for root weevils.** They are wingless and do not move a great distance. However, new plantings should be placed 50 meters or more from an infested

planting. (*Source: New York Berry News, Vol. 7, No. 5, May 2008*)

How To Monitor for Clipper Weevil in Strawberries

Pam Fisher, Ontario Ministry of Agriculture and Food

How to Monitor for Clipper Weevil

In a field 5 acres in size or less:

- 1) Check 5 locations near the edge of the field, near sheltered areas, woods or bush.
- 2) Mark a 2 ft square.
- 3) Check all the buds on all the plants in that section.

How to Evaluate Damage

There are two ways to evaluate damage:

- 1) Count the number of buds which have been clipped. If the average is 13 or more clipped buds per 2 foot square, then control is recommended.
- 2) Look at the whole flower cluster, rather than individual buds. Decide if the cluster is highly damaged by clipper or not. A cluster is highly damaged if:
 - the primary bud has been clipped
 - two or more secondary buds have been clipped
 - three or more tertiary buds have been clipped

Use a threshold of 3 or more highly damaged clusters per 2 foot square.

Other Monitoring Tips

Other monitoring tips:

- 1 Holes in petals or base of the bloom indicate clipper weevil adults have been feeding on pollen. Expect to see injury shortly.

- 2 Clipper weevil adults are most active when temperatures, especially nighttime temperatures, exceed 16°C.
- 3 Clipped buds, which appear brown or dry, have been clipped for a few days or more. Clipped buds, which are green or fresh looking, indicate more recent injury.
- 4 Clipped buds often fall to the ground, leaving a stem with a black stubby end. Don't forget to include these in your count.
- 5 Clippers do not clip buds in bloom. Monitor twice a week until tertiary buds open.

(*Source: Ontario Berry Bulletin for May 11, 2006*)



Figure 1. Monitoring for strawberry clipper weevil in strawberry plants.

RASPBERRY

Monitor for Orange Rust in Brambles

Annemiek Schilder, Michigan State University

This is a good time to check blackberry and black raspberry plantings for orange rust. Red raspberries are immune.



Orange rust symptoms on the underside of a black raspberry leaf.

Characteristic symptoms are spindly shoots with clustered, misshapen, pale green to yellowish leaves, as well as bright orange, powdery blisters on the undersides of leaves. Before the blisters burst open, they look waxy or shiny, as if covered with lacquer. On black raspberries, the rusted

leaves start to wither and drop in late spring to early summer. New leaves produced towards the tips of canes may appear normal, giving the impression that the plant has “grown out” of the disease. However, such canes will remain infected and will produce a mass of spindly shoots with no blossoms the following spring. The plant becomes systemically infected and remains so for the rest of its life. Orange rust does not usually kill plants, but it can significantly reduce vegetative growth and yield. The disease can be caused by either of two closely related fungi, *Arthuriomyces peckianus* or *Gymnoconia nitens*. The orange spores are spread by wind and can infect leaves of healthy plants with long periods of leaf wetness provided by rain or dew. Orange rust is favored by relatively low temperatures (50-70°F). The fungus overwinters in the crown and roots of infected plants, leading to the production of new infected canes every year.

Cultural control

While there were no chemical control options for this disease in the past, we now have several excellent fungicide options. This does not mean that we should abandon cultural practices, such as establishing new plantings from disease-free nursery stock, which will also help in avoiding virus diseases. If any plants show signs of the disease during the spring in which they were planted, this means there were already infected at the time of planting. Upon inspection of plants each spring, any infected plants, which are economically worthless, should be dug up and destroyed promptly before rust pustules mature and spores are liberated. The location of those plants should be clearly marked, and any new suckers arising from root pieces left in the ground should be removed and sprayed with an approved systemic herbicide. It is also prudent to remove infected wild brambles in nearby wooded areas and fence rows. Management practices that improve air circulation, such as thinning out canes within the row, pruning out floricanes immediately after harvest, and effective weed control aid in disease control by reducing build-up of moisture in the planting. Some blackberry cultivars (e.g., Eldorado, Raven, and Ebony King) are reported to be resistant to orange rust, but no black raspberry cultivars are known to be resistant.

Fungicide options

The best fungicide options are Nova (myclobutanol), Pristine (pyraclostrobin + boscalid), and Cabrio (pyraclostrobin). While Abound (azoxystrobin) is labeled for use on brambles, it does not have orange rust (or any other rust for that matter) on the label. Nova may have a bit better curative activity than the others because of its greater systemicity, which would make it the material of choice during or after a rainy period with inoculum already being present. Each of the earlier-mentioned fungicides will also control various other cane, leaf, and fruit diseases. Since Pristine has two active ingredients, it has the broadest spectrum of activity. None of these fungicides will cure an already infected plant. However, they can prevent healthy plants from becoming infected. Since infected plants will continue to be sources of inoculum over their lifetime, it is best to remove and destroy them altogether and replace them with healthy plant material from a reputable nursery. Apply fungicides upon first discovery of the blisters, preferably before they burst open and release spores. If the field has a history of the disease, sprays should be initiated before blisters appear. Since infections can also originate from wild brambles near the field, one should keep an eye on these as well if possible. (*Source: Michigan Fruit Crop Advisory Team Alert, Vol. 23, No. 8, May 27, 2008*)

BLUEBERRY

Fruitworm Management in Blueberries

John Wise and Rufus Isaacs, Michigan State University

Pheromone traps should already be out in Michigan blueberry fields for monitoring of adult cherry fruitworm (CFW) and cranberry fruitworm (CBFW). CFW flight is well underway in most areas of southwest Michigan and yesterday, May 14, we received the first report of CFW larvae entering fruit in a Bluejay field. We have also trapped the first CBFW moths in the past few days, one in Grand Junction, and one in Fennville. These were only single moths, but this does indicate the fruitworm management season is upon us. Once a consistent number of moths of either species is caught in monitoring traps and blueberries reach the early fruit set stage (as some of the earliest varieties are now doing), these fields should be considered for protection against fruitworm larvae. Scouting for the presence of fruitworm eggs on fruit is the best way to determine when control actions should begin.

Growers typically can manage both fruitworm pests together, but in recent years when there has been a cool period during blueberry bloom, the timing of CBFW and CFW have not overlapped. Instead, the earlier cherry fruitworm went unnoticed and the larvae were already inside fruit when CBFW control programs started. Monitoring for both insects in hotspots on the farm is a good idea, especially in early varieties where it is more likely that CFW infested fruit could be harvested.

There is an array of insecticides available for control of fruitworms, but their performance characteristics are not all the same, and only some of them can be used during bloom. It is important to refrain from using compounds that are toxic to pollinators when these insects are in your fields. Two products registered for use during bloom or in the presence of pollinators have provided consistent control of fruitworms in trials at the Trevor Nichols Research Complex and in grower fields. These are the *B.t.* products such as Dipel® and Javelin®, and the insect growth regulator Confirm®. These products must be consumed by fruitworm larvae to be effective, so they are best applied over the top of fruitworm eggs, so they are eaten as the larvae emerge. *B.t.* products have short residual activity, typically around five days, so are best applied when daily temperatures reach 70°F. Confirm is more resistant to breakdown, giving between seven and 14 days activity, and it is quite rainfast, which can be a useful property in Michigan spring weather. Another option for control of cranberry fruitworm, is the growth regulator Esteem®. This insecticide disrupts the adult moth's ability to make eggs and disrupts hatching of eggs and molting of larvae. Because of its activity, it is most effective when applied just before egg-laying, so timing is critical. When thinking about application timing during bloom, getting the most out of your insecticides will require close scouting of fields with high fruitworm pressure. As with all fruitworm control applications, excellent coverage of fruit clusters is required

to ensure that eggs or larvae come in contact with the insecticide.

natural enemies such as parasitic wasps, ladybeetles and lacewings. Correct timing and coverage are critically important, so regular scouting of fields, use of sufficient

Table 1. Details of insecticide options and timing for fruitworm control in blueberry				
Compound trade name	Chemical class	Life-stage activity	Optimal spray timing	Pollinator/Parasitoid Toxicity rating *
Guthion/Imidan	Organophosphate	Eggs, Larvae, Adults	100% Petal Fall	H
Lannate/Sevin	Carbamate	Eggs, Larvae, Adults	100% Petal Fall	H
Asana/Danitol	Pyrethroid	Eggs, Larvae, Adults	100% Petal Fall	H
SpinTor/Entrust	Naturalyte	Eggs, Larvae	Early fruit set over/under eggs	M
Dipel	<i>B.t.</i>	Larvae	Early fruit set over eggs	S
Confirm	Growth regulator	Eggs, Larvae	Early fruit set over eggs	S
Esteem	Growth regulator	Eggs, Larvae	Early fruit set under eggs	S

* Pollinator/Parasitoid Toxicity rating; S – relatively safe, M – moderate toxicity, H – Highly Toxic

After 100 percent petal fall, the range of options for fruitworm control increases, with Guthion®, Imidan®, Asana®, Danitol®, Lannate® and Sevin® being the most effective of the broad-spectrum insecticides available. With all these products, maintaining good coverage is still important to get residue to the parts of the berry, where fruitworms are found. Recent research trials in Michigan, have demonstrated that Confirm® and SpinTor™ applied after petal fall to fields with low or moderate fruitworm pressure can also achieve control of fruitworms, with minimal negative impact on

spray volume to get good fruit coverage and selecting appropriate spreader-stickers can increase activity of most insecticides applied for fruitworm control.

The table and figure are designed to summarize several key factors that can help you select an insecticide for your integrated pest management program for fruitworm control in blueberries.

(Source: Michigan Fruit Crop Advisory Team Alert, Vol. 22, No. 6, May 15, 2007)

GRAPE

Prebloom Foliar Nutrient Sprays

Alice Wise, Cornell Cooperative Extension of Suffolk County

There are some prebloom sprays useful in certain situations. Given the cost of fertilizers and fuel, it is important to think through the need for any material. Visual verification as well as petiole and soil analysis can be helpful in diagnosis of deficiencies. Nitrogen and boron are often applied annually at low rates, with manganese and zinc applied on an as needed basis.

Nitrogen – Long term nitrogen needs of vines, particularly in sandy soils, can be addressed in whole or in part by improving soil organic matter. Otherwise, N fertilization is best addressed via ground application whether using a dry product or dripping in liquid N. The benefits of foliar N are

debated, but experience dictates that periodic foliar applications can be of benefit in maintaining a green, photosynthesizing canopy. Some growers feel foliar N helps sluggish early spring growth; others feel the primary benefit is later in the season. There are many different products from which to choose including organic options. Price may dictate what a vineyard can afford to use. At the research vineyard, we use an organic liquid fish hydrolyzate for several foliar N applications during the season. Note also that some phosphorous acid products contain nitrogen.

Zinc - Considered essential for proper cluster development, berry set and normal shoot growth. Deficiency is seen early summer. New leaves are

smaller, distorted and may be chlorotic with darker green veins. Straggly clusters and shot berries may also occur. Soil application of Zn is less effective because Zn can be tightly bound in soil (though past recommendations for our vineyard were soil applications of zinc sulfate). Zinc sulfate, zinc oxide and chelated Zn are used as foliar sprays; follow label for rates and timing. Rely on your soil and petiole analyses to gauge the need for this nutrient.

Boron - Deficiency is seen as stunted zigzag growth and death of shoot tips, poor set with shot berries, often flattened or oblong. Soil treatment is effective since boron (B) moves with the soil water, however this is best applied in the fall or with the spring herbicide. Common boron products include Solubor and Borosol. For foliar sprays, 0.2 lb./a actual B in 1 or 2 prebloom sprays is the standard recommendation. Given shoot growth this spring, it is advisable to go below that rate. And, it is risky to go above it due to the high risk of phytotoxicity. Boron toxicity can easily cause leaf scorching/distortion, typically one or two cupped leaves with very rounded margins with or without

interveinal chlorosis. Where phyto is bad, shoot tips will have tiny, pale leaves on the same shoot. We've seen phyto locally where soil uptake is increased: unevenly spread product, young vines with roots near the surface, older vines with root systems limited by a hardpan, vines at the ends of the row where the tractor slows down. Boron interferes with the dissolving of watersoluble packets used for certain pesticides. When tank mixing, dissolve the packet thoroughly in the spray tank and then add B to the spray mix.

Manganese - Deficiency is seen mid-late summer starting as interveinal chlorosis on basal leaves. A herringbone pattern is characteristic. At soil pH's >6.0, e.g. properly limed soils, Mn availability in the soil is relatively low. Where a deficiency is confirmed by petiole analysis, foliar applications of manganese sulfate (2-3 lbs./100 gal.) are recommended as a corrective measure. Other manganese products used at label rates may also be effective. Foliar manganese oxide materials are considered to be less effective. (*Source: Long Island Fruit & Vegetable Update, No. 12, MAY 30, 2008*)

General

Spring 2008 Disease Update for Berry Crops

Kerik Cox, New York State Ag. Experiment Station

Diseases and Timing

We're in the heart of spring and summer is fast approaching. Most berry crops are either in bloom or on the verge of bloom and we're finally getting a good bit of rain. In Geneva, the spring cold streak hit when most of our blueberries, raspberries, and currants were in cluster to bloom, and things seem to have slowed a little. Now that we're past dormancy, there is no longer a need for delayed dormant applications of copper and sulfur for tip diebacks and canker diseases. As we enter bloom, other diseases can potentially pose threats.

Blueberries: Mummy berry, gray mold, and anthracnose are three major diseases that occur around this time and could require fungicide applications. These diseases need warm rainy weather and don't mandate a fungicide application unless you have them now, or had a severe infection last year. Make sure that you keep an eye out for mummy berries. You should never make a fungicide application if you don't have the disease; however if this disease is present and gets out of control, it's difficult to manage even with the most effective fungicides.

Brambles: Not surprisingly, gray mold and anthracnose are also a bloom threat for Brambles. There is usually

no need to apply fungicides for gray mold, especially if you have covered plantings or if you're planting black raspberries (which are more resistant to the disease). Conversely, make sure to protect young blossoms in red raspberries, especially if you have bloom as recent rain and warming temperatures favor gray mold. For anthracnose, fungicide applications shouldn't be needed unless you have history of the problem. If you have orange rust of black-fruited brambles, don't apply anything. Quickly dig up the infected plants, including all of the roots, and burn them. If orange rust were a human disease rather than a bramble disease, it would definitely mandate the white suited visitors from the CDC during disease outbreaks.

Strawberries: Don't apply fungicides for leaf spot, scorch, and blights unless these diseases really hammered your planting the previous year. The impact of these diseases on the plant's physiology can be questionable. If infections were severe last year, you can make a fungicide application for these diseases, but I'd only recommend one application for these diseases. As with the other small fruit, you can start to have problems with anthracnose and gray mold. If you routinely have these problems, you should consider applying fungicides for bloom infections, particularly if the weather continues to warm and we get more rain. Anthracnose can easily ruin a crop of strawberries

Currants and Gooseberries: Powdery mildew can be a problem during this time on European *Ribes* varieties, but you shouldn't have to apply fungicides for this disease unless you've seen it in plantings the previous year. You can apply fungicides for white pine blister rust during this time frame, but see the sections below about fungicide name changes before making applications. Also, if you have rust resistant currant varieties, you may not need to spray at all. Gooseberry anthracnose leaf spot can be very troublesome to manage as even the "Cadillac" fungicides may fail to provide 100% control in severely infected plantings. This is something that we are investigating in our field research trials on fungicide timing.

New Products and Name Changes: Few new materials were registered for berry diseases in NY in 2007, but there have been name and formulation changes to some products with critical roles in berry crop disease management. Combine name changes with NY's additional state registration requirements and problems can occur.

Rally 40WSP is the replacement product for Nova 40WP and is effectively the same material, just under a new name. Nova 40WP is being discontinued and may not be available by distributors this year. The Rally 40WSP label has most berry diseases covered, but based on my correspondences with the NYSDEC, we will not be able apply Rally 40WSP for white pine blister rust under our 2ee for Nova 40WP.

Indar 2F is the replacement product for *Indar 75WSP*, which just received new supplemental labeling for blueberry diseases. Indar 2F has not been approved by the NYSDEC yet, but our Dow AgroSciences representative indicates that you will still be able to get Indar 75WSP for a little while longer. Interestingly, Dow is now recommending the use of a nonionic surfactant with applications of the Indar 2F. The active ingredient of Indar 2F is the least 'systemic' (to avoid getting too technical) of the chemicals in Indar's fungicide class. The addition of such an adjuvant like Li-700 or X-77 may improve efficacy of an already excellent fungicide.

Orbit has been around for some time as an excellent brown rot fungicide for stone fruit and now is widely labeled on diseases of bush berries and strawberries. It's an effective product in stone fruit and merits use in berries. However, the PIMS database isn't showing the updated label for Orbit. However, Katherine Hetter, environmental chemist in the Pesticide Product

Registration Section at NYSDEC, indicates that the berry use registrations have been approved for NY.

I've placed a copy of the NY Orbit label on my website. [Click here to obtain a copy.](#)

Organic approved and biopesticide products: As a whole these materials are fairly numerous and vary widely in terms of efficacy, formulation, and cost. Successful use of these products to control berry disease relies on a well thought out plan of use. To successfully use biopesticides: ensure optimal timing and complete coverage of the crop by the product, do not use biopesticides on a highly susceptible variety, and use them only in moderate to light disease pressure blocks. Even the most potent conventional fungicides will fail when the odds are stacked against them. Below are some the biopesticide/organic-approved products that I've had success with in field trials in Geneva.

Serenade Max is a formulated bacterium that prevents disease by producing antimicrobial peptides. Serenade is labeled for several berry diseases, and would be a good choice for an organic approved fungicide for late season applications. I have had good results using this product on bushberry rust and anthracnose. On a moderately susceptible red currant, Serenade Max was as effective as conventional fungicides against white pine blister rust.

JMS Organic Stylet Oil is not a biopesticide, but is an environmentally safe minimum-risk, organic-approved fungicide labeled for numerous berry diseases. Its active ingredient is white mineral oil or paraffinic oil. I have had success using this material on powdery mildew, anthracnose, and rust in bushberries. On a seven-day schedule, this material can go "toe-to-toe" with a premium conventional material.

Phosphorous acid products (*Phostrol*, *ProPhyt*, *Agri-fos*, etc) are biopesticides, but not approved for organic agriculture. The active ingredients of these materials consist of various phosphorous acid salts that inhibit pathogens by boosting plant defenses and through direct action via the release of phosphite ions. I've also had success using these on foliar diseases of bushberries and apples, but most of these products are not yet labeled for foliar diseases. They are labeled for controlling *Phytophthora* root disease problems, and for this use, I strongly recommended using them. Their efficacy against the straminopilous root pathogens (*Phytophthora* and *Pythium*) is well documented, and there is little chance for resistance compared to mefanoxam (a conventional material). (*Source: New York Berry News, Vol. 7, No. 5, May 2008*)

Upcoming Meetings:

- May 22, 2008 **Strawberry Cultivation Equipment Demonstration**, Green Acres Fruit Farm, 960 Manitou Rd., Rochester, NY 14612, 3:00 – 4:30 PM. For more information go to <http://www.hort.cornell.edu/extension/commercial/fruit/Berries/calendarpdf/STRAWBERRY%20CULTIVATION%20EQUIPMENT%20DEMONSTRATION.pdf>
- June 3, 2008, **Canopy and Disease Management for Hybrid Wine Grape Varieties**, UMass Cold Spring Orchard Research and Education Center, Belchertown MA. More info at www.newenglandwinegrapes.org or contact Sonia Schloemann at sgs@umext.umass.edu
- June 3, 2008, **On Farm Biodiesel Workshop** - State Line Farm, Shaftsbury VT
9:00-Noon: Hands-On Instruction: Make Your Own Biodiesel
1:00-4:00 pm: Tour the On-Farm Biodiesel Facility and a Mobile Processor
Pre-Registration is Required Registration for the morning session costs \$15 and is *limited to 36 people*. Mail your contact info with a check to 'UVM Extension' 11 University Way, Brattleboro VT 05301, so it arrives no later than May 30. The afternoon session is free but please register by calling Vern Grubinger at 802-257-7967 x13 or email: vernon.grubinger@uvm.edu.
- June 9, 2008 **Berry Grower's Field Meeting** 4 locations in Schoharie/Albany County Area
10:00 am – Bohringers Fruit Farm, 3992 State Rt. 30, Middleburgh, NY 12122. Broad array of berries to look at here, the focus will be on strawberry and raspberry pest management. Weed control options at renovation and in the fall will be discussed.
12:00 pm – Scotch Ridge Berry Farm, 5092 Scotch Ridge Road, Duanesburg, NY 12056. We will be focusing on blueberry pest management at this stop. Learn about how to use insect traps as a way to predict problems with fruit fly and blueberry maggot. A brief discussion of Ribes pest management as well.
3:00 pm - Feura Farm, 210 Onesquethaw Creek Rd., Feura Bush, NY 12067. We will touch on strawberry and raspberry weed and pest management. We will learn how to scout both these berries for pest problems.
5:00 pm - Indian Ladder Farm, 342 Altamont Rd., Altamont, NY 12009. Learn more about pests and diseases of blueberries and brambles. We will also be taking a look at the raspberries grown in a high tunnel. Indian Ladder has strawberries both in and out of a hoop house – some of which are being grown in raised planting trays where nutritional issues are of interest.
There is no cost for this program, but please pre-register by calling 518-885-8995, and let us know where you'll be meeting us. NYS DEC Pesticide Applicator recertification credits will be available. For more info go to: <http://www.hort.cornell.edu/extension/commercial/fruit/Berries/calendarpdf/6908%20Field%20Meeting.pdf>
- June 11, 2008. **New Hampshire Tree Fruit and Berry Twilight Meeting** at Butternut Farm, Meaderboro Rd, Farmington, NH.
5:30 - 8:00 pm. Hosts: Giff and Mae Burnap. For more information, contact George Hamilton at george.hamilton@unh.edu or 603-641-6060.
- July 9, 2008. **New Hampshire Tree Fruit Twilight Meeting**. 5:30 - 8:00 pm. This meeting was scheduled in response to a request made by Tracy Leskey. Dr. Leskey will have research projects going on at both Poverty Lane Orchard (West Lebanon), and Apple Hill Farm (Concord). We will be finalizing which site for the meeting later. Speakers: Dr. Tracy Leskey, Research Entomologist at the USDA-ARS Appalachian Fruit Research Station in Kearneysville, WV and Dr. Starker Wright, Support Scientist at the USDA-ARS Appalachian Fruit Research Station in Kearneysville, WV. For more information, contact George Hamilton at george.hamilton@unh.edu or 603-641-6060.
- June 12, 2008 **Getting Ready for Raspberries: Raspberry Killed Sod Demonstration**, Dan's Berry Farm, 5027 Dubois Rd., Ithaca, NY 14850 More info at: www.hort.cornell.edu/extension/commercial/fruit/Berries/calendarpdf/Raspberry%20killed%20sod%20demonstration.pdf
- Aug. 20-21, 2008 **NASGA Summer Tour** Columbus, Ohio. See <http://www.nasga.org/> 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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